THE PHYSIOLOGY OF ADDICTION

Effects of Drug-Taking Behavior on the Brain

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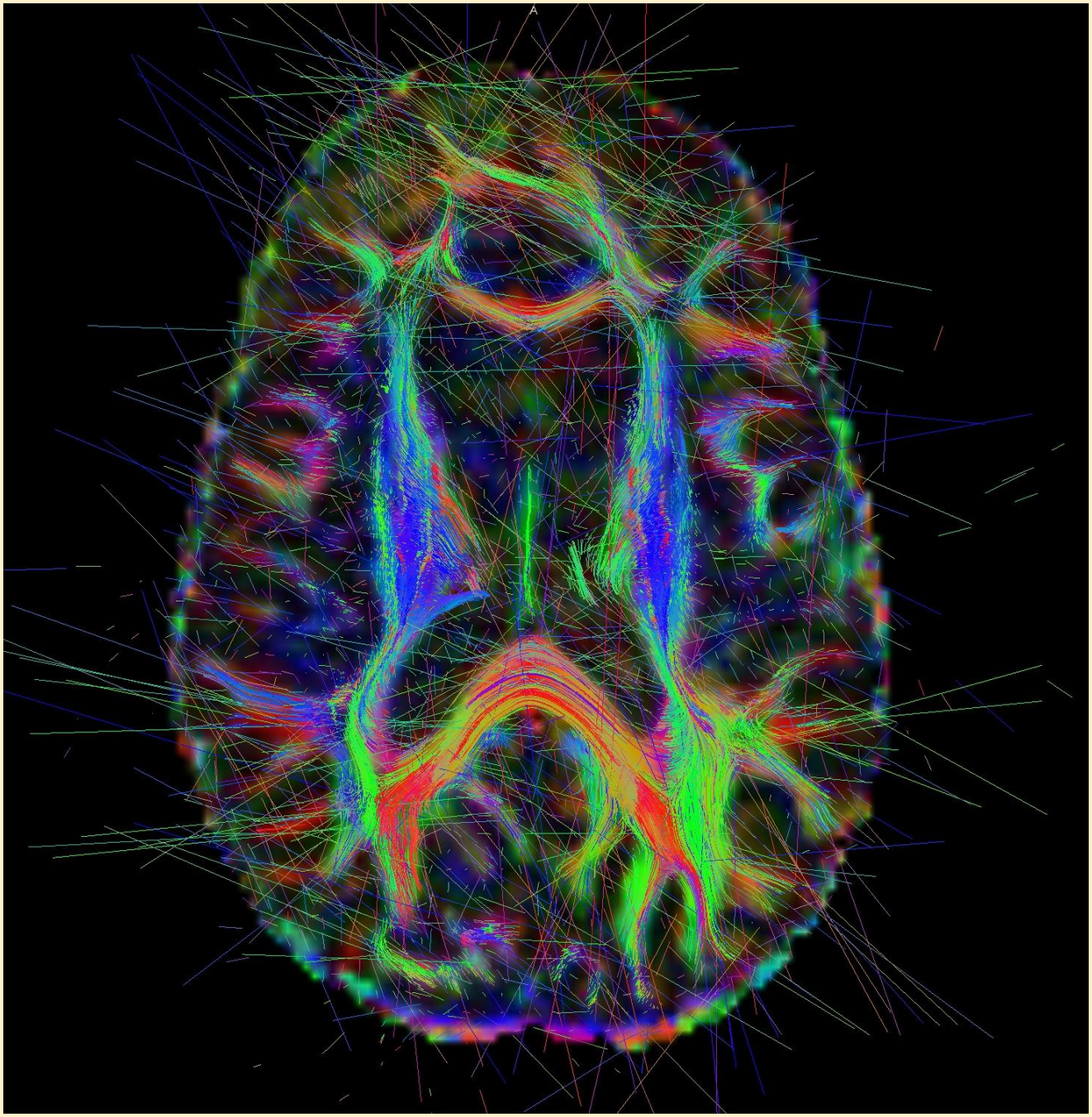
Chair, Department of Medicine, Baystate – Franklin Medical Center
Co-Chair – Healthcare Solutions of the Opioid Taskforce

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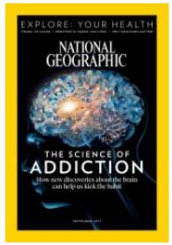


September 2017

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.

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

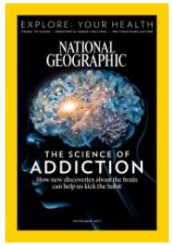
Orbitofrontal cortex
This hot spot gives a sense of gratification but is also the first to shut down if a person has indulged too much.

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

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

PLEASURE HOT SPOTS

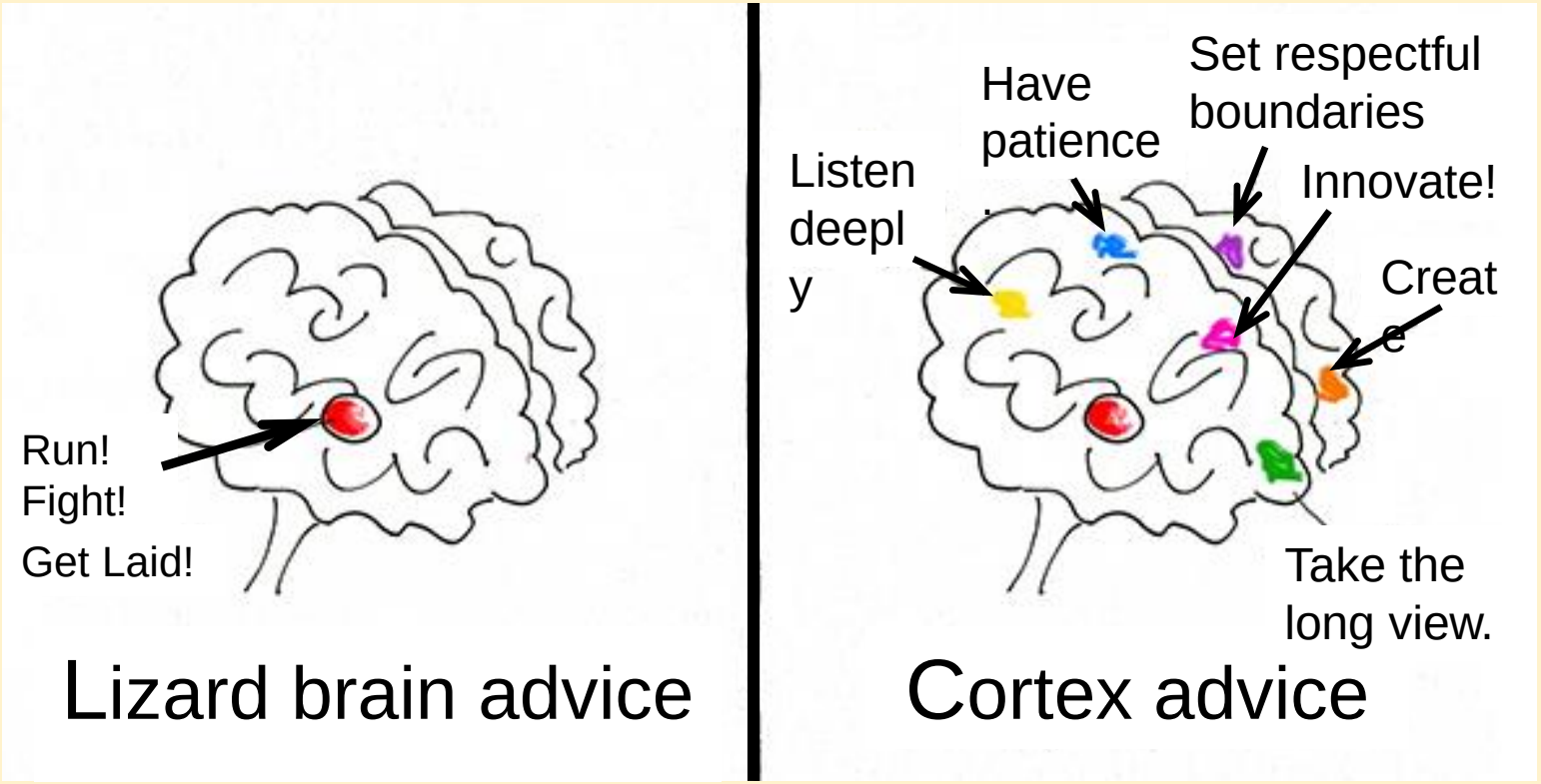
A system of small hedonic hot spots, unrelated to dopamine, provides temporary sensations of pleasure and forms a feedback loop with the reward system that controls desire.



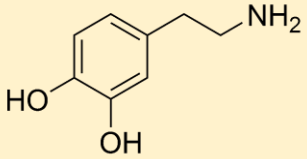
September 2017

EAT, DRINK, HAVE SEX

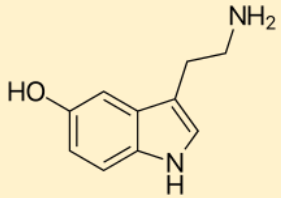
(AND USE DRUGS)

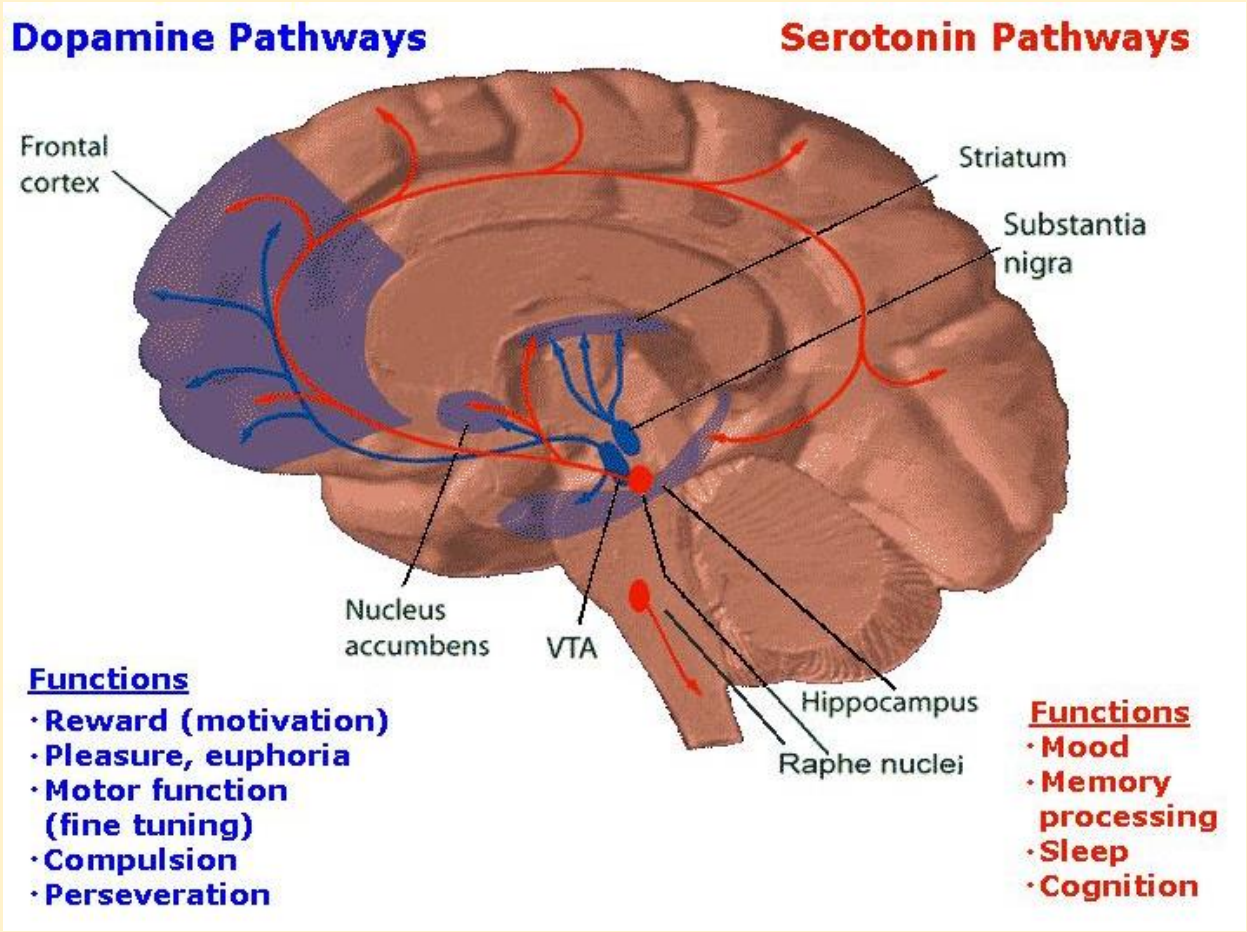


DOPAMINE & SEROTONIN

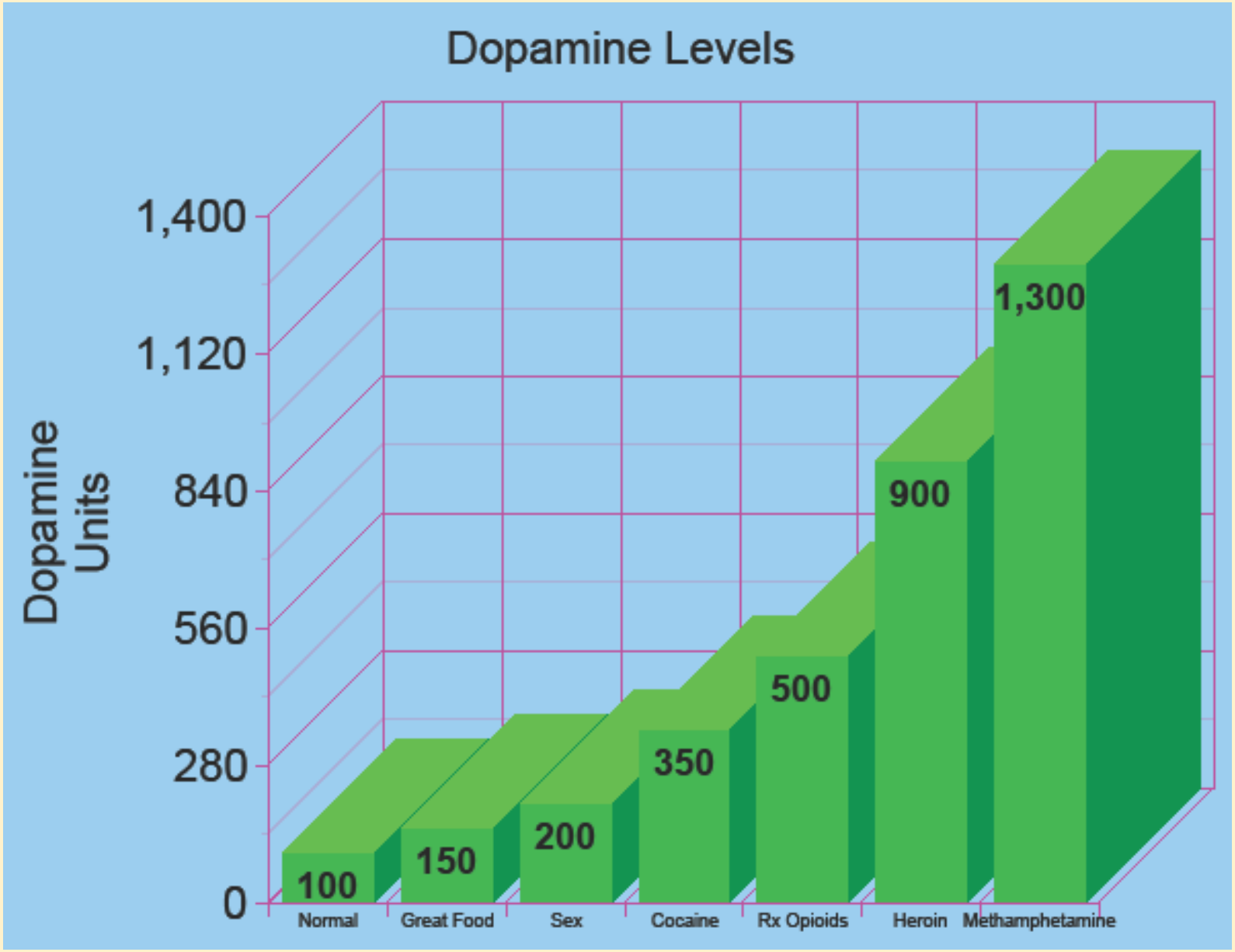


Location and Function

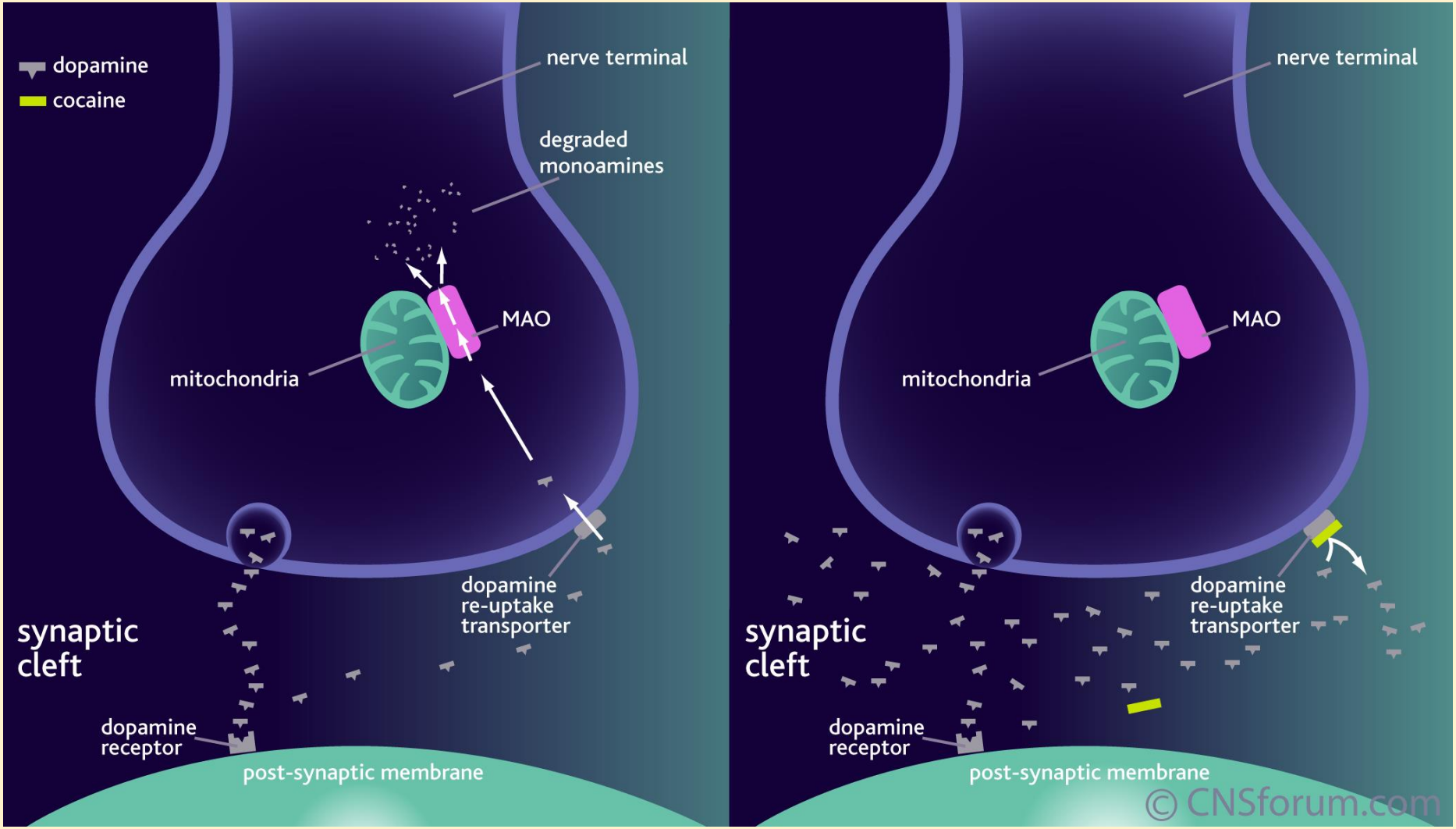




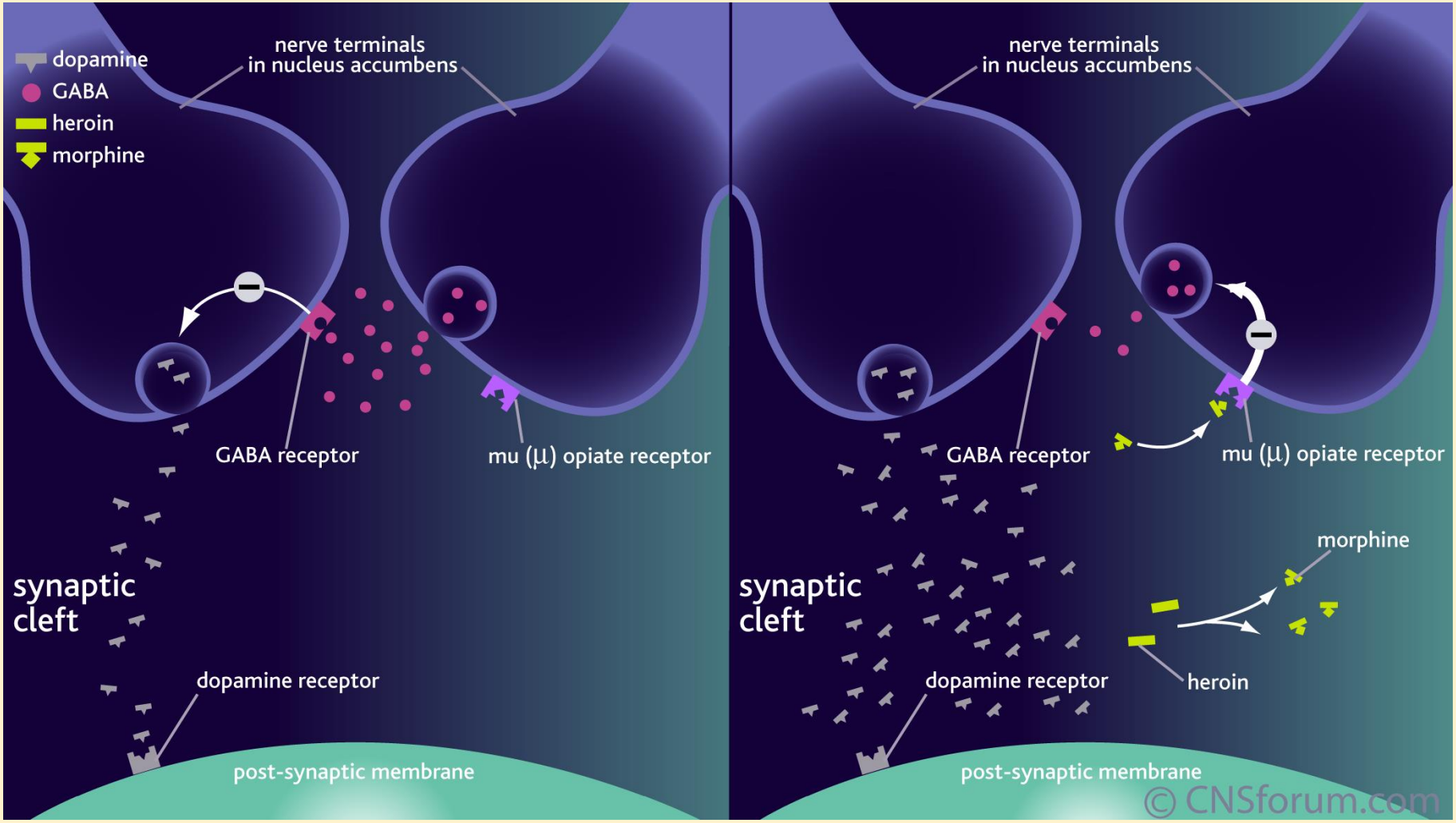
IT IS SAD
TODAY.
GJO
5-05

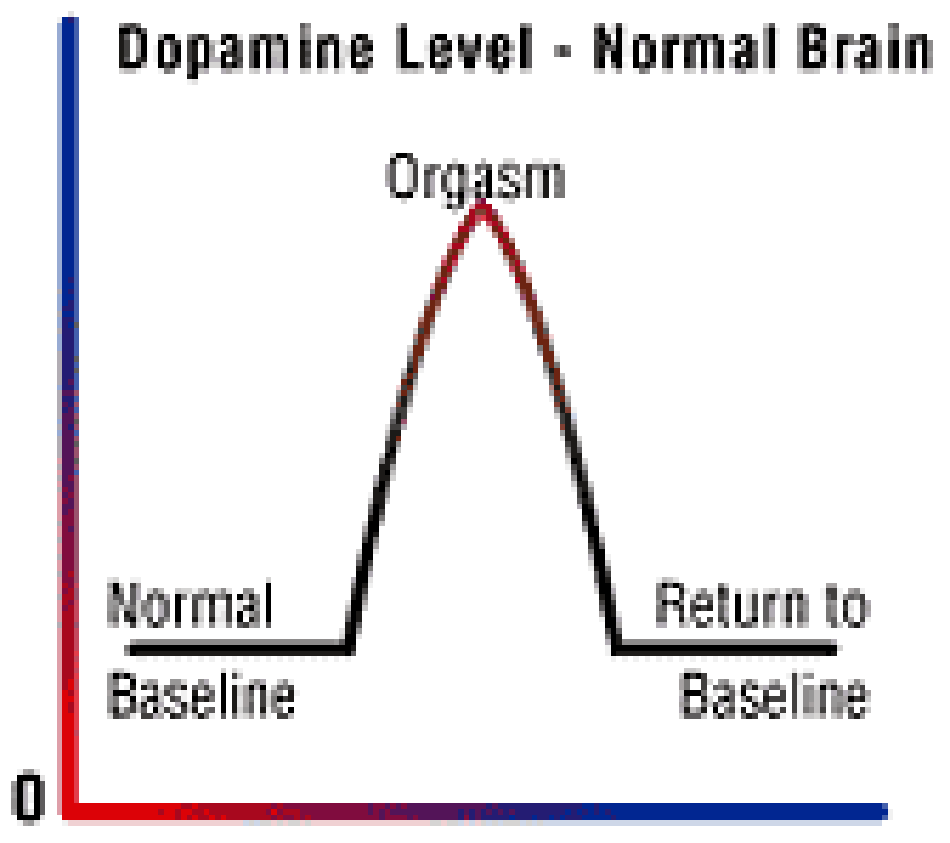

Dopamine Levels
Dopamine Units
1,400
1,120
840
560
280
0
100
150
200
350
500
900
1,300
Normal
Great Food
Sex
Cocaine
Rx Opioids
Heroin
Methamphetamine

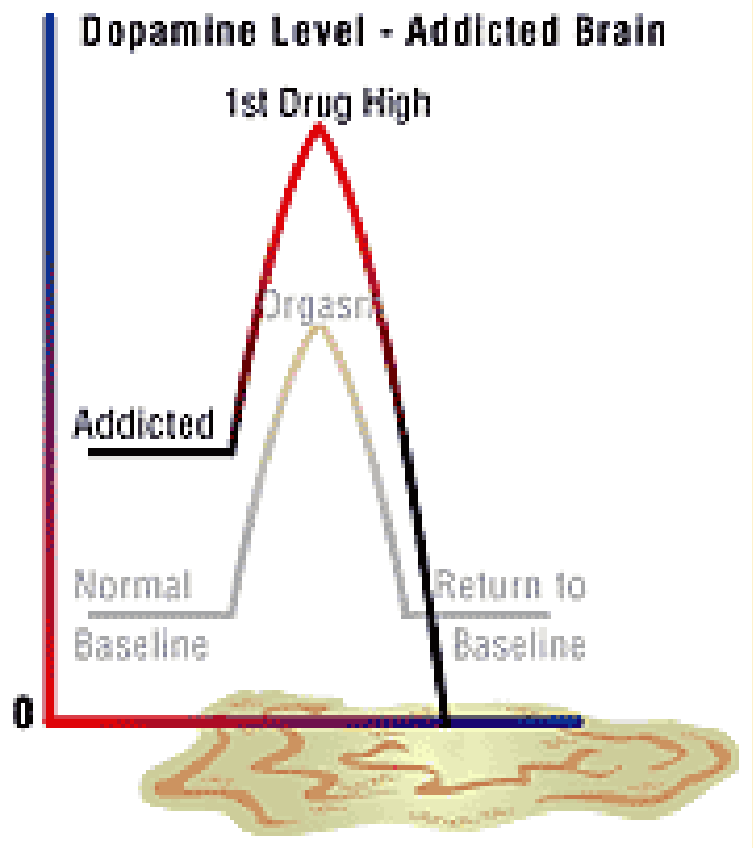
How Cocaine Works

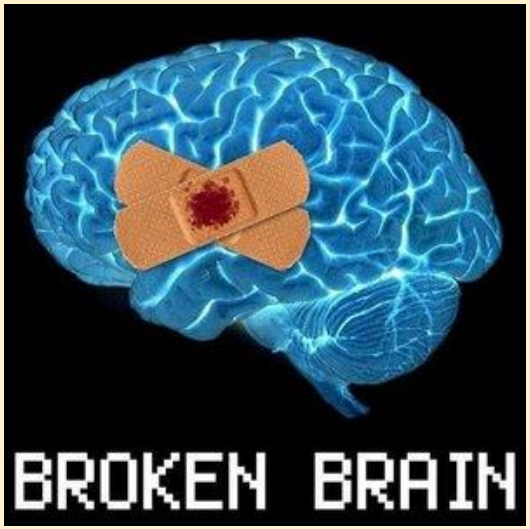


How Heroin Works



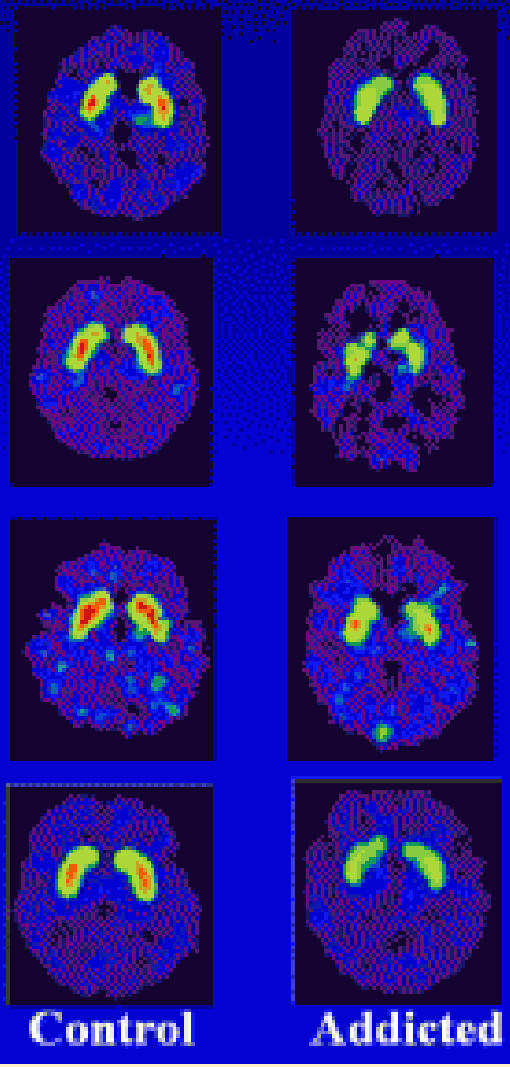

Dopamine Level - Normal Brain
Orgasm
Normal
Baseline
Return to
Baseline
0

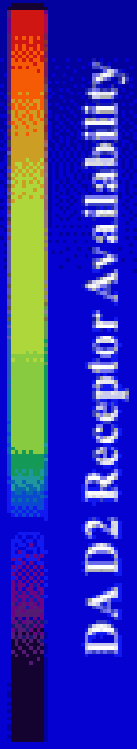

Dopamine Level - Addicted Brain
1st Drug High
Orgasm
Addicted
Normal
Baseline
Return to
Baseline
0

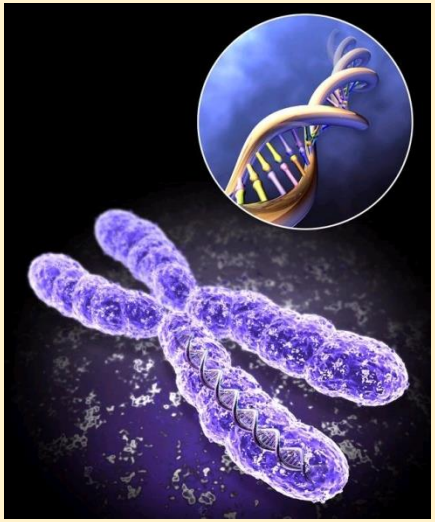

BROKEN BRAIN

Functionally…

Dopamine D2 Receptors are Decreased by Addiction







Genetics

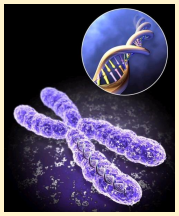
+

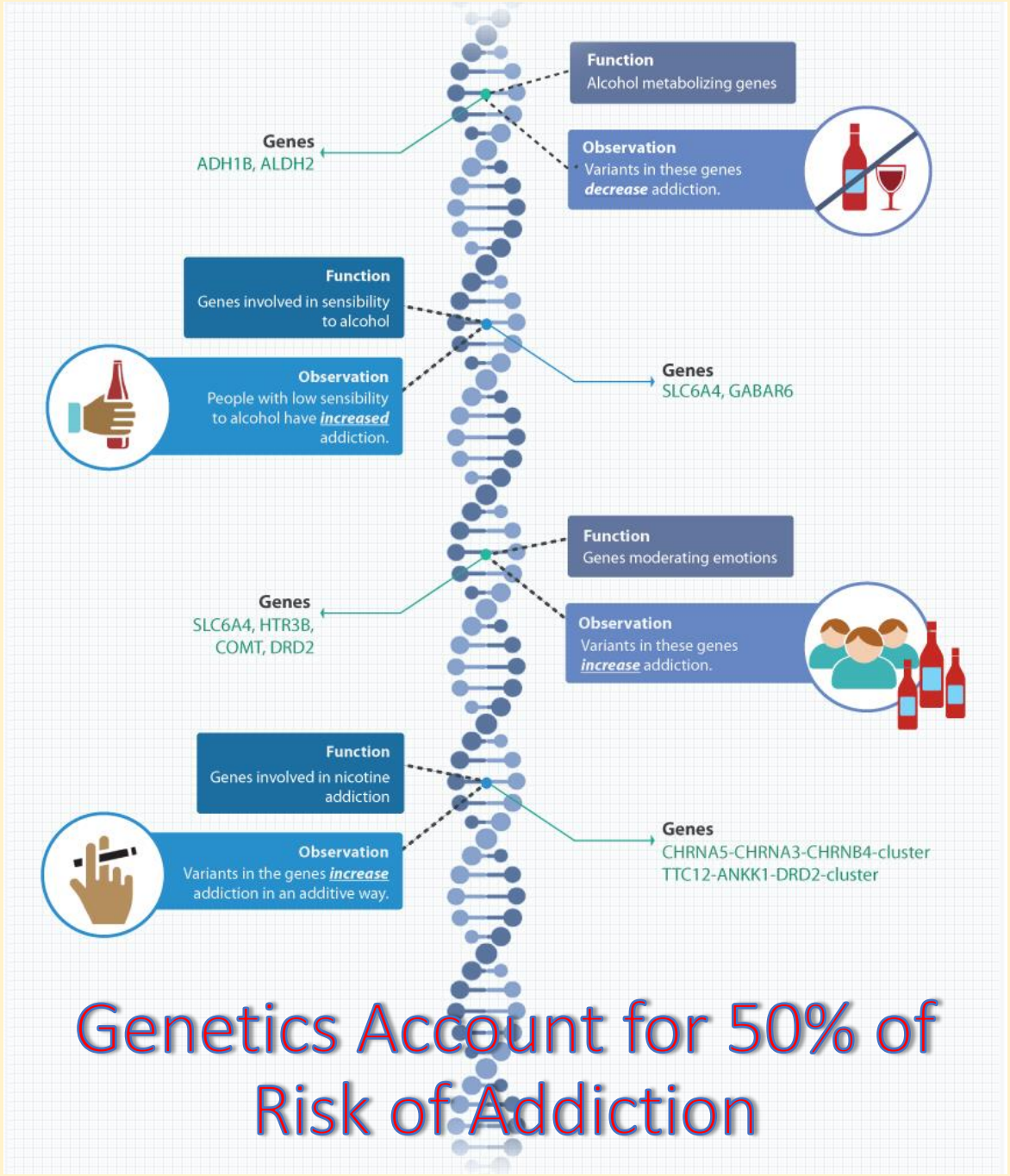
Early Use

+

Trauma

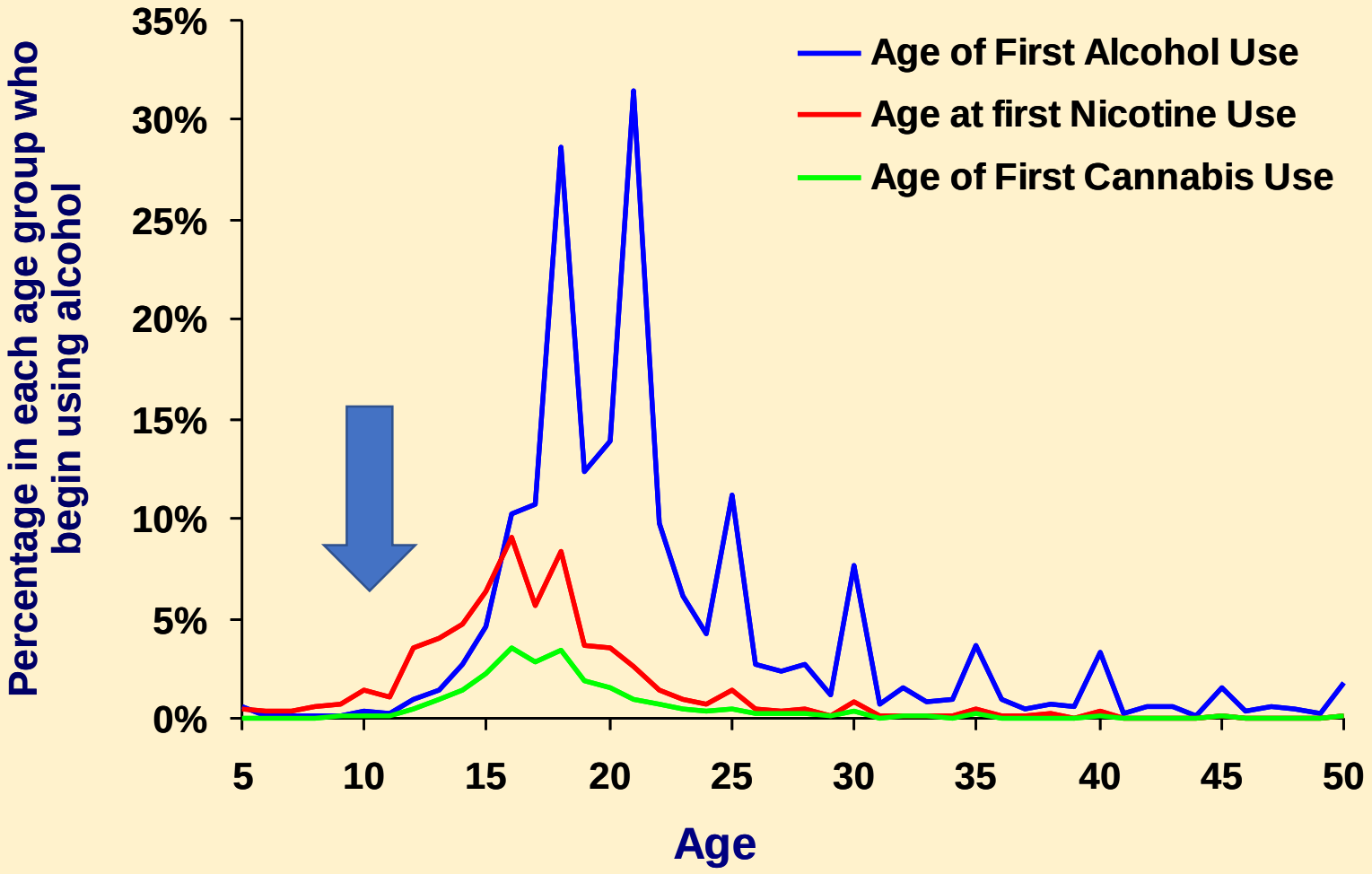
Poor Mental Health





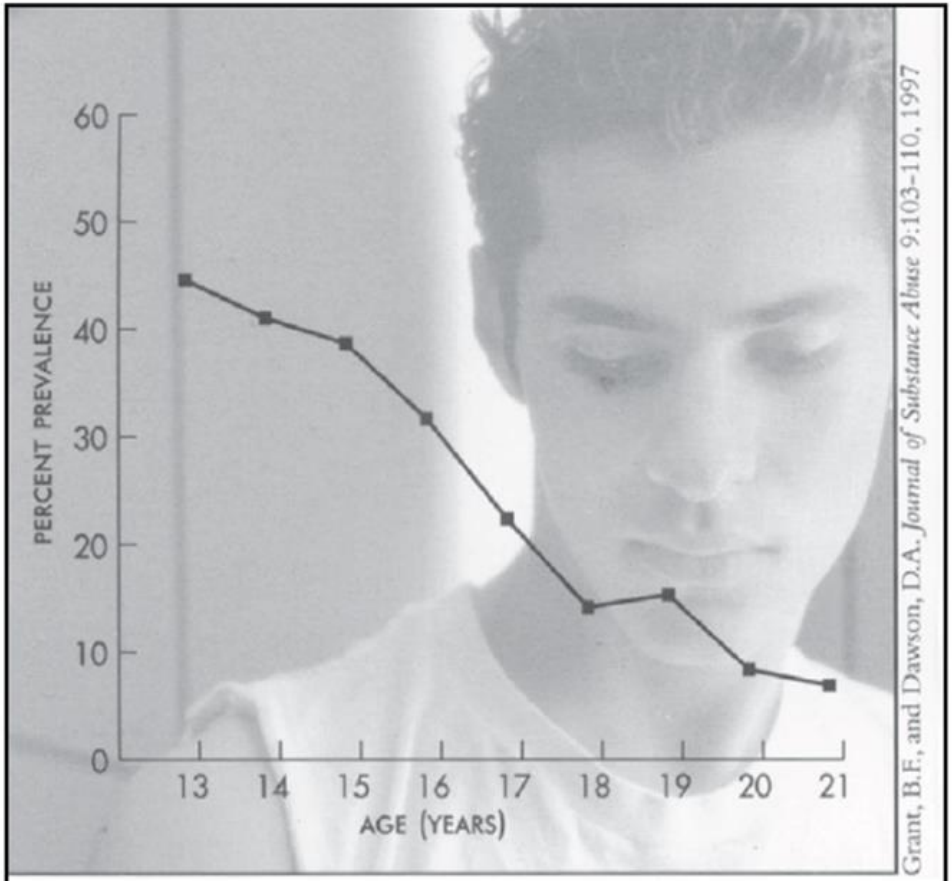
Genetics Account for 50% of Risk of Addiction

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

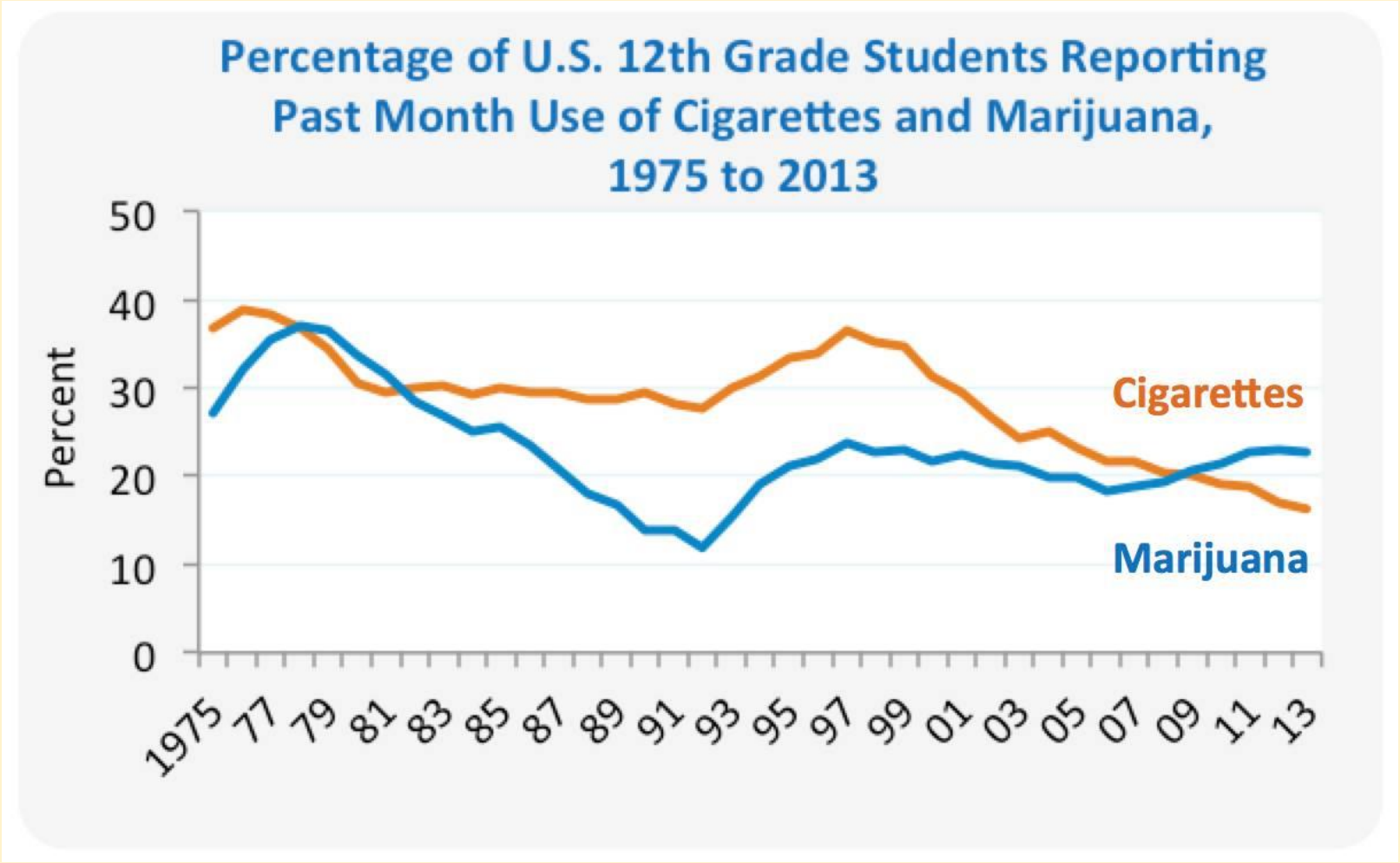


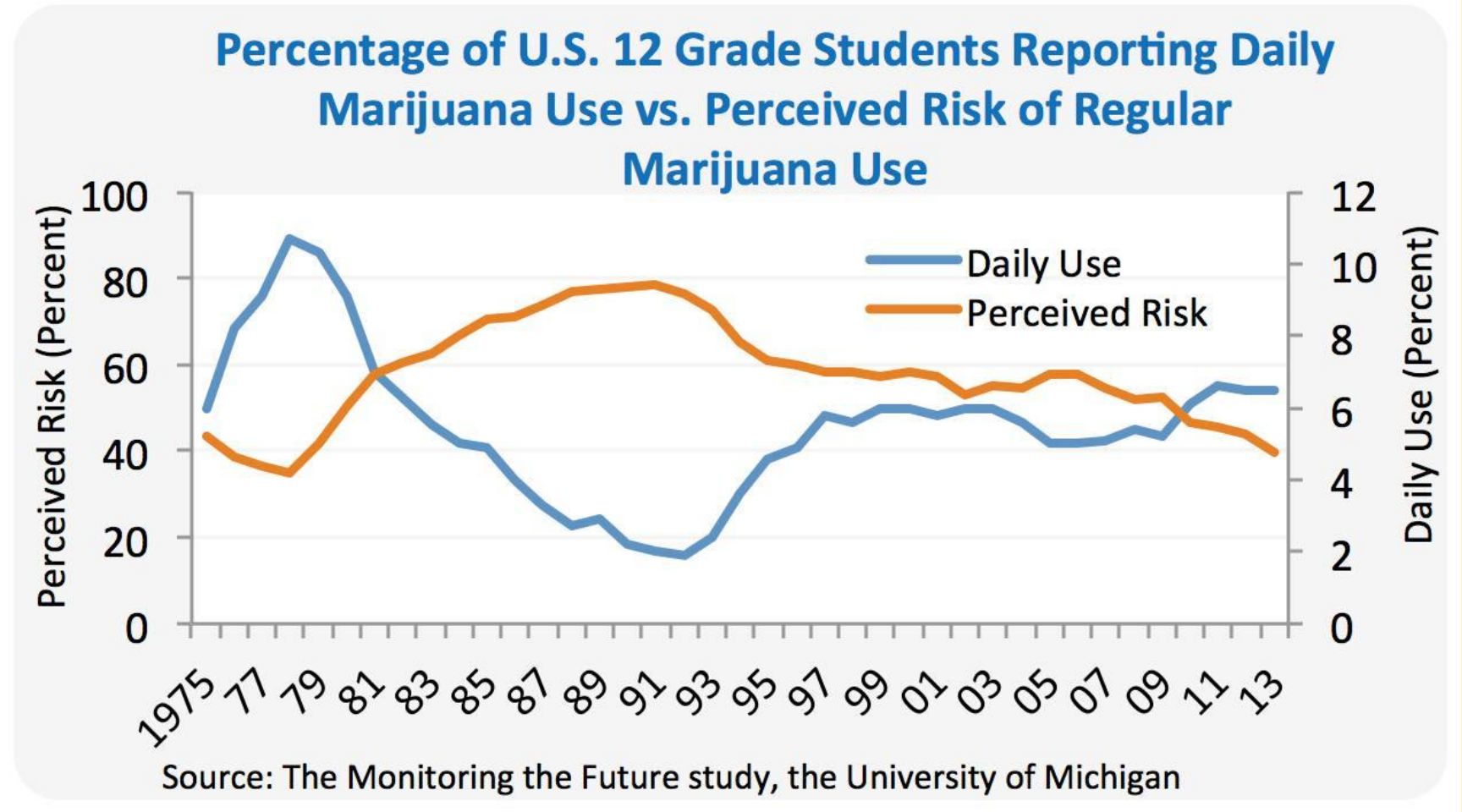
Grant, BF and Dawson, DA. Journal of Substance Abuse 9:103-110. 1997

* Photo courtesy of NIAAA and MADD

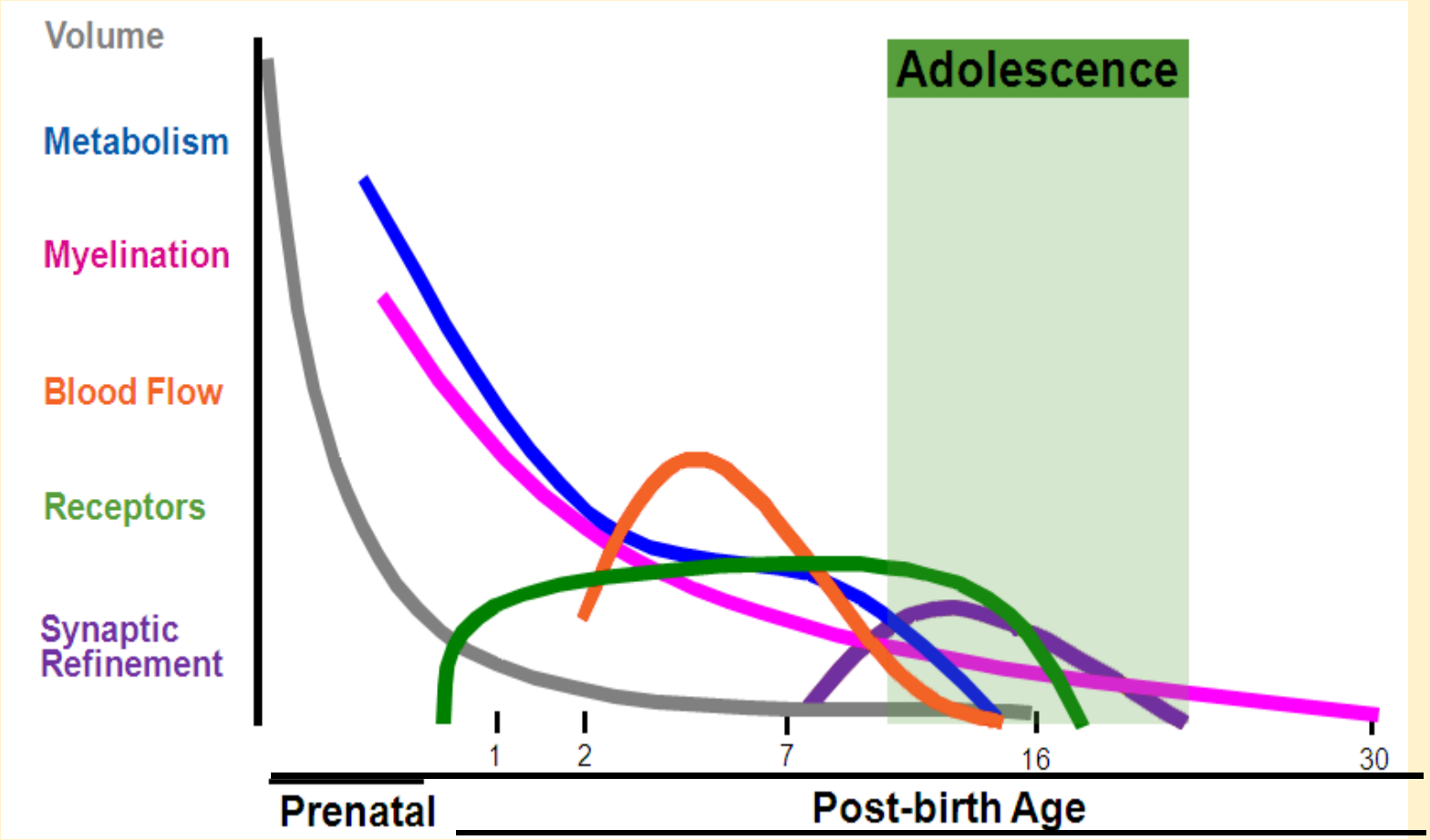
40% of kids who begin drinking at age 15 will become alcoholics.

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

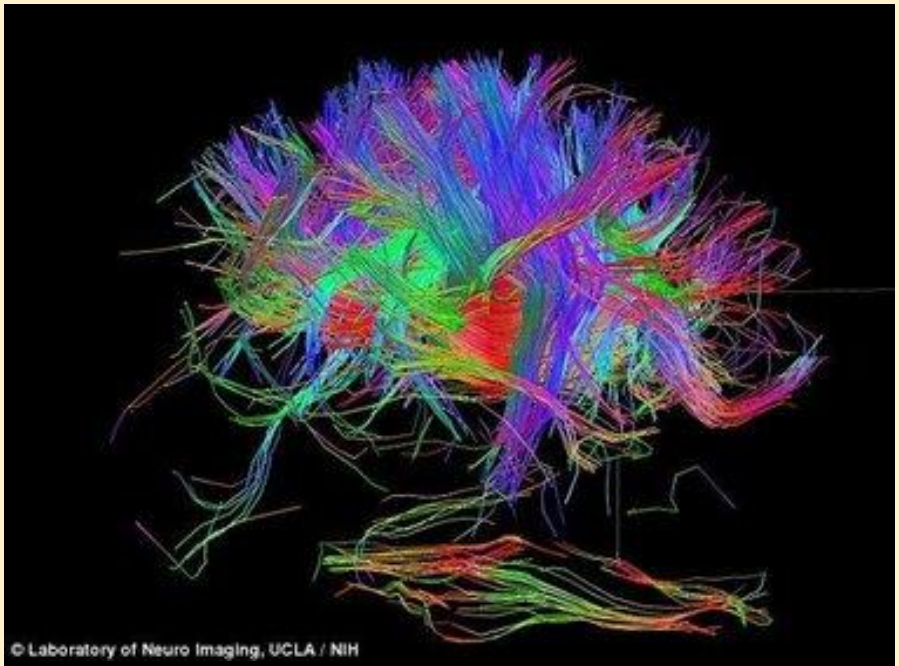

Percentage of U.S. 12th Grade Students Reporting Past Month Use of Cigarettes and Marijuana, 1975 to 2013
Percent
50
40
30
20
10
0
1975
77
79
81
83
85
87
89
91
93
95
97
99
01
03
05
07
09
11
13
Cigarettes
Marijuana

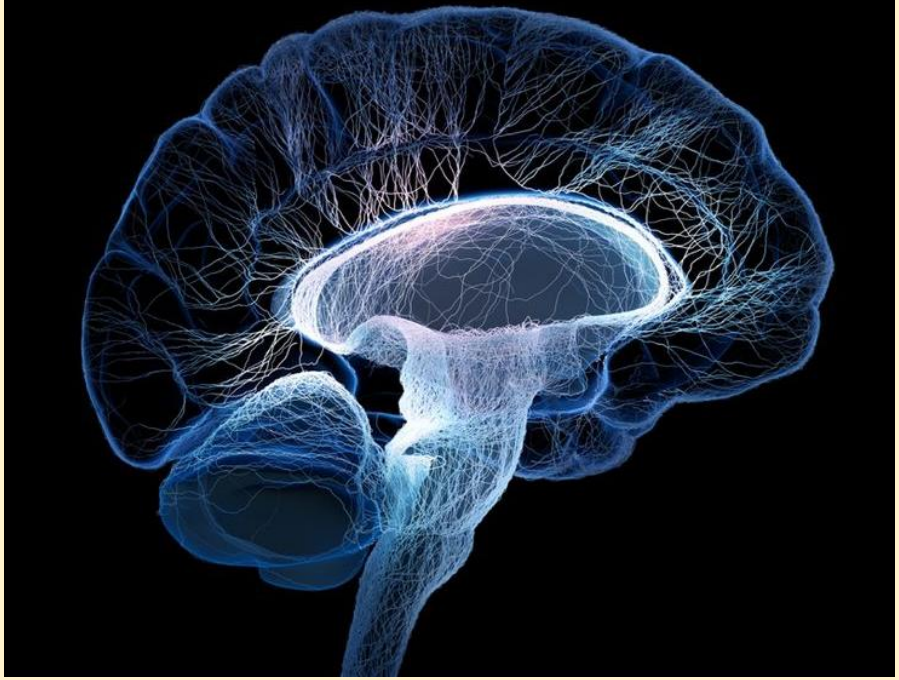

Percentage of U.S. 12 Grade Students Reporting Daily Marijuana Use vs. Perceived Risk of Regular Marijuana Use
Perceived Risk (Percent)
Daily Use (Percent)
Daily Use
Perceived Risk
100
80
60
40
20
0
12
10
8
6
4
2
0
1975
77
79
81
83
85
87
89
91
93
95
97
99
01
03
05
07
09
11
13
Source: The Monitoring the Future study, the University of Michigan

Brain Development

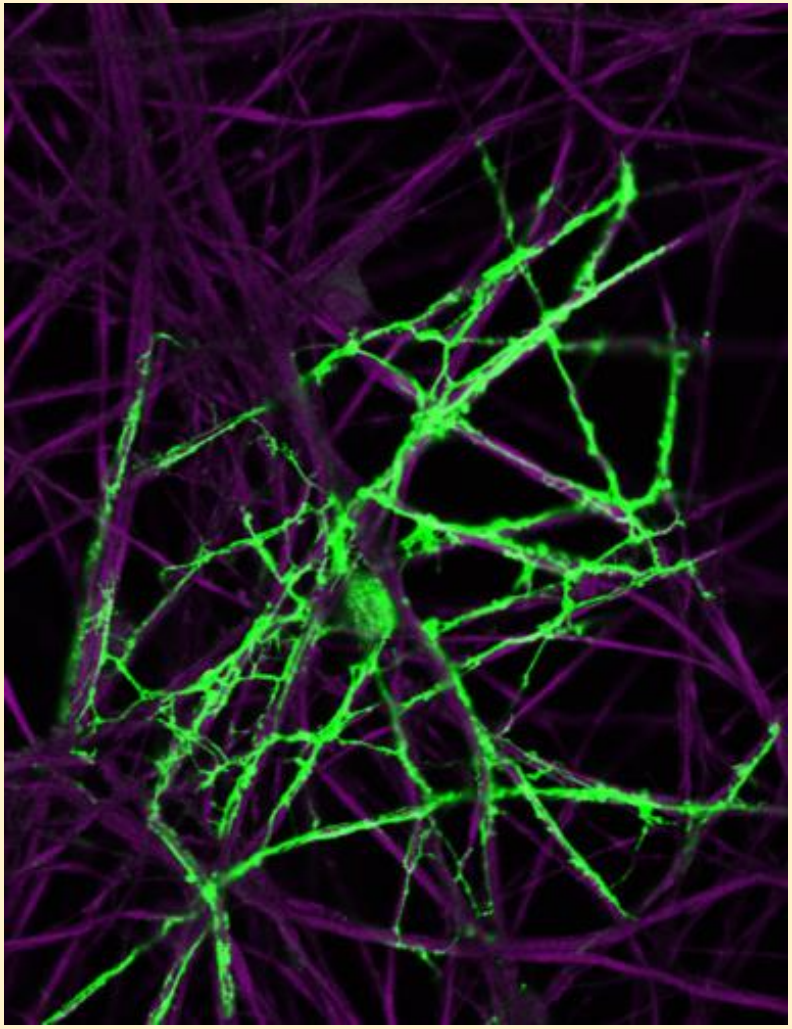


Source: Tapert & Schweinsburg, 2005





Synaptic Refinement



Myelination

This is Normal Development

Act First, Think Later

Preference for Physical Activity and Sensation Seeking

More Risky Impulsive Behavior

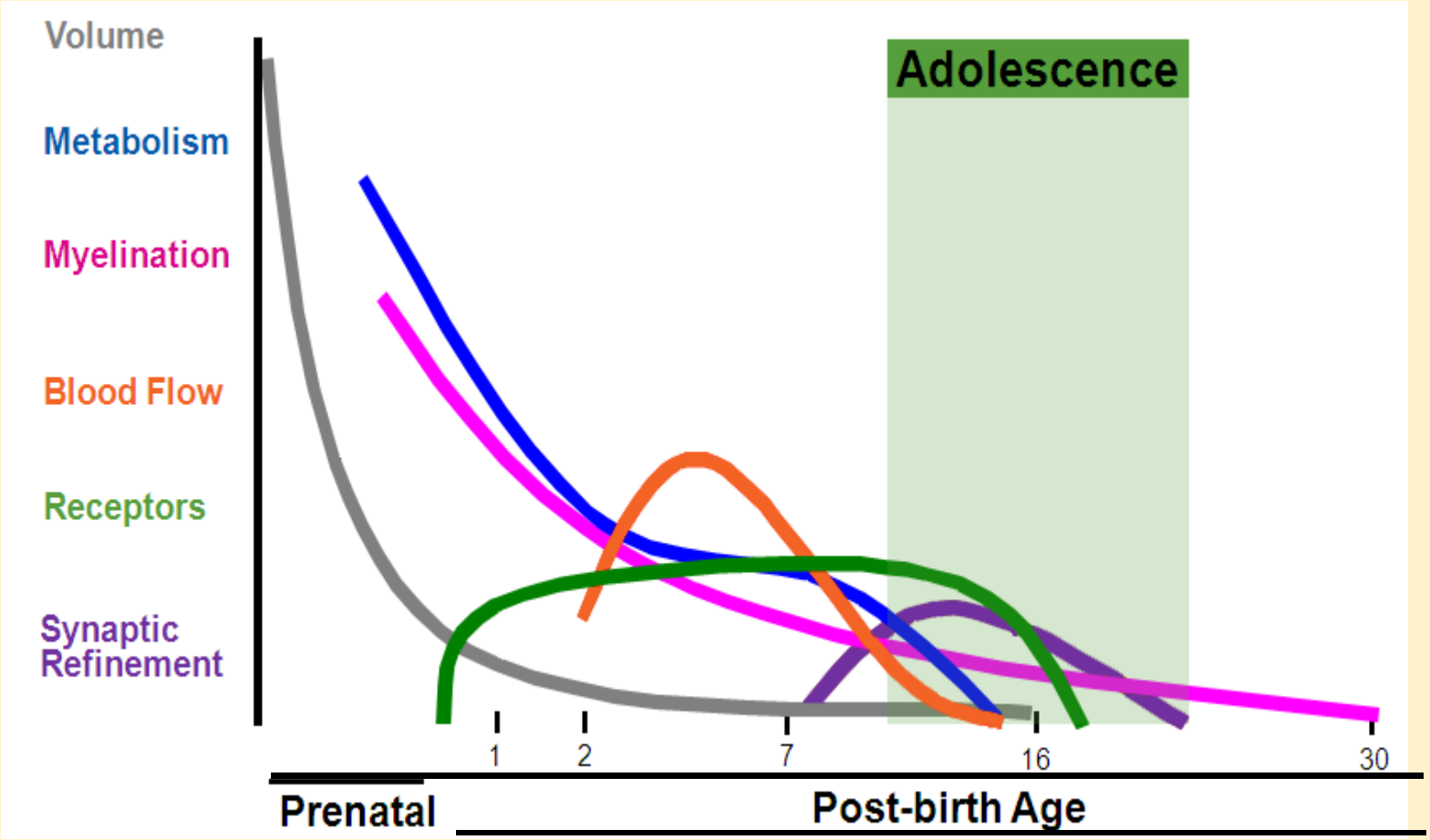
Emotions Felt Very Intensely

Less than Optimal Planning

Less Consideration of Negative Consequences

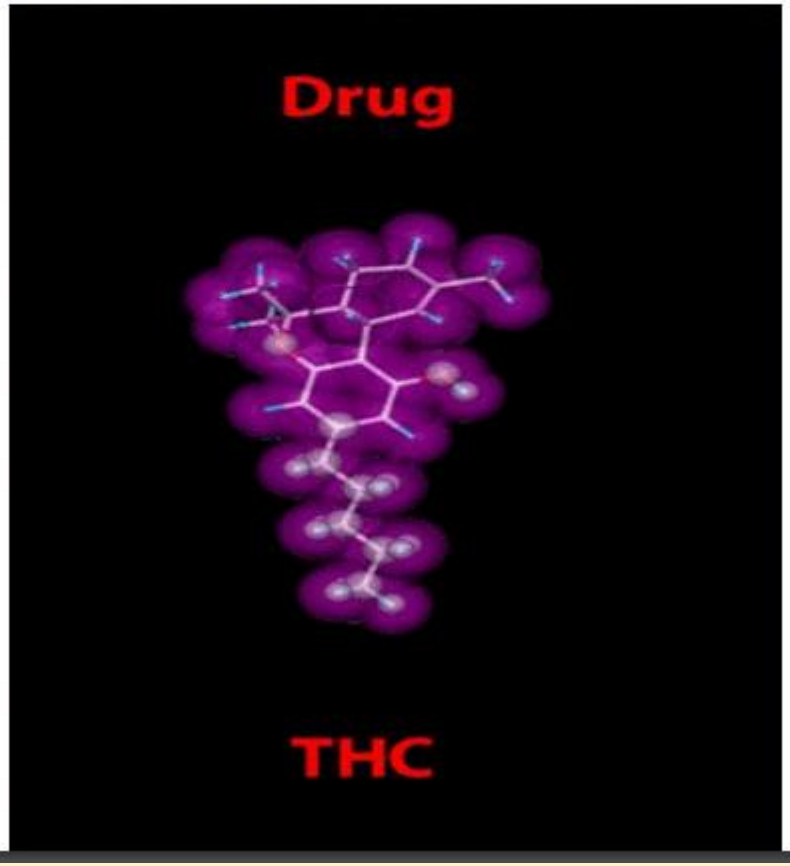
Strongly Influenced by Friends and Peers

Brain Development

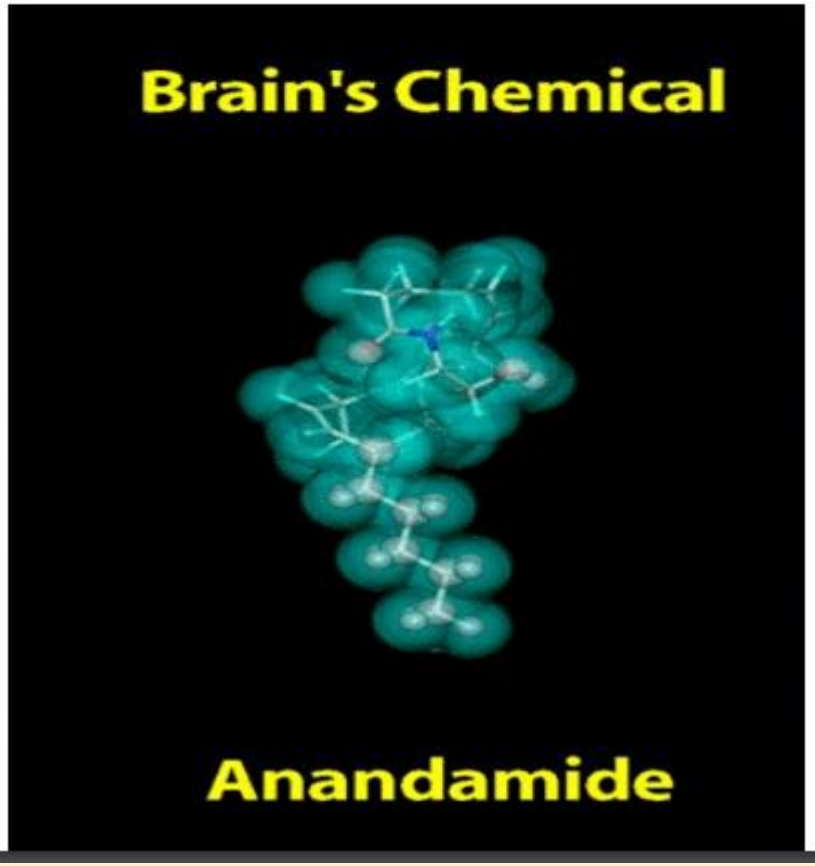


Source: Tapert & Schweinsburg, 2005

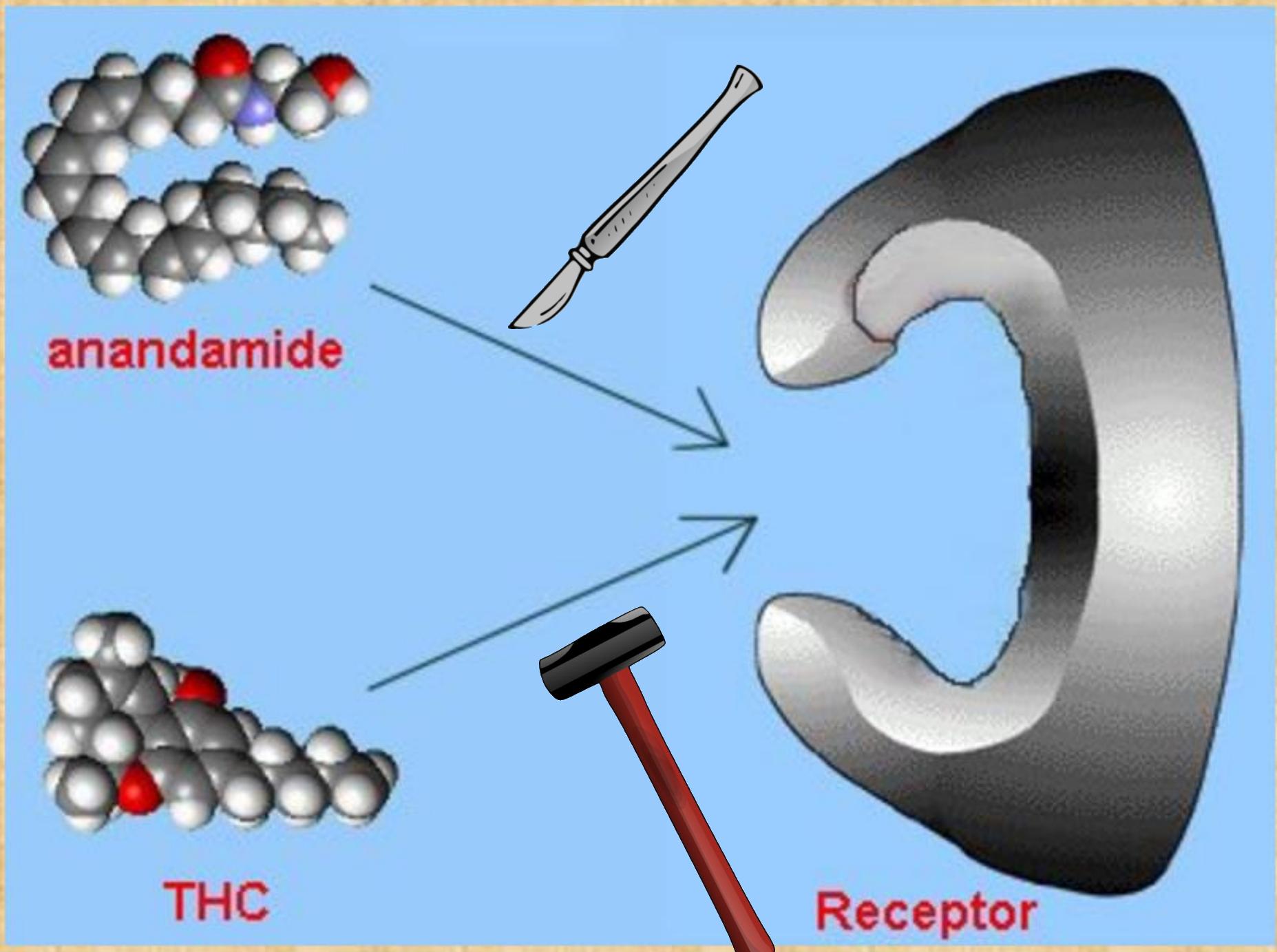
Marijuana
(Tetrahydrocannabinol



Endo-cannabinoid
(Anandamide)



Source: NIDA

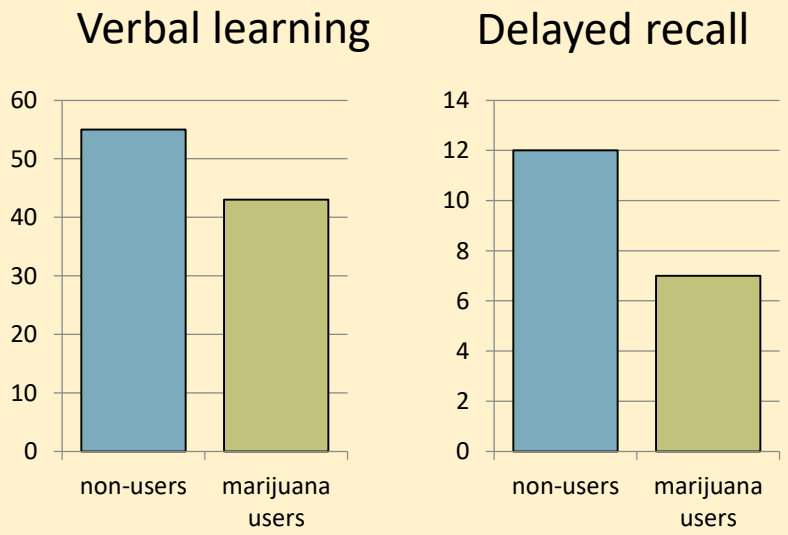

anandamide
THC
Receptor

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:

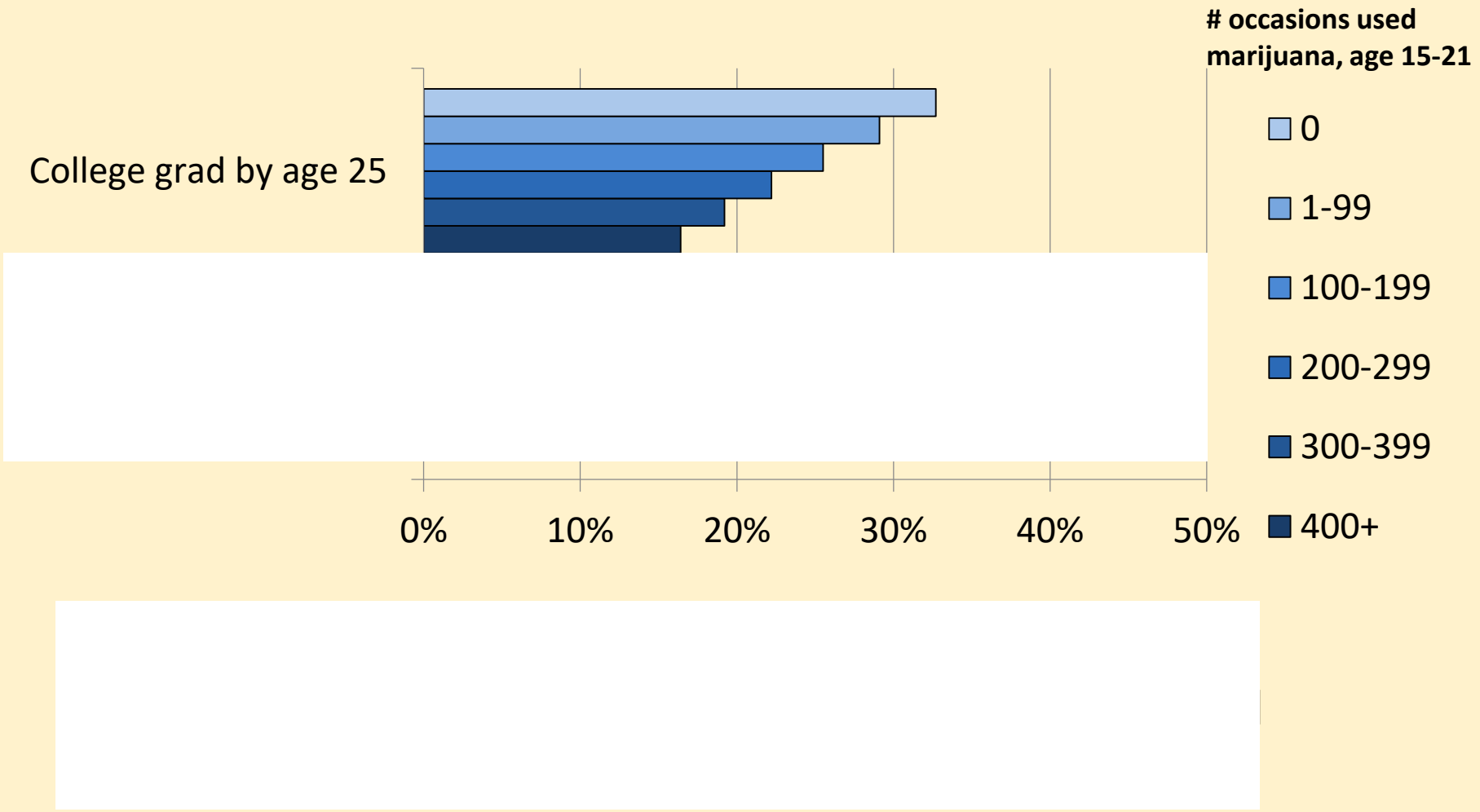
- attention
- verbal learning
- memory
- processing speed

… even when they are not high.



Messinis, et al 2006

Adult life outcomes affected by marijuana use in adolescence



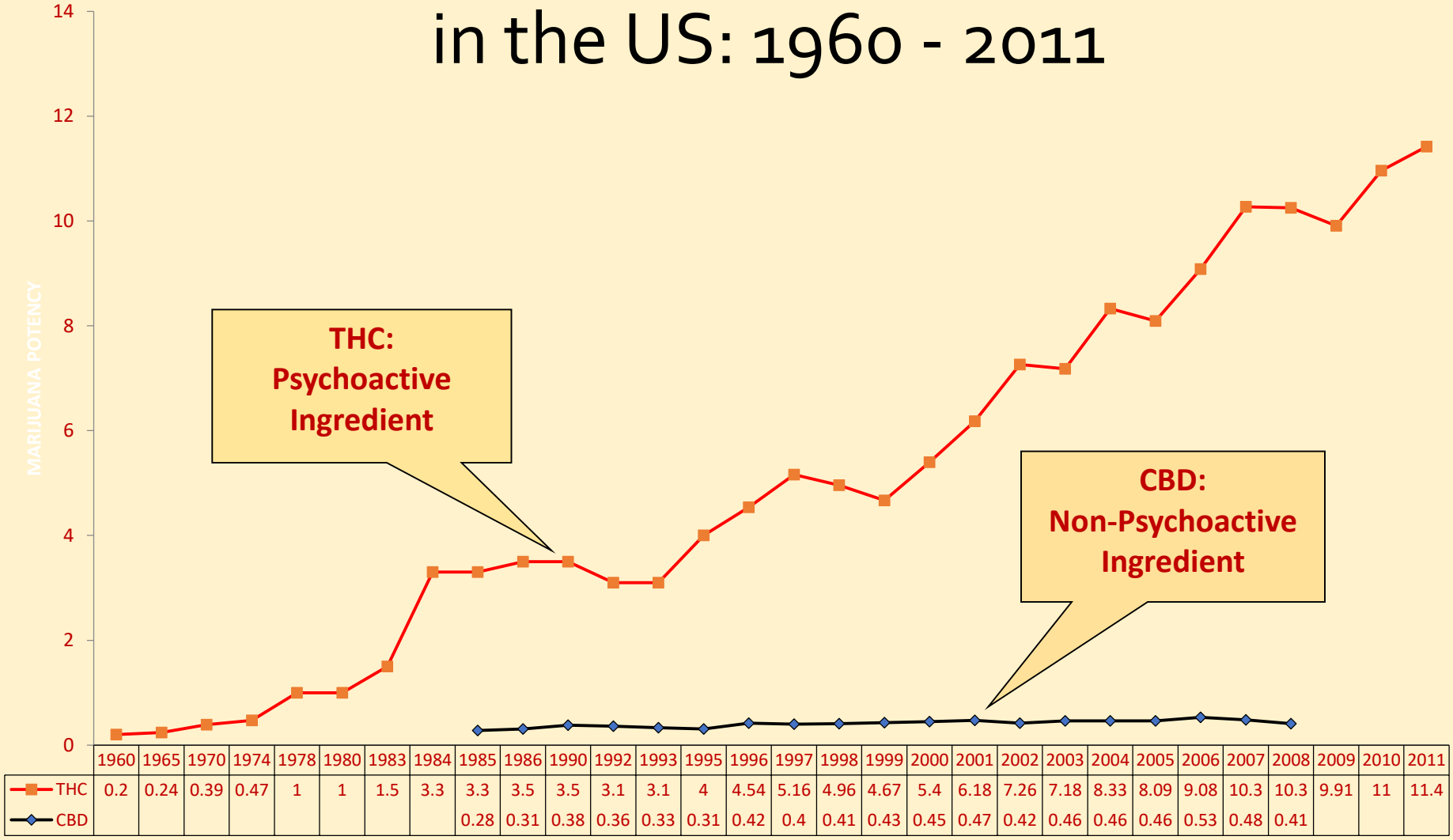
Fergusson DM & Boden JM, Cannabis use and later life outcomes. Addiction. 2008 Jun; 103(6):969-76

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.

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



	1960	1965	1970	1974	1978	1980	1983	1984	1985	1986	1990	1992	1993	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011
THC	0.2	0.24	0.39	0.47	1	1	1.5	3.3	3.3	3.5	3.5	3.1	3.1	4	4.54	5.16	4.96	4.67	5.4	6.18	7.26	7.18	8.33	8.09	9.08	10.3	10.3	9.91	11	11.4
CBD									0.28	0.31	0.38	0.36	0.33	0.31	0.42	0.4	0.41	0.43	0.45	0.47	0.42	0.46	0.46	0.46	0.53	0.48	0.41			

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)

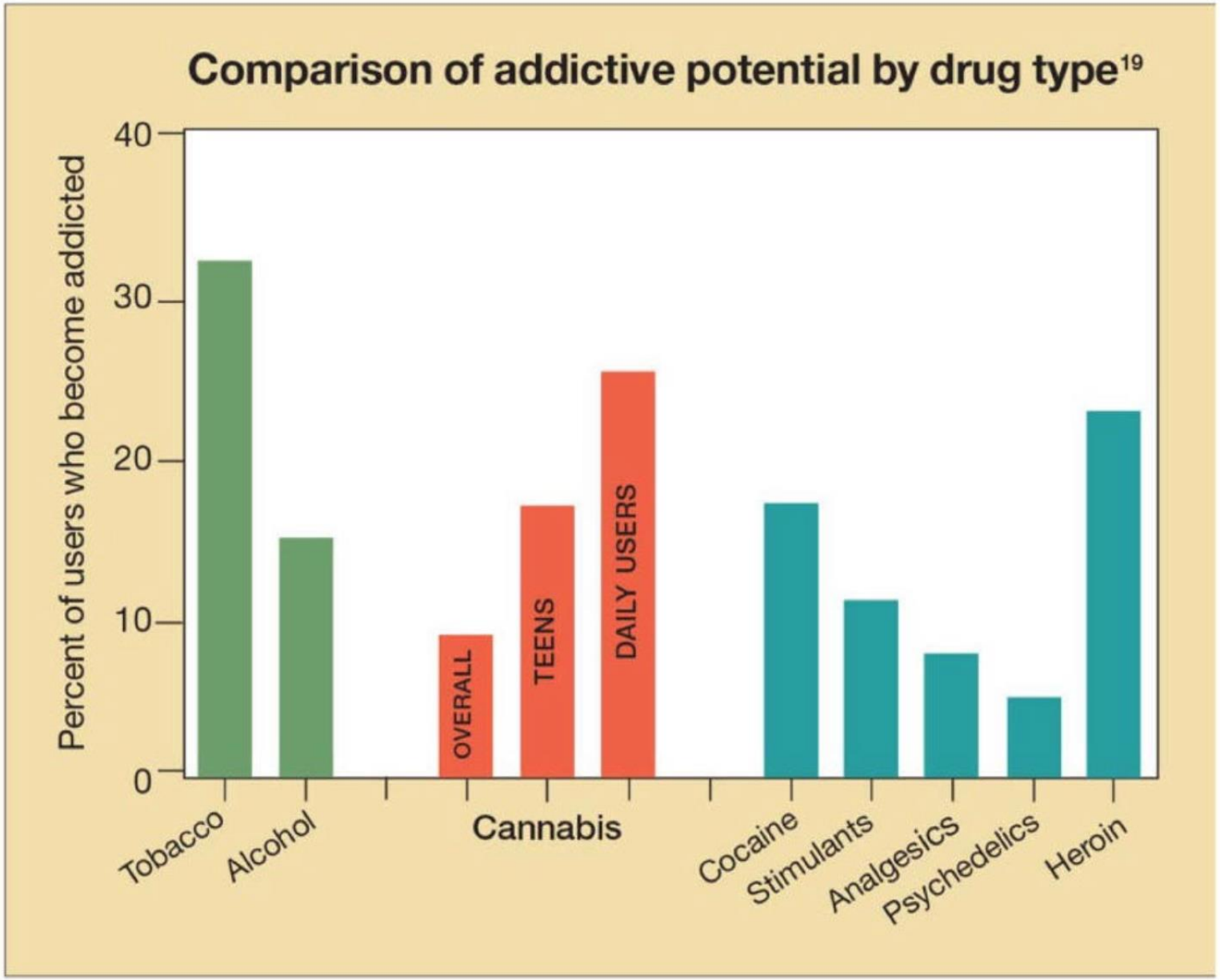
Hash Oil Capsules

"Budder"

"Shatter"

SMOKING
PIPE
BONG
BUBBLER
DAB
JOINT
BLUNT
EDIBLES
FULLY BAKED
CANDY
ICE CREAM
BAKED GOODS
VAPORIZING
DESKTOP VAPORIZER
PORTABLE VAPORIZER
BEVERAGES
TEA
SODA
ALCOHOL
MILK
Ways to consume marijuana
OTHER
CAPSULES
SPRAY
TINCTURE

Cheeba Chews
Kandy Care
MEDICAL CANNABIS
COTTON CANDY
3 Rastaleers
Munchy Way
Rasta Reese's
KeefKat
Puff-A-Mint Patue
Buddahfinger
Double Puff OEO
Tri-Chrome CRUNCH



Gilman, 2015--http://www.psychiatrictimes.com/special-reports/cannabis-use-young-adults-challenges-during-transition-adulthood

Big Marijuana — Lessons from Big Tobacco

Kimber P. Richter, Ph.D., M.P.H., and Sharon Levy, M.D., M.P.H.

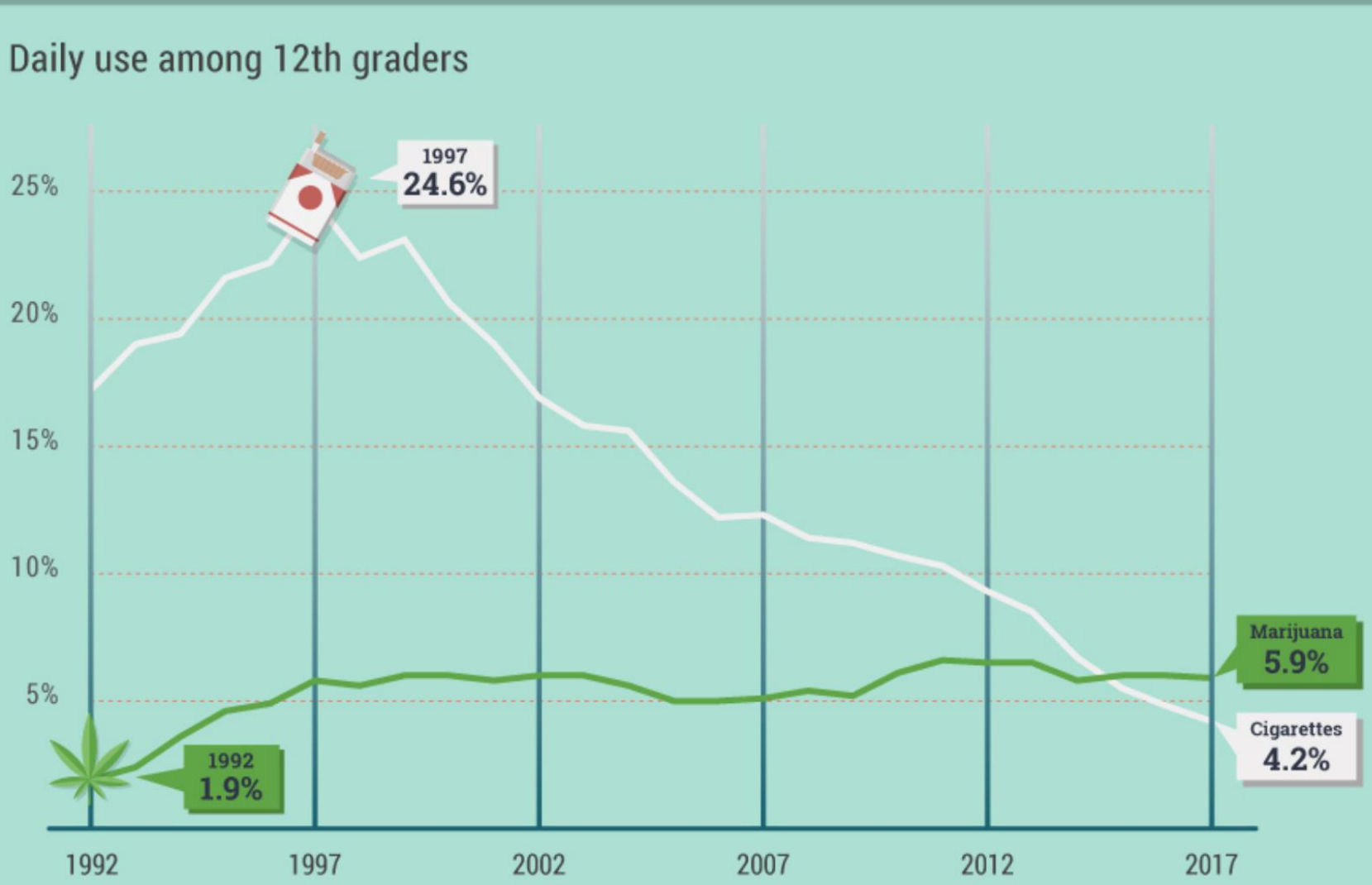
The United States is divided over the legalization of marijuana. Arguments in favor include protection of individual rights, elimination of criminal sentencing for minor offenses, collection of tax revenue, and elimination of the black market. Counterarguments include the

The New England Journal of Medicine

It took the medical and public health communities 50 years, millions of lives, and billions of dollars to identify the wake of illness and death left by legal, industrialized cigarettes. The free-market approach to tobacco clearly failed to protect the public's welfare and the common good: in spite of recent federal regulation, tobacco use remains the leading cause of death in the United States.

History and current evidence suggest that simply legalizing marijuana, and giving free rein to the resulting industry, is not the answer. To do so would be to once again entrust private industry with safeguarding the health of the public — a role that it is not designed to handle.

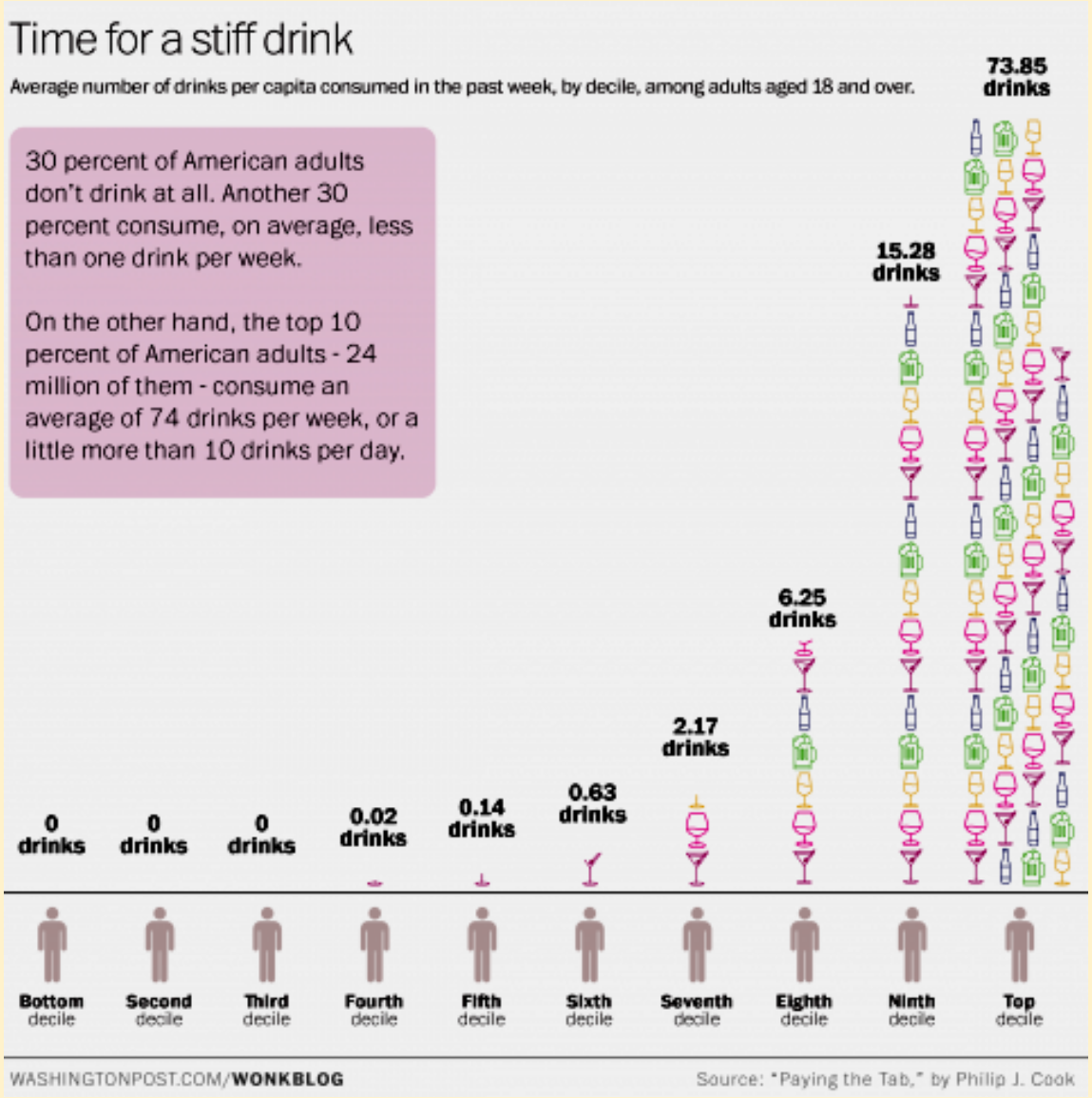
TEENS MORE LIKELY TO USE MARIJUANA THAN CIGARETTES



National Institute on Drug Abuse

DRUGABUSE.GOV

Think you drink a lot?



Low-risk drinking limits
MEN
WOMEN
On any single DAY
No more than
4
drinks on any day
No more than
3
drinks on any day
****AND ****
****AND ****
Per WEEK
No more than
14
drinks per week
No more than
7
drinks per week
To stay low risk, keep with BOTH the single-day AND weekly limits
Infographic NIAAA

12 fl oz of regular beer
=
8–9 fl oz of malt liquor (shown in a 12 oz glass)
=
5 fl oz of table wine
=
1.5 fl oz shot of 80-proof spirits ("hard liquor"—whiskey, gin, rum, vodka, tequila, etc.)
Beer
about 5% alcohol
about 7% alcohol
about 12% alcohol
about 40% alcohol

Mommy's Time Out
2005
GARGANEGA
PINOT GRIGIO
Mommy's Time Out
ROSSO
PRIMITIVO
2005

MAD HOUSEWIFE
CABERNET SAUVIGNON
CALIFORNIA

Moms who Need wine

Mommy Juice

Adverse Childhood Experiences – ACEs

Emotional Neglect

Abuse

Household Dysfunction

Research Article

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 ≥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, ≥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

The three types of ACEs include

ABUSE
- Physical
- Emotional
- Sexual

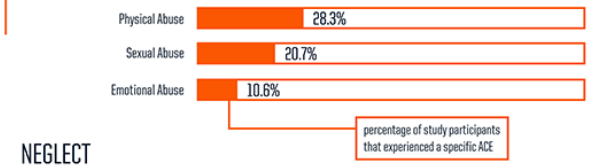
NEGLECT
- Physical
- Emotional

HOUSEHOLD DYSFUNCTION
- Mental Illness
- Incarcerated Relative
- Mother treated violently
- Substance Abuse
- Divorce

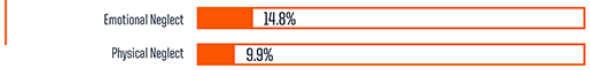
HOW PREVALENT ARE ACEs?

The ACE study revealed the following estimates:*

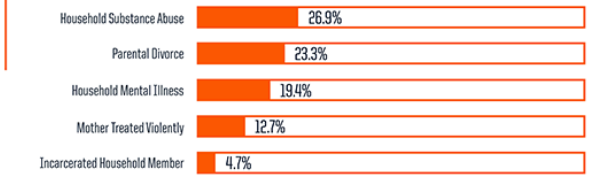
ABUSE



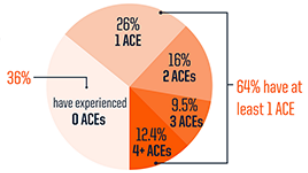
NEGLECT



HOUSEHOLD DYSFUNCTION



Of 17,000 ACE study participants:



WHAT IMPACT DO ACEs HAVE?

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

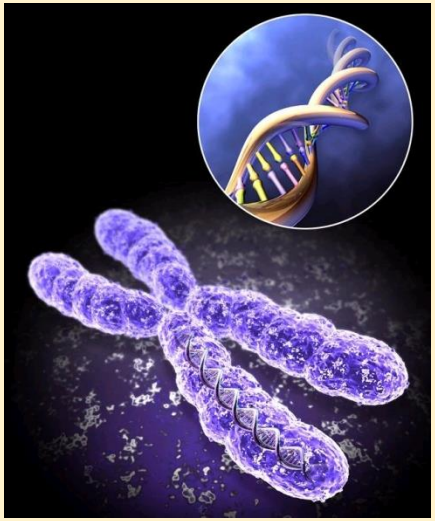
Possible Risk Outcomes:

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"

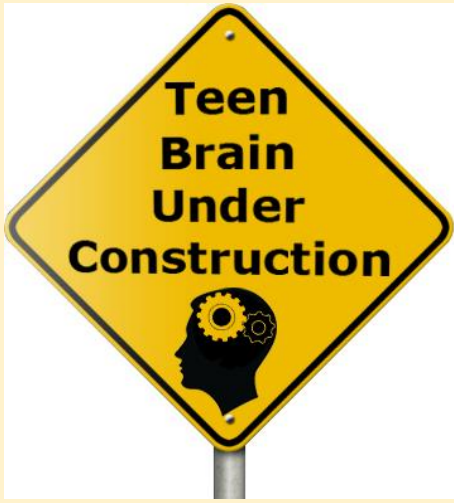


Genetics

+

Trauma

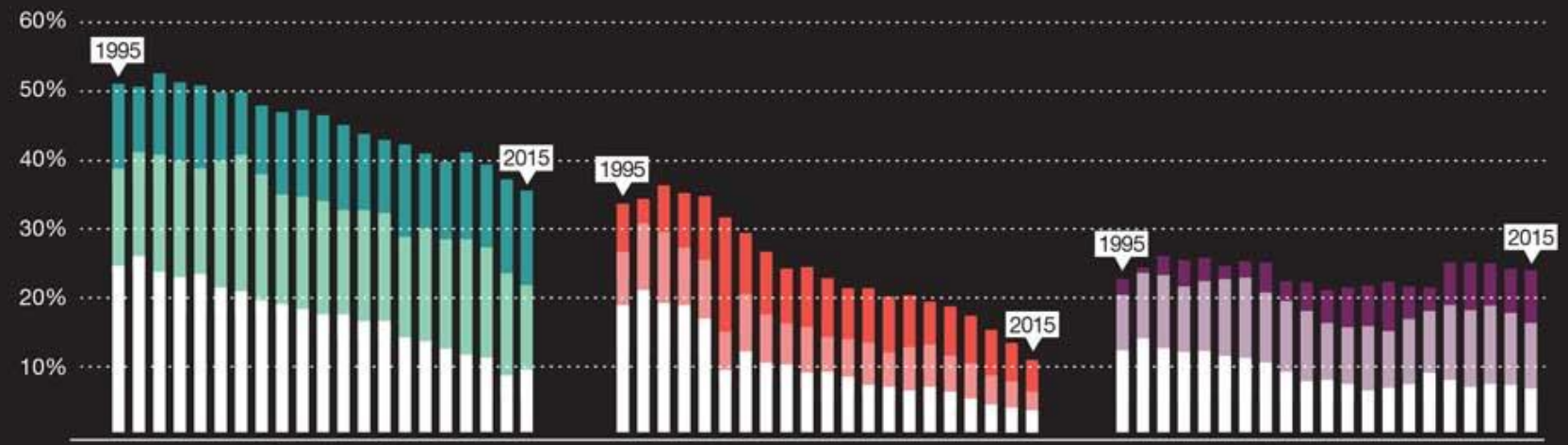
+



Early Use

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

*Past-month use



2015

Alcohol	Cigarettes	Illicit drugs
35.3% OF 12TH GRADERS	11.4% OF 12TH GRADERS	23.6% OF 12TH GRADERS
21.5% OF 10TH GRADERS	6.3% OF 10TH GRADERS	16.5% OF 10TH GRADERS
9.7% OF 8TH GRADERS	3.6% OF 8TH GRADERS	8.1% OF 8TH GRADERS

DEPARTMENT OF HEALTH & HUMAN SERVICES · USA

NIH National Institute on Drug Abuse

WWW.DRUGABUSE.GOV

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

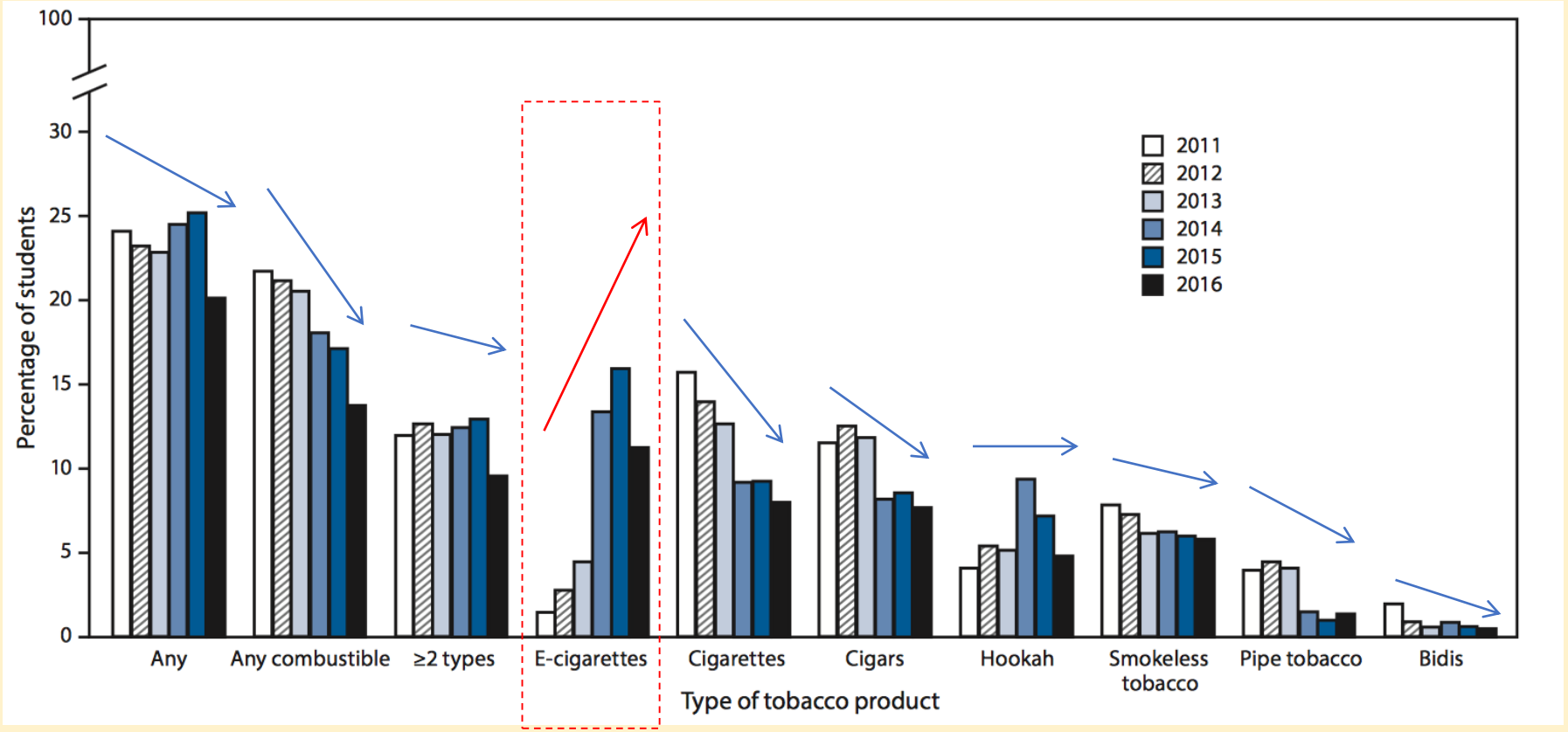
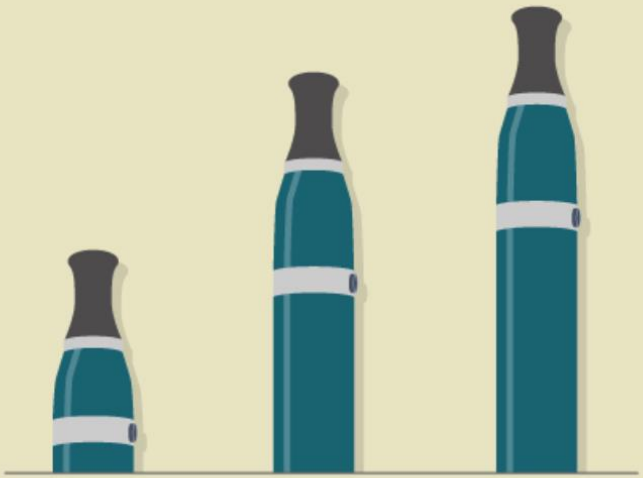


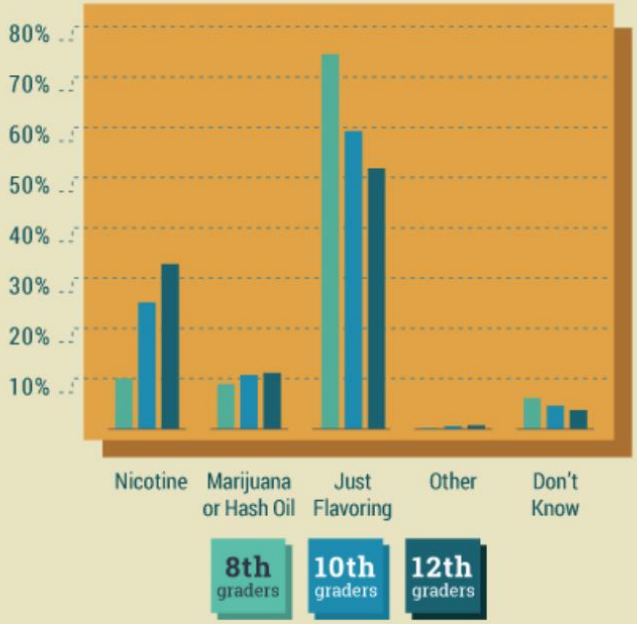
Figure 1. Estimated percentage of **high school students** who currently use any tobacco products, any combustible tobacco products, ≥2 tobacco products, and selected tobacco products – National Youth Tobacco Survey, United States. 2011-2016.

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



8th graders	10th graders	12th graders
13.3%	23.9%	27.8%

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.

NIH National Institute on Drug Abuse

DRUGABUSE.GOV

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.

JUUL e-cigarettes

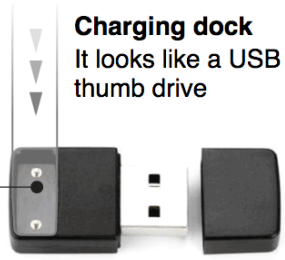
Some e-cigarette critics are calling the JUUL e-cigarette the "Apple of vaping" or the "iPhone of vaping." With its relatively low entry price, sleek portable design, ease of use, and nicotine head rush it generates for users, JUULS are catching on with younger people.

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



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

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.

SOURCE: juulvapor.com

JAMES ABUNDIS / GLOBE STAFF

Have Smartphones Destroyed a Generation?

More comfortable online than out partying, post-Millennials are safer, physically, than adolescents have ever been. But they're on the brink of a mental-health crisis.

The Atlantic

JEAN M. TWENGE

SEPTEMBER 2017 ISSUE

OPIOID Task Force
of Franklin County and the North Quabbin Region

OPIOID Task Force
of Franklin County and the North Quabbin Region

JUNE 15, 2015

TIME

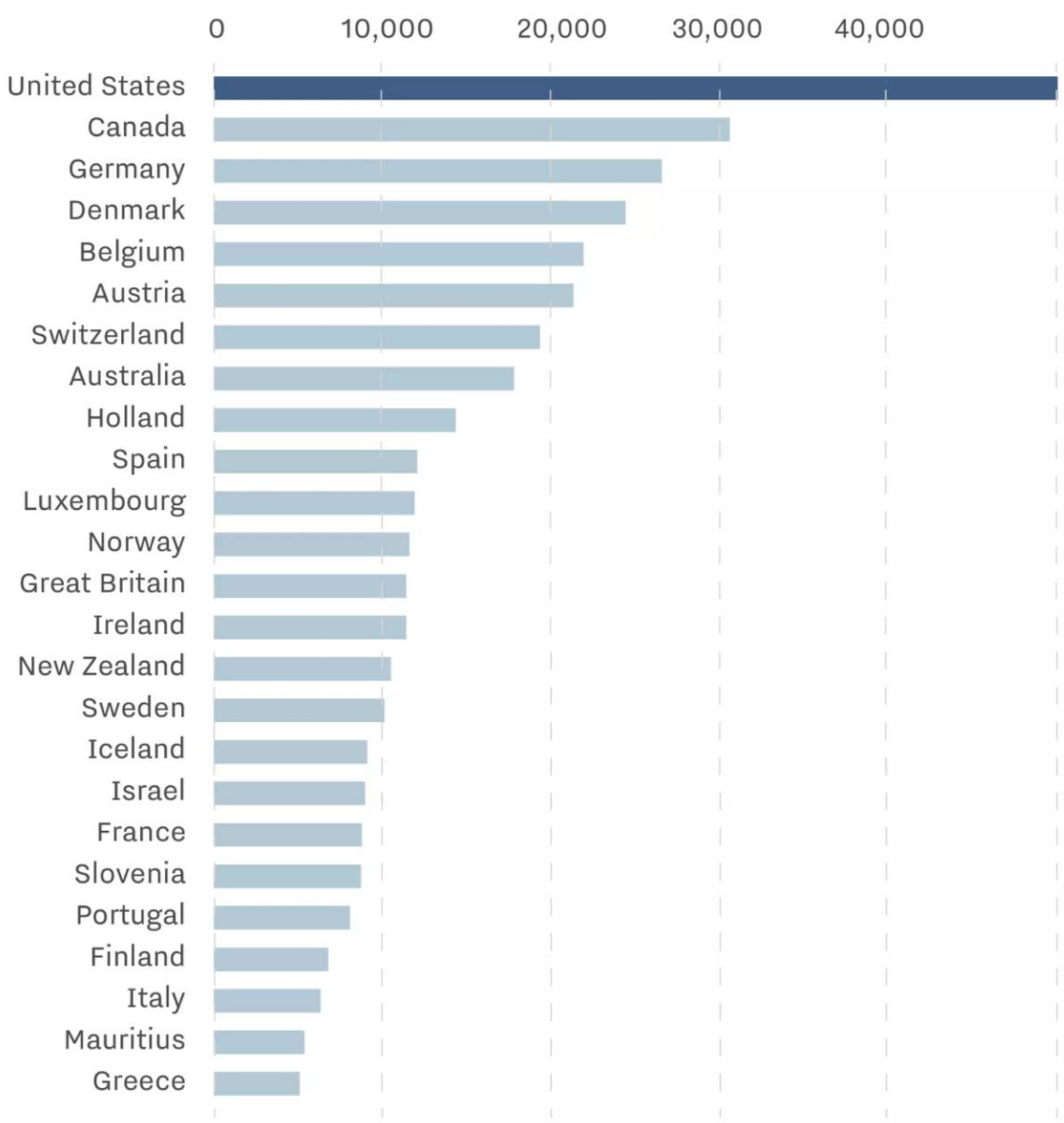
They're the most **powerful painkillers** ever invented.

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

SHARE

Drug Deaths in America Are Rising Faster Than Ever

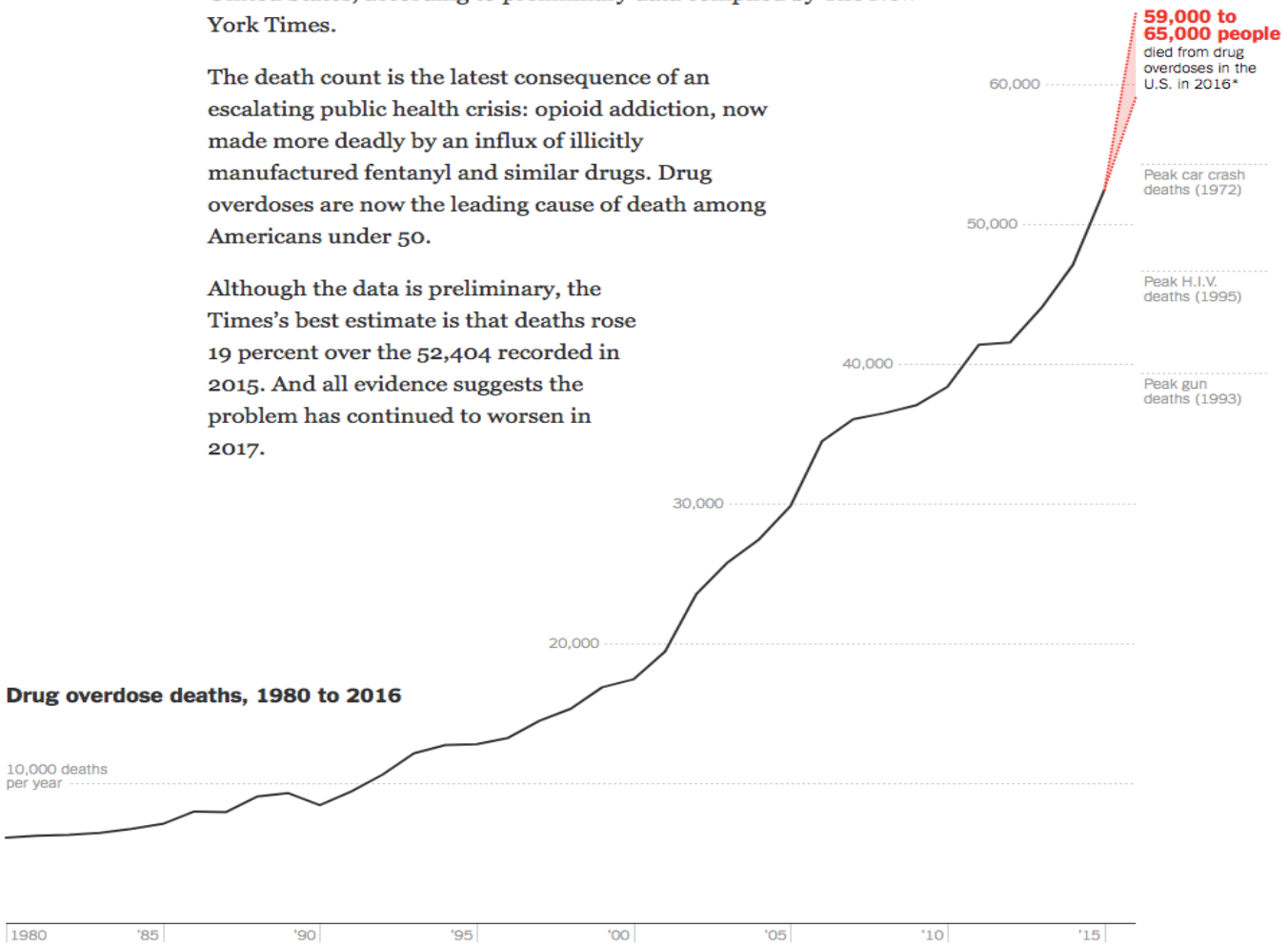
By **JOSH KATZ** JUNE 5, 2017

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.

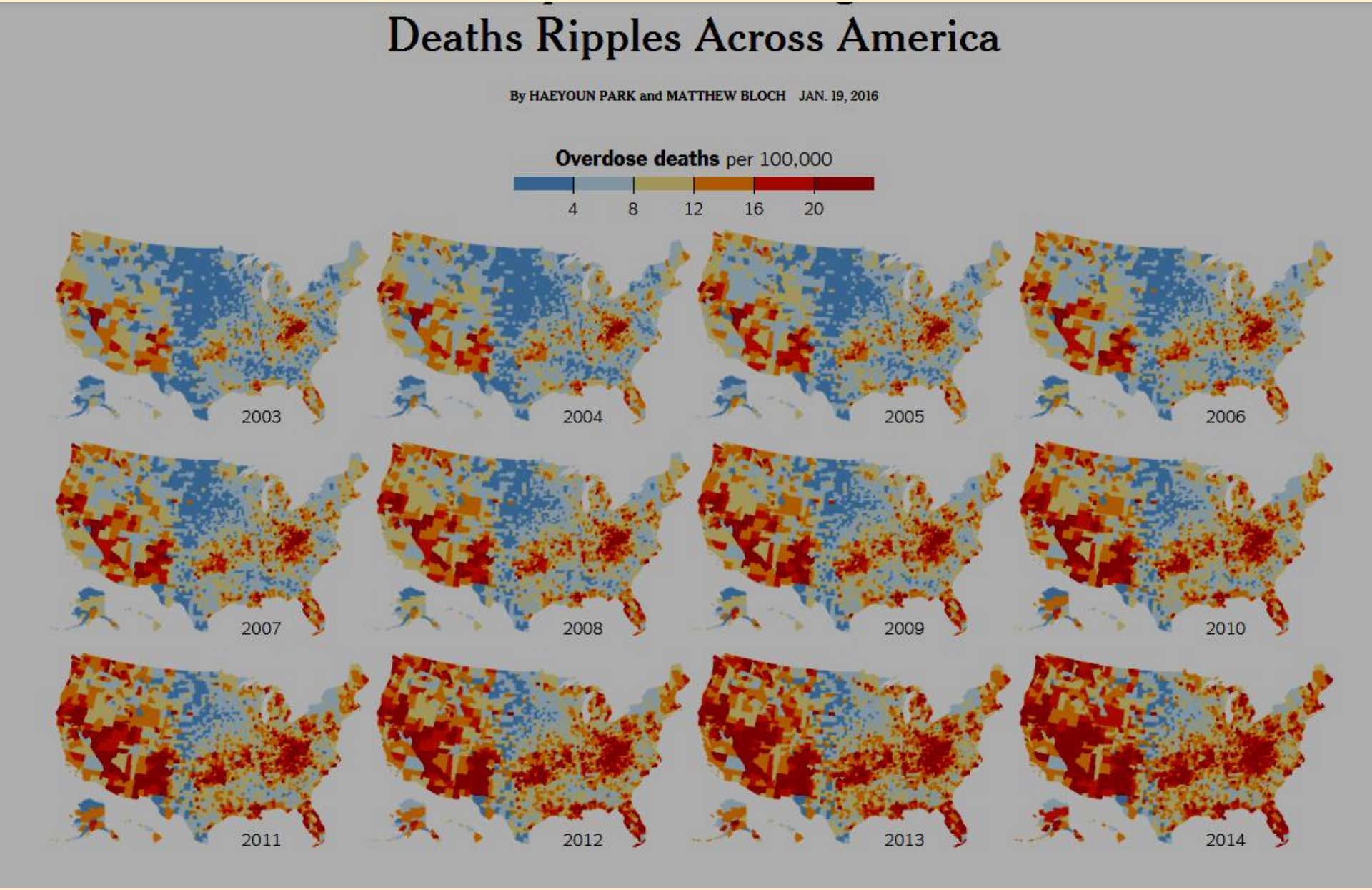
The death count is the latest consequence of an escalating public health crisis: opioid addiction, now made more deadly by an influx of illicitly manufactured fentanyl and similar drugs. Drug overdoses are now the leading cause of death among Americans under 50.

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.



Drug overdose deaths, 1980 to 2016

*Estimate based on preliminary data



NYT January 19, 2016

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Welcome to
Maine

TOURISTS!! THANK GOD! MAY I SUGGEST RESTAURANTS, HOTELS, DESTINATIONS?
WE'RE JUST HERE TO BUY SOME PAIN PILLS.
FLORIDA
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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."

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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.

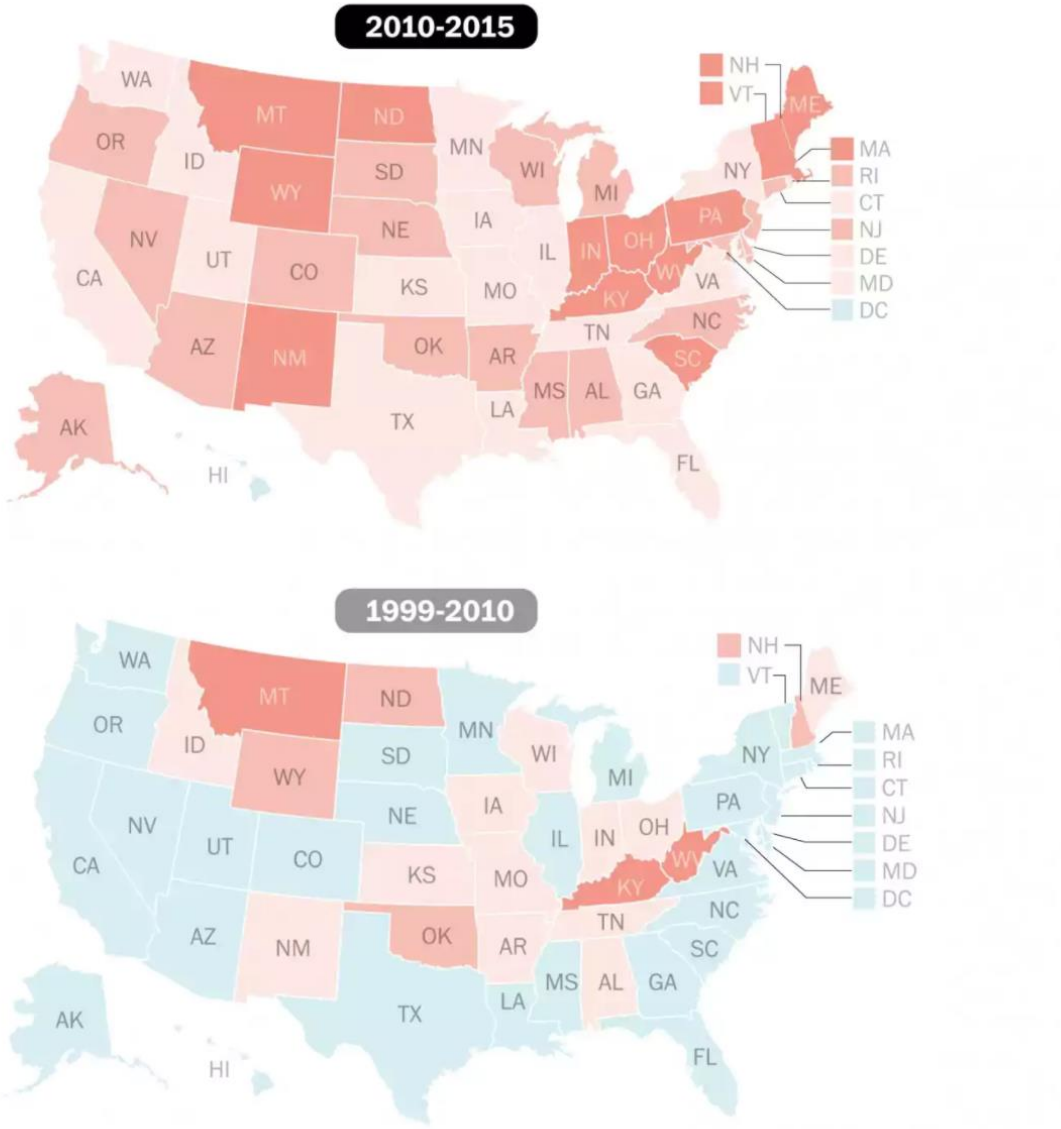
ACADEMY AWARD® WINNER
ANTHONY HOPKINS

http://www.nytimes.com/2011/09/01/us/01drugs.html?src=me&ref=us

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

DEATHS PER 100,000 PEOPLE. AGE 25 TO 44

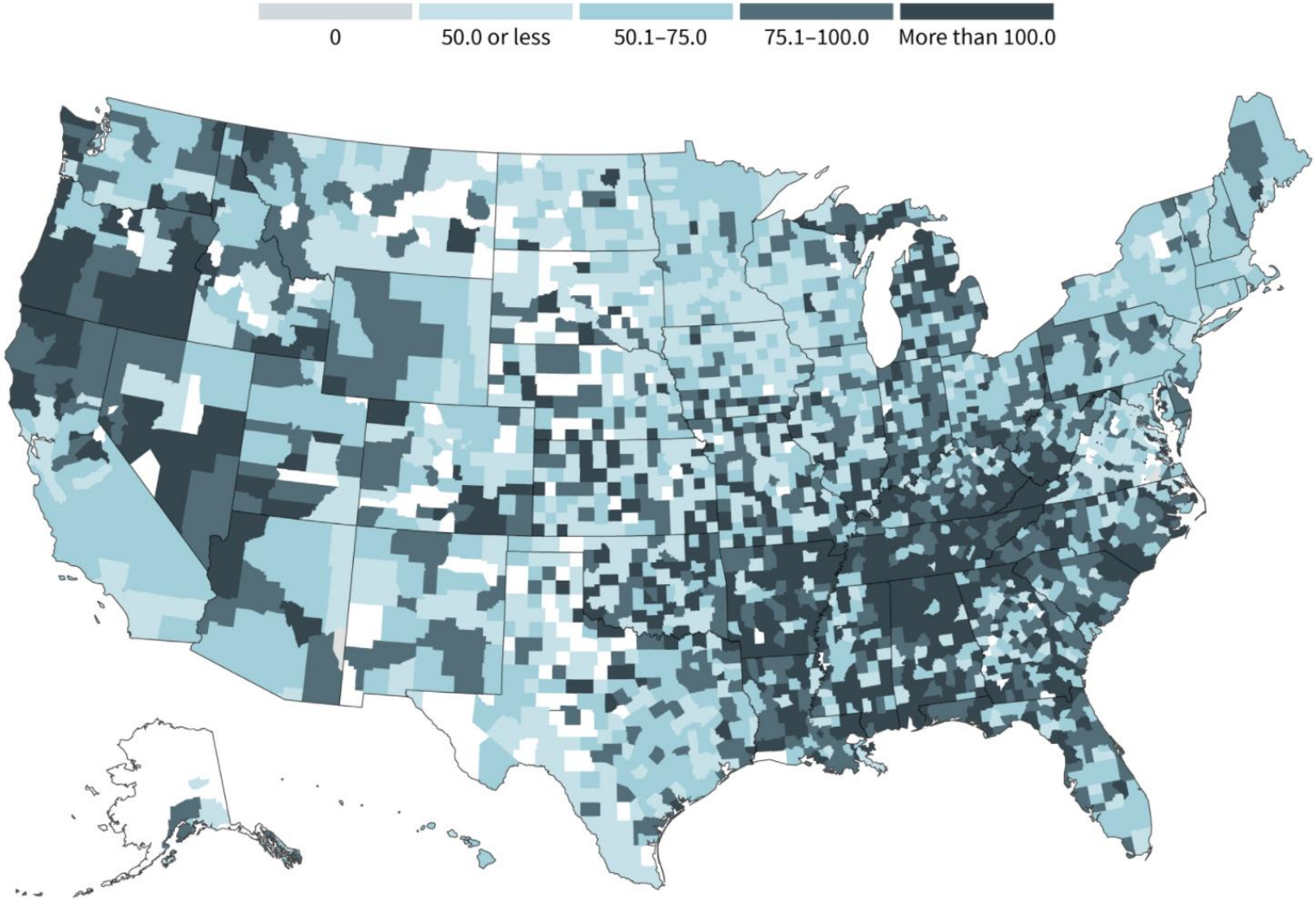
Decline · Increase up to 10 · Increase up to 20 · More than 20



Source: Centers for Disease Control and Prevention

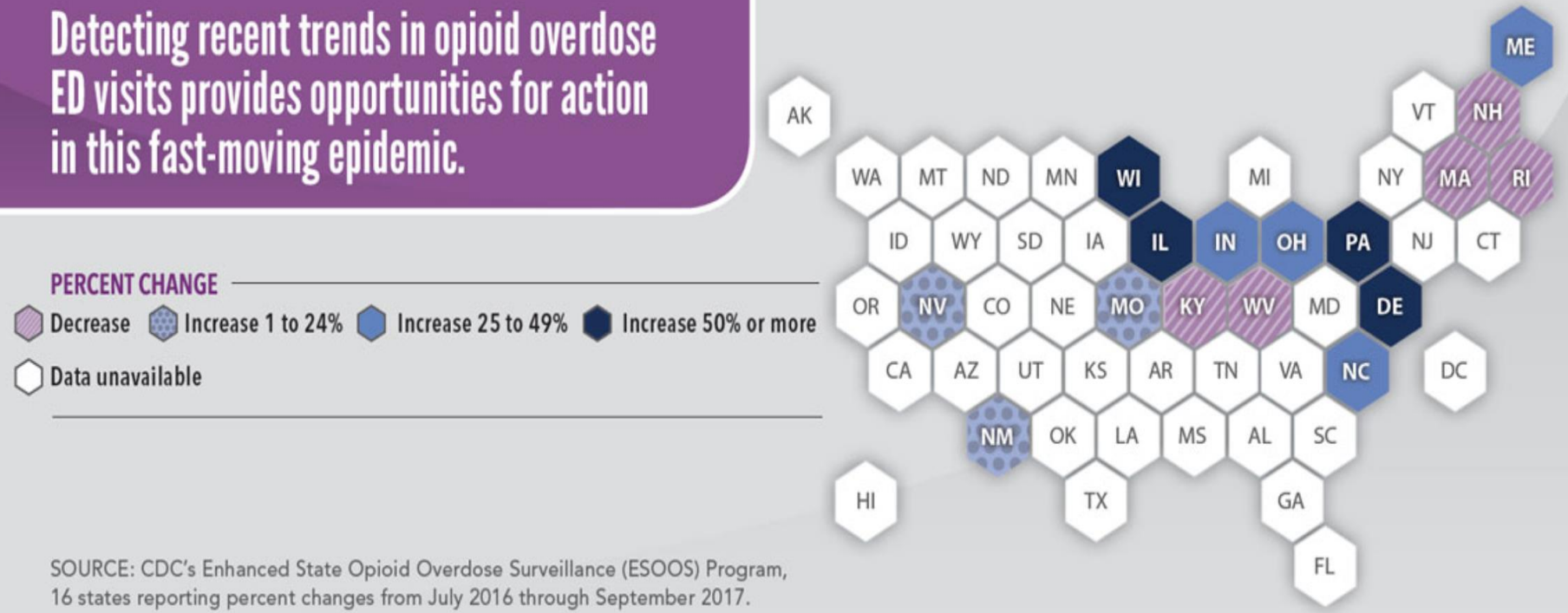
THE WASHINGTON POST

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



Note: Counties with insufficient data are left blank.

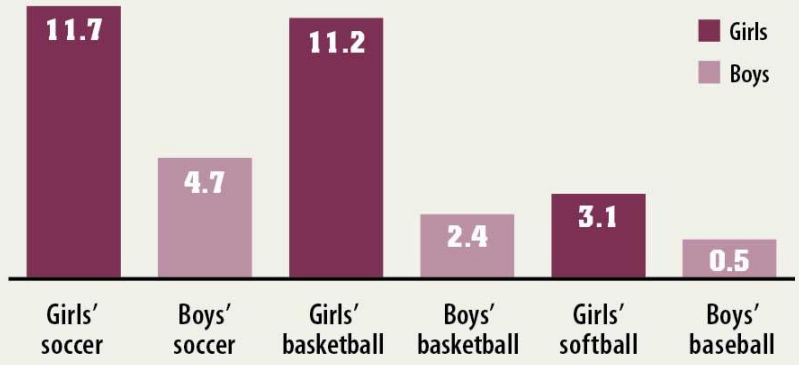
Detecting recent trends in opioid overdose ED visits provides opportunities for action in this fast-moving epidemic.



SOURCE: CDC's Enhanced State Opioid Overdose Surveillance (ESOOS) Program, 16 states reporting percent changes from July 2016 through September 2017.

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.[3]

www.getnaloxonenow.org

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Get Naloxone Now

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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

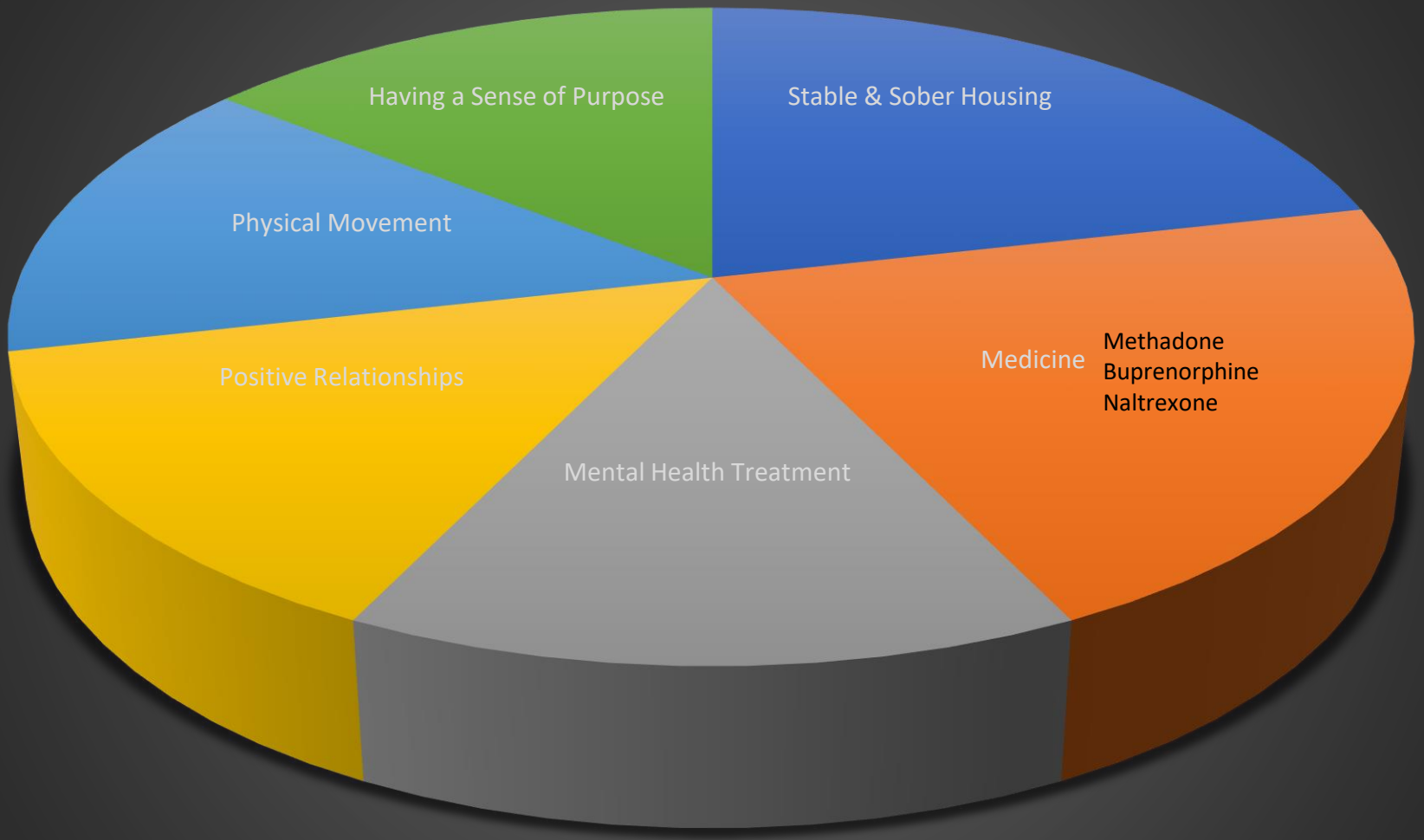
INSTITUTIONAL PROGRAM

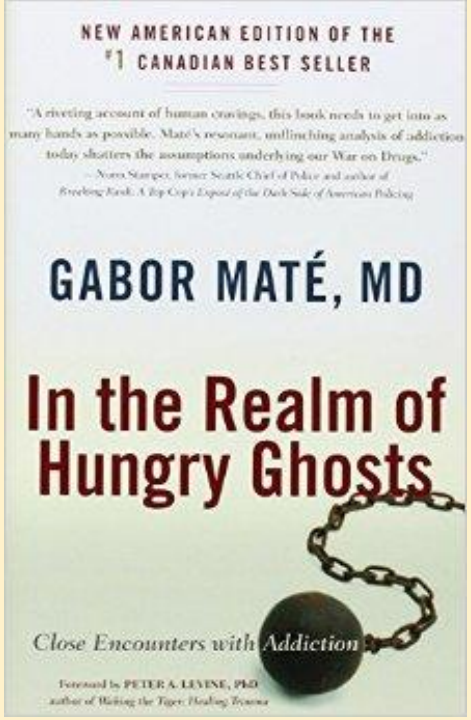
Central to our mission to save lives is our institutional program. Targeted online training is available to professional first responders (police officers, firefighters, EMTs) through use of our first responder computer-based module.

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

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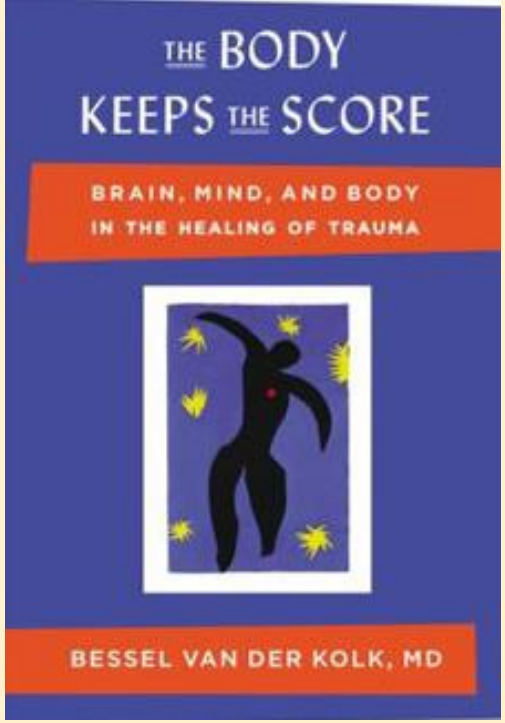
GABOR MATÉ, MD
In the Realm of Hungry Ghosts
Close Encounters with Addiction
Foreword by PETER A. LEVINE, PhD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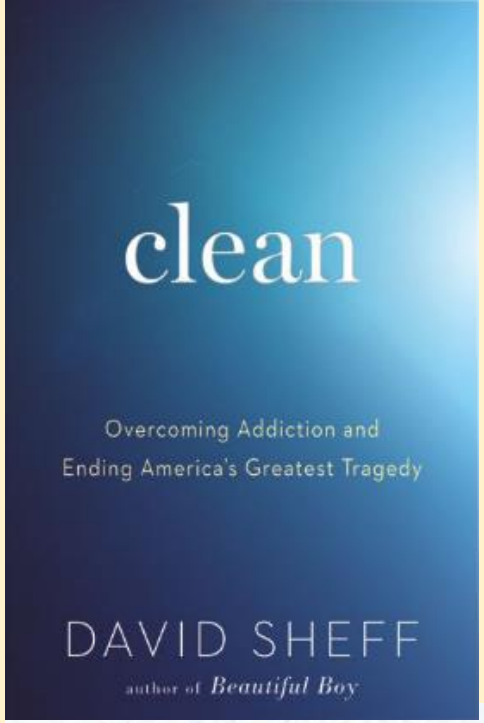
BRAIN, MIND, AND BODY IN THE HEALING OF TRAUMA
BESSEL VAN DER KOLK, MD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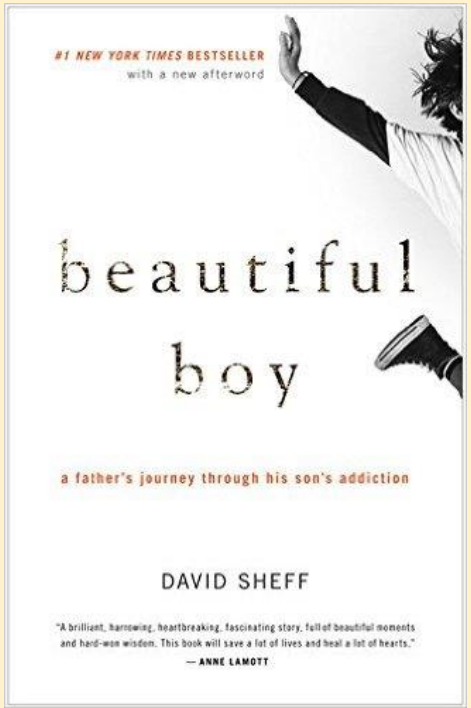
Overcoming Addiction and Ending America's Greatest Tragedy
DAVID SHEFF
author of Beautiful Boy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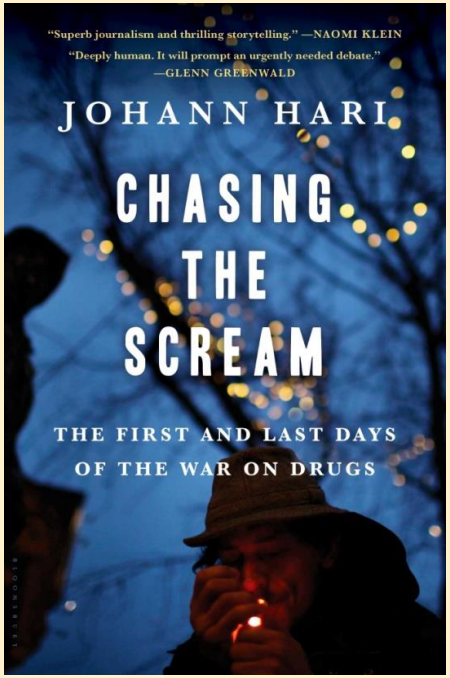
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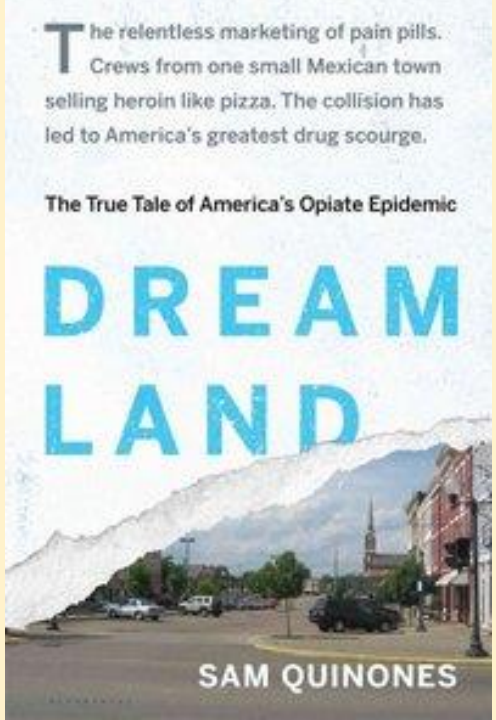
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Dr. Potee joins the Home Podcast to talk about addiction and stigma

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

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CNN's Anthony Bourdain discusses addiction with Dr. Potee

CNN; ANTHONY BOURDAIN

The Boston

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

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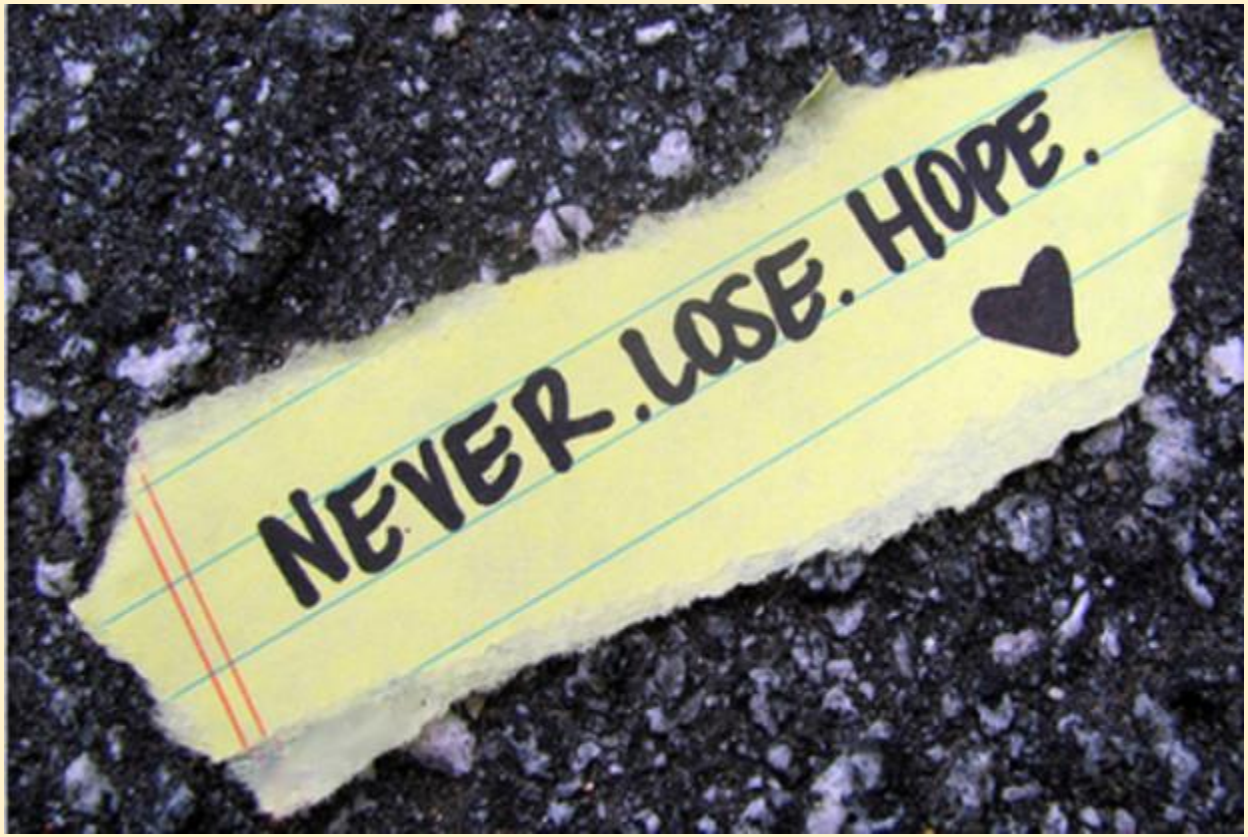
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