PCSS MAT TRAINING
PROVIDERS' CLINICAL SUPPORT SYSTEM
For Medication Assisted Treatment

Adolescent Substance Use

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Boston Children's Hospital

Associate Professor of Pediatrics
Harvard Medical School

Boston Children's Hospital
Until every child is well™

HARVARD MEDICAL SCHOOL
TEACHING HOSPITAL

Sharon Levy Disclosures

- No financial relationships to disclose.

The contents of this activity may include discussion of off label or investigative drug uses. The faculty is aware that is their responsibility to disclose this information.

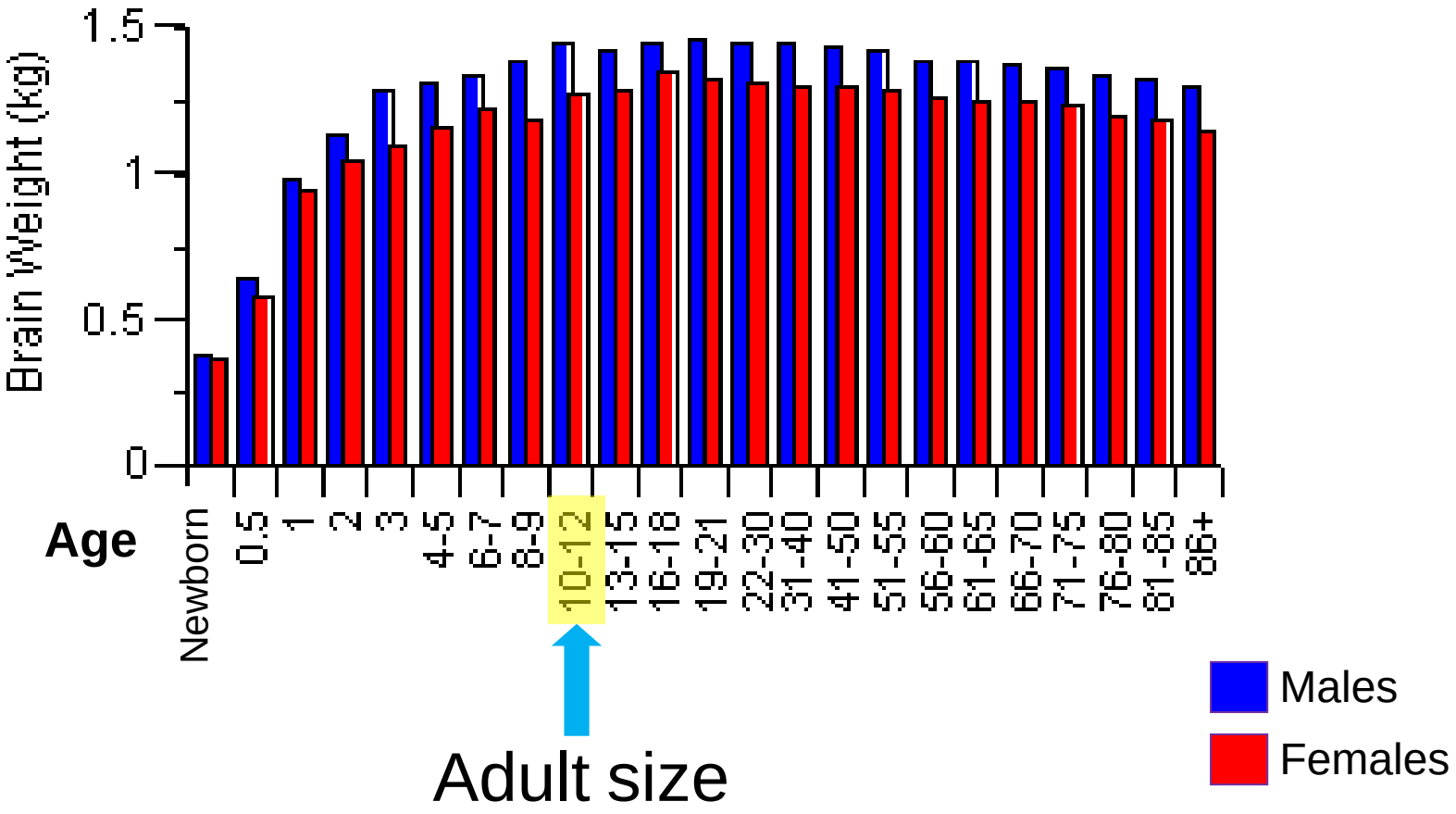
Target Audience

- The overarching goal of PCSS-MAT is to make available the most effective medication-assisted treatments to serve patients in a variety of settings, including primary care, psychiatric care, and pain management settings.

Educational Objectives

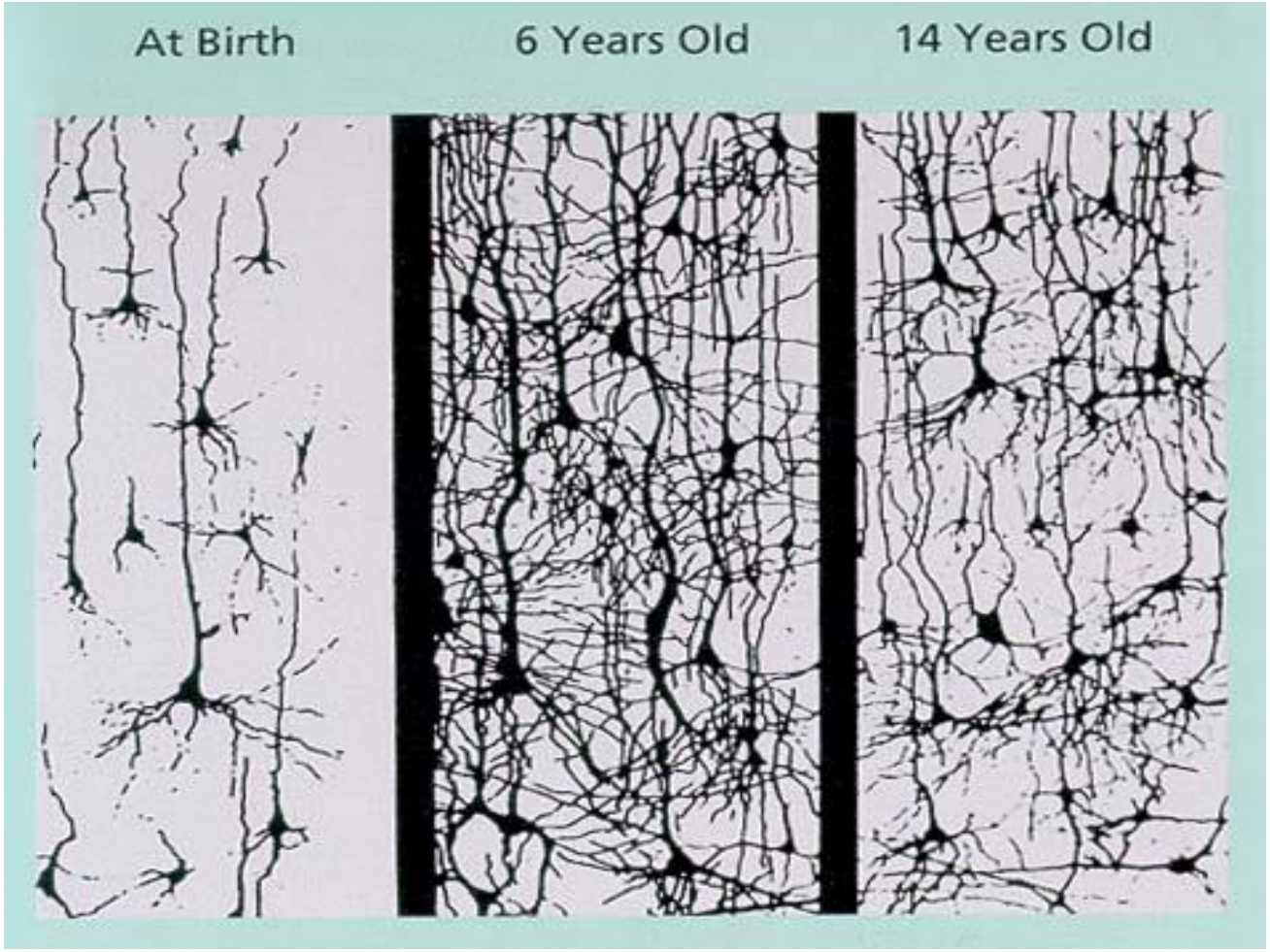
- At the conclusion of this activity participants should be able to:
  - Explain how adolescent brain development poses unique risks associated with substance use
  - Identify tools for screening adolescents for substance use in clinical settings and appropriate steps to take based on response
  - Describe evidence-based treatment options for adolescents with moderate-high risk

Brain Weight by Age



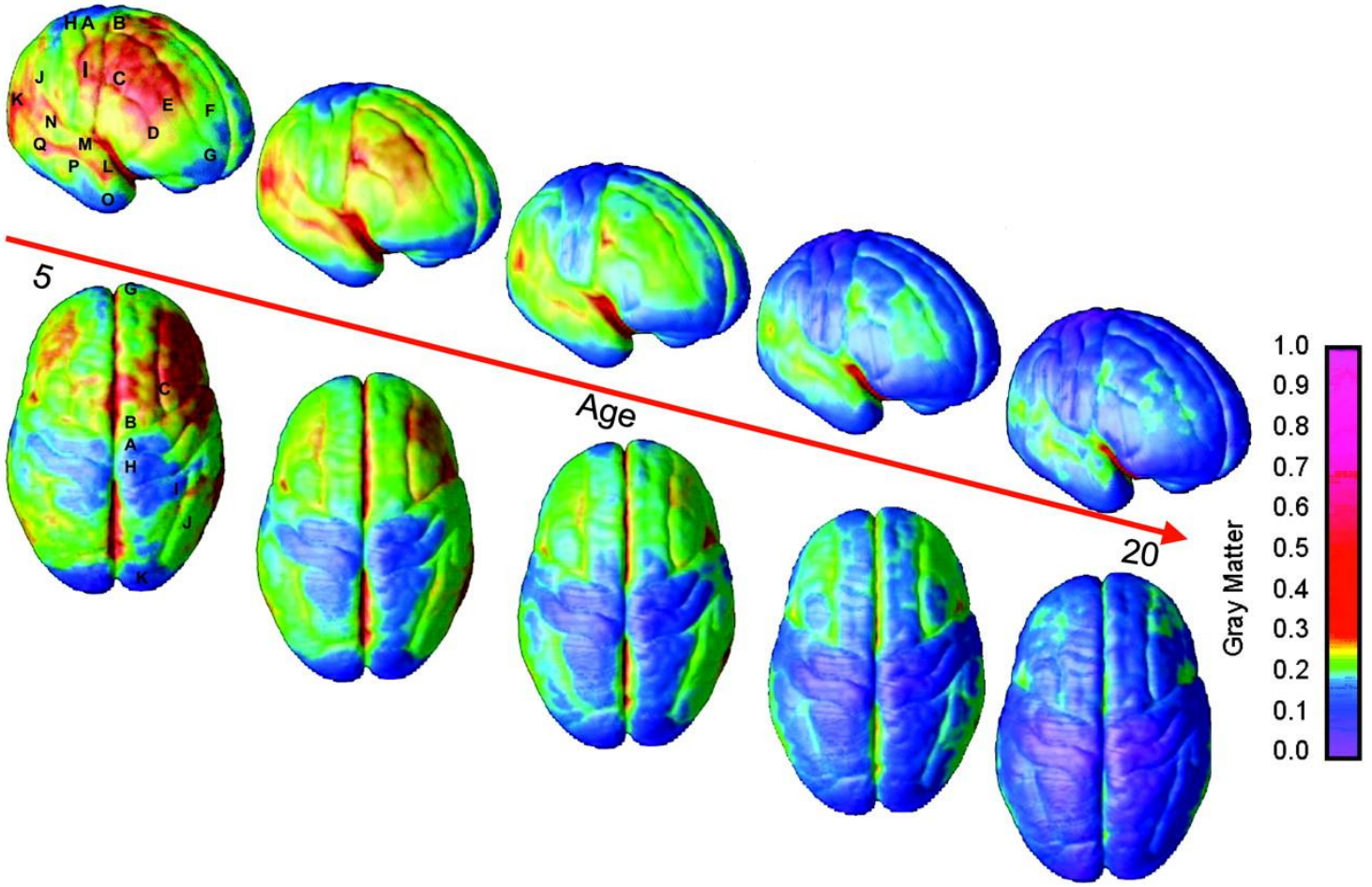
Dekaban, A.S. and Sadowsky, D. (1978). *Annals of Neurology*, 4:345-356.

Neuron Growth in Brain Development

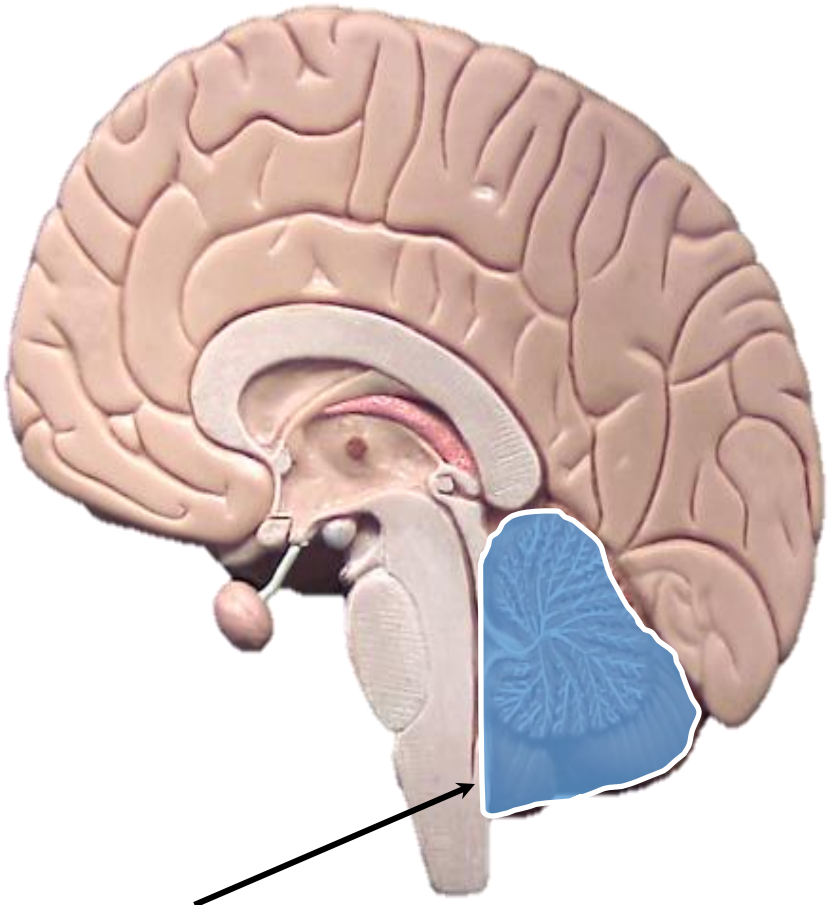


http://etec.ctlt.ubc.ca/510wiki/Brain-based_Learning

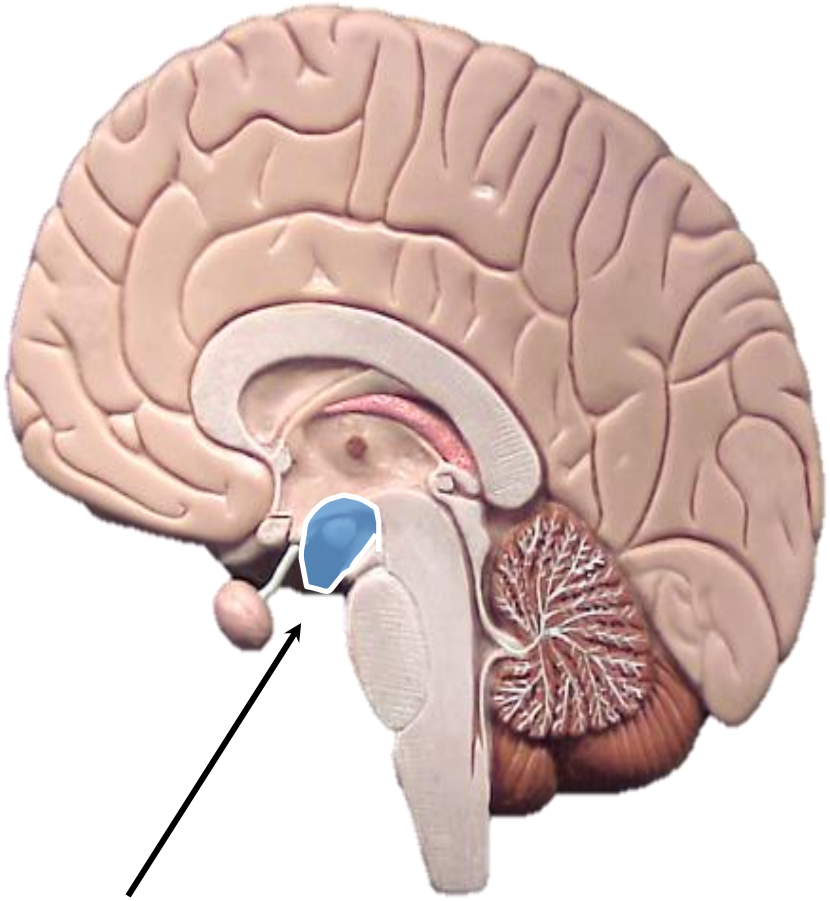
Brain Maturation



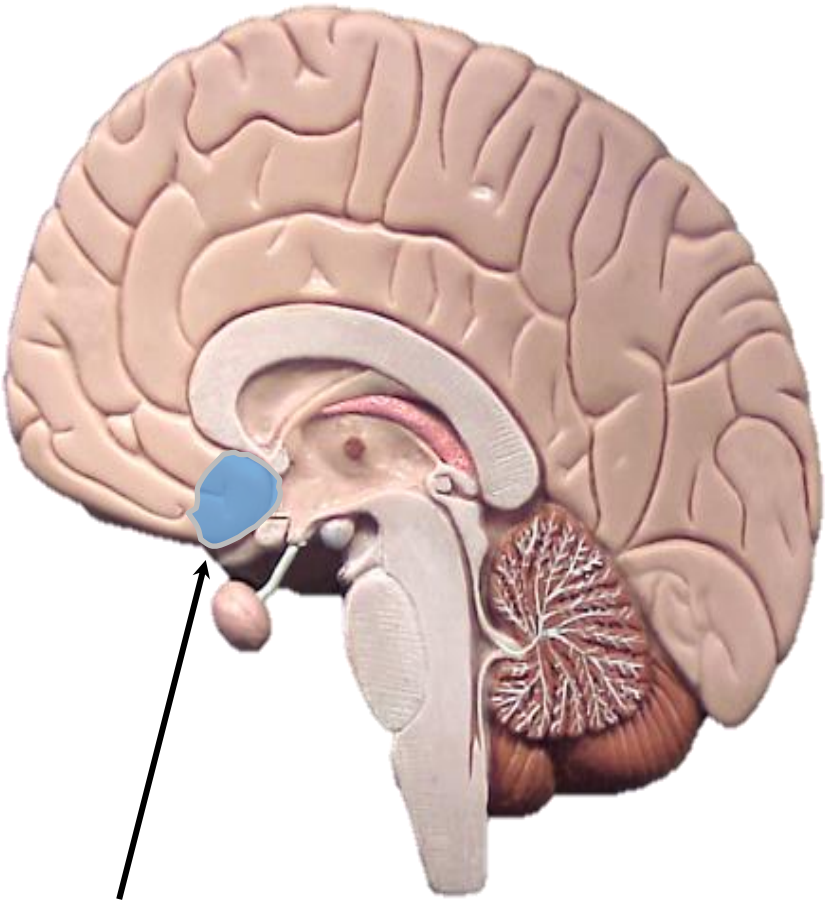
Copyright (2004) National Academy of Sciences, USA Gogtay et al (2004). *P Nat Acad Sci.* 101(21):8174-8179. Retrieved on February 17, 2015 from http://www.ncbi.nlm.nih.gov/pmc/articles/PMC419576/figure/fig3/ Permission received from PNAS.



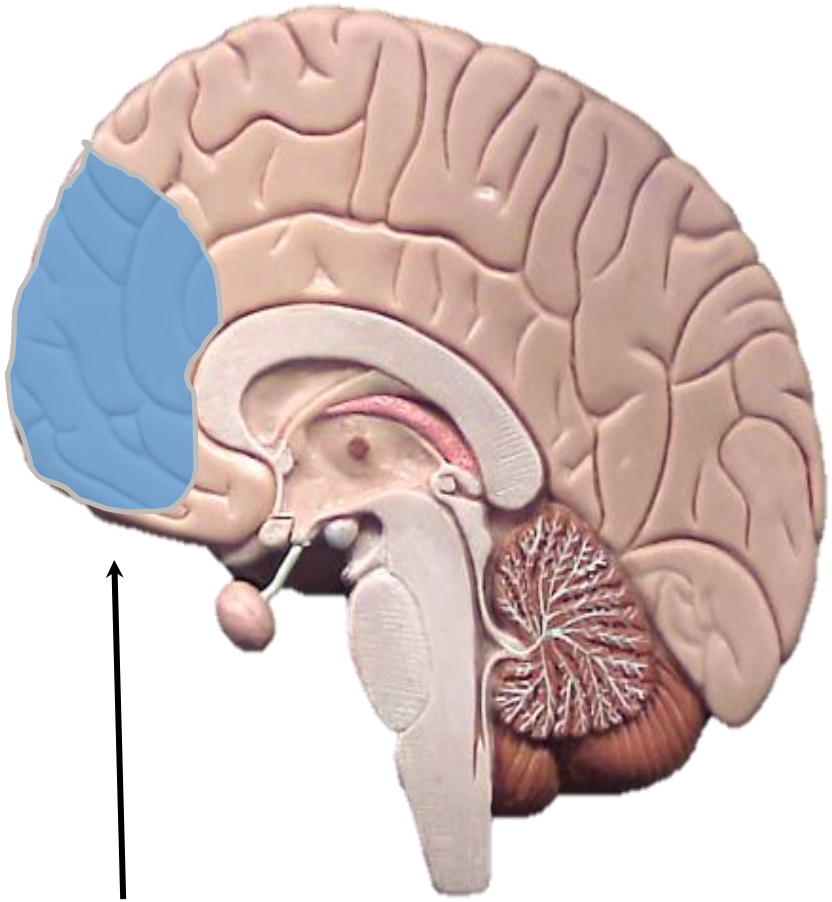
Cerebellum



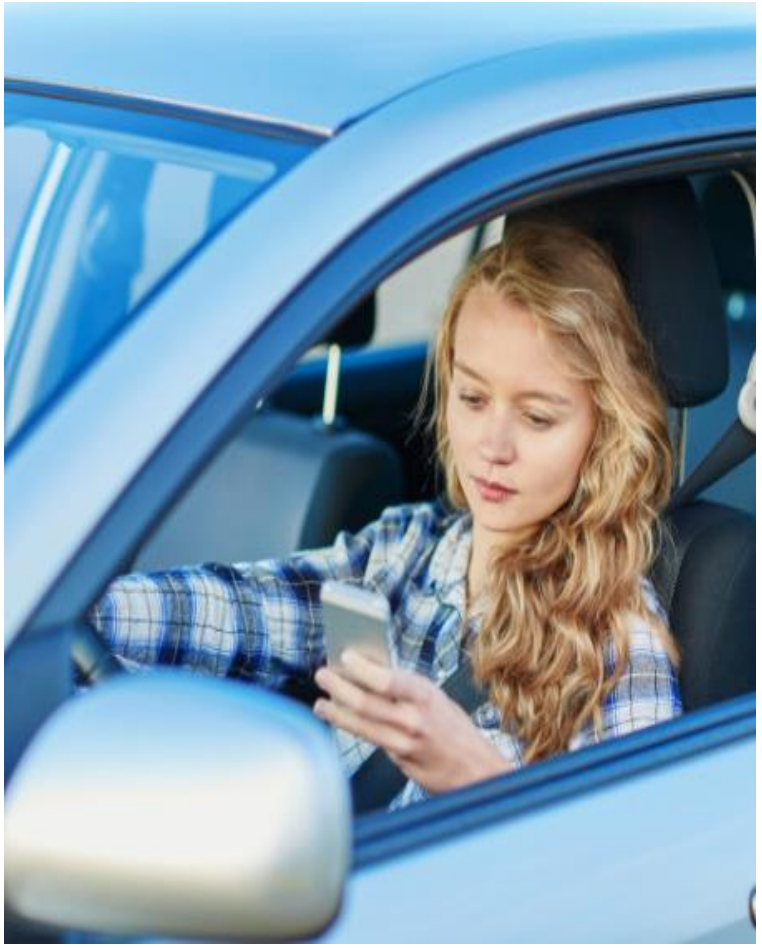
Amygdala

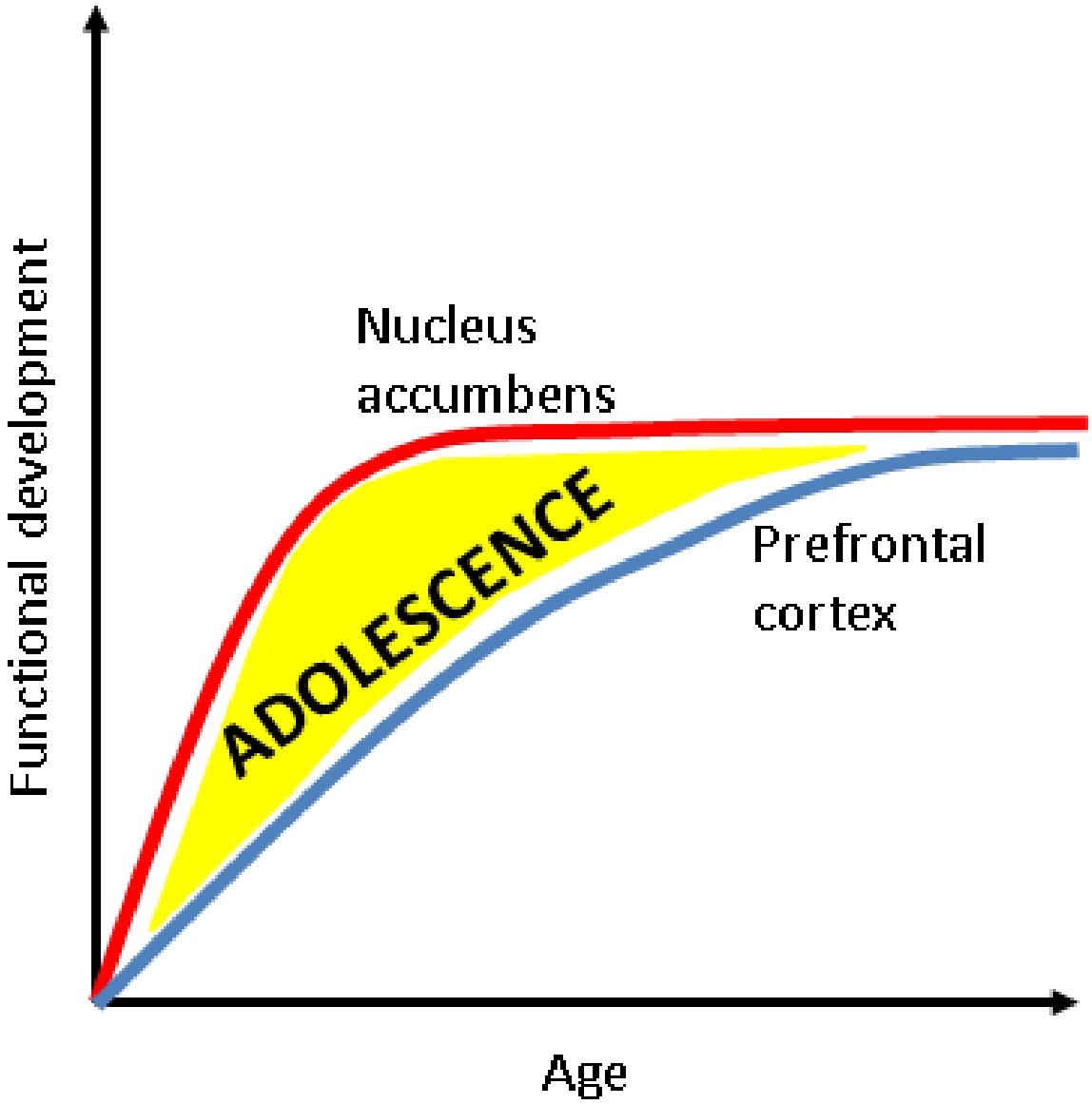


Nucleus accumbens



Prefrontal cortex





Casey BJ, et al., Development Reviews. 2008; 28: 62-77.

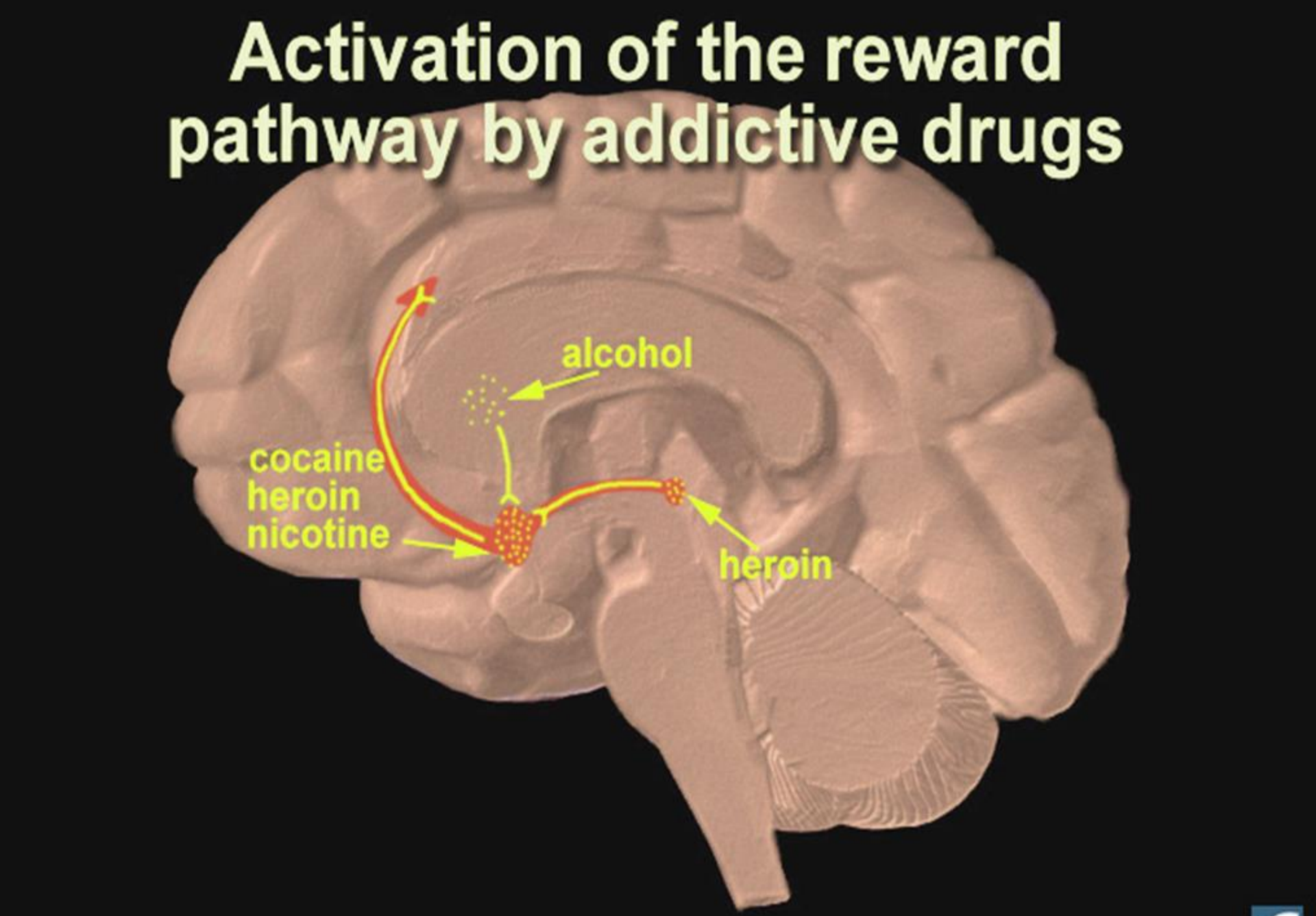
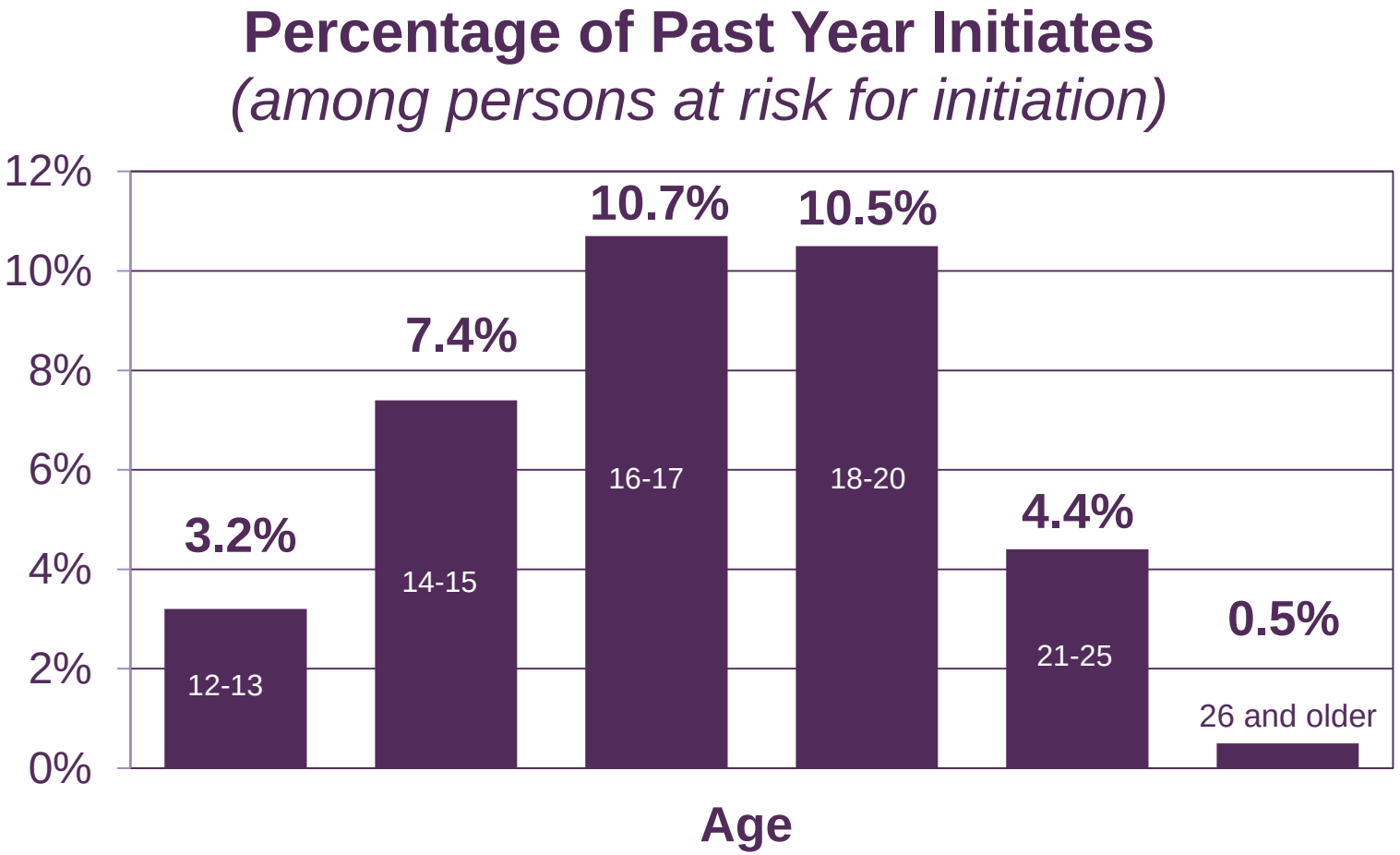


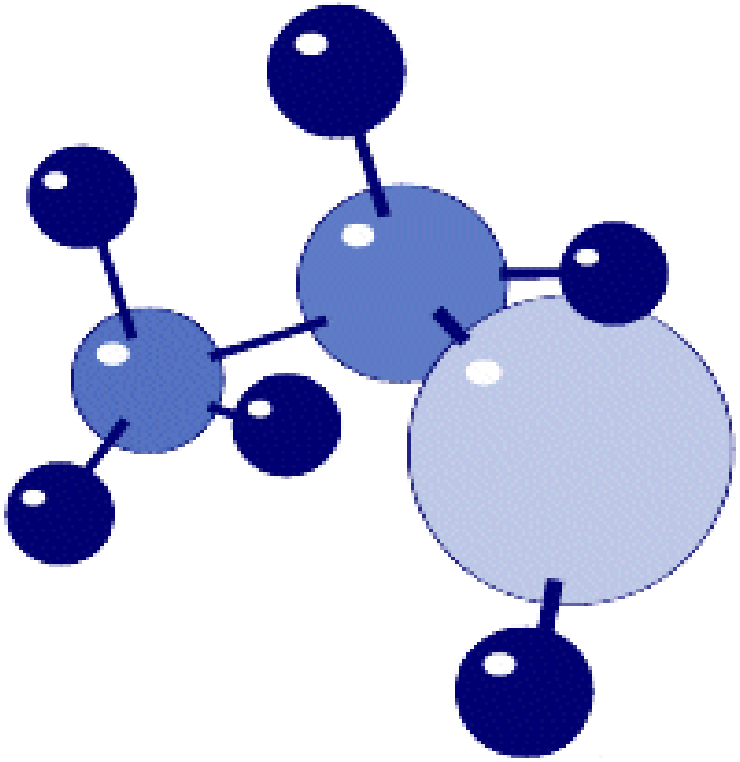
Image retrieved on February 17, 2015, from http://www.drugabuse.gov/publications/teaching-packets/neurobiology-drug-addiction/section-iv-action-cocaine/7-summary-addictive-drugs-activate-reward

Adolescents are developmentally primed to use substances

Most Substance Use Starts in Adolescence



Ethyl Alcohol



CH_3-CH_2-OH

Parts of the Brain Affected by Alcohol

Parts of the Brain Affected by Alcohol

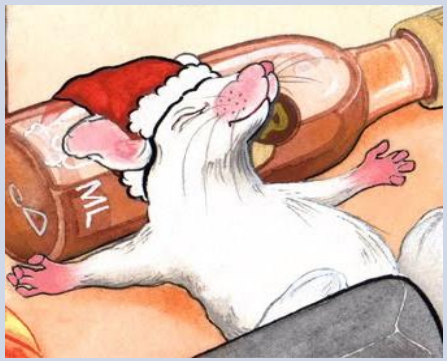
90% of all Alcohol Consumed by Underage Drinkers Occurs in the Context of a Binge*

*Binge= 4 or more drinks for women and 5 or more drinks for men

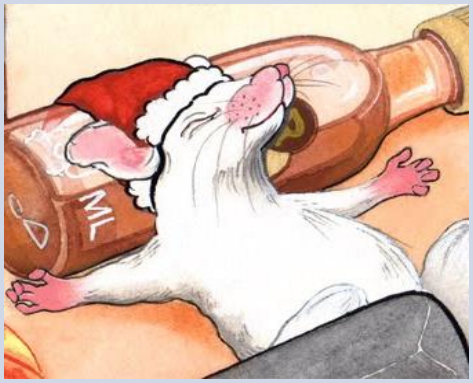
Office of Juvenile Justice and Delinquency Prevention. Drinking in America: Myths, Realities, and Prevention Policy. Washington, DC: U.S. Department of Justice, 2005.

Adolescents Respond Differently to Intoxication

Sircar & Sircar (2005). Adolescent Rats Exposed to Repeated Ethanol Treatment Show Lingering Behavioral Impairments. *Alcohol Clin Exp Res* 29(8):1402–1410.

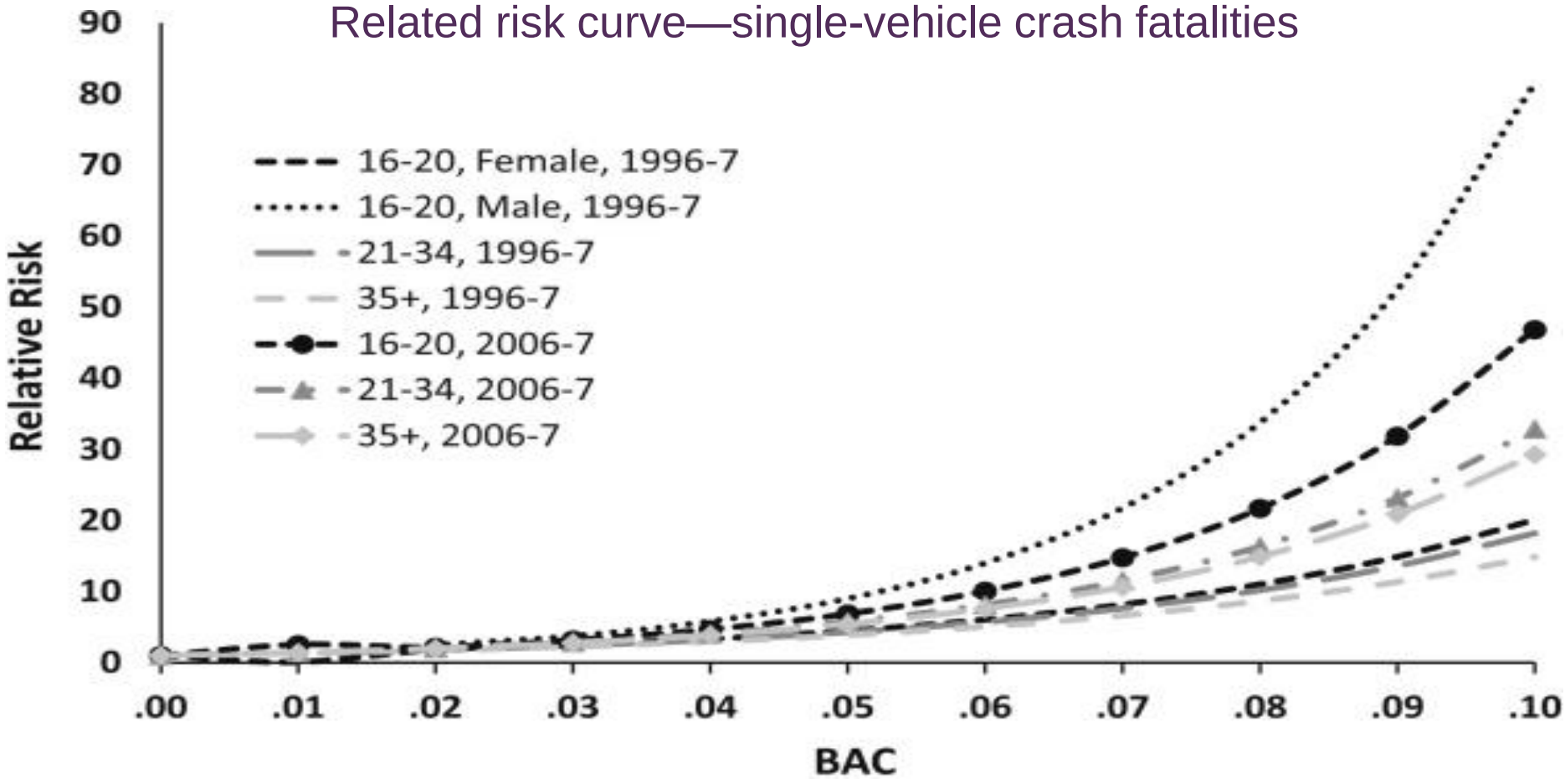
Intoxicated Adult Rat	Swimming Speed	Time to Platform
	Decreased	Increased

Sircar & Sircar (2005). Adolescent Rats Exposed to Repeated Ethanol Treatment Show Lingering Behavioral Impairments. *Alcohol Clin Exp Res* 29(8):1402–1410.

Intoxicated Adult Rat	Swimming Speed	Time to Platform
	Decreased	Increased

Intoxicated Adult Rat	Swimming Speed	Time to Platform
	Unchanged	Increased

At Higher Blood Alcohol Content (BAC), Younger Drivers are Much More likely to be Involved in a Car Crash



Voas RB, Torres P, Romano E, Lacey JH (2012). Alcohol-related risk of driver fatalities. *J Stud Alcohol Drugs* 73(3):341-50.

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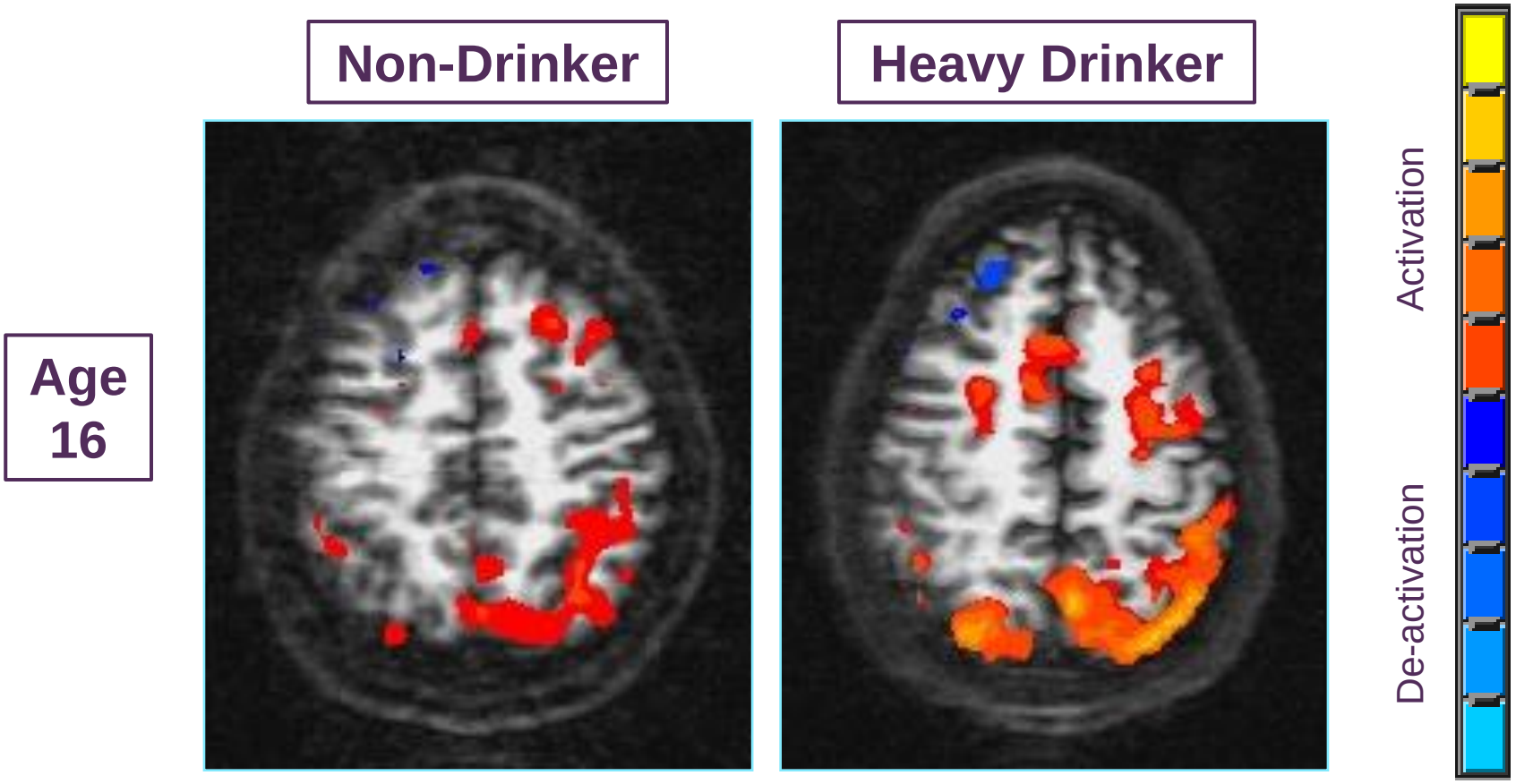
Impact of Chronic Alcohol Exposure

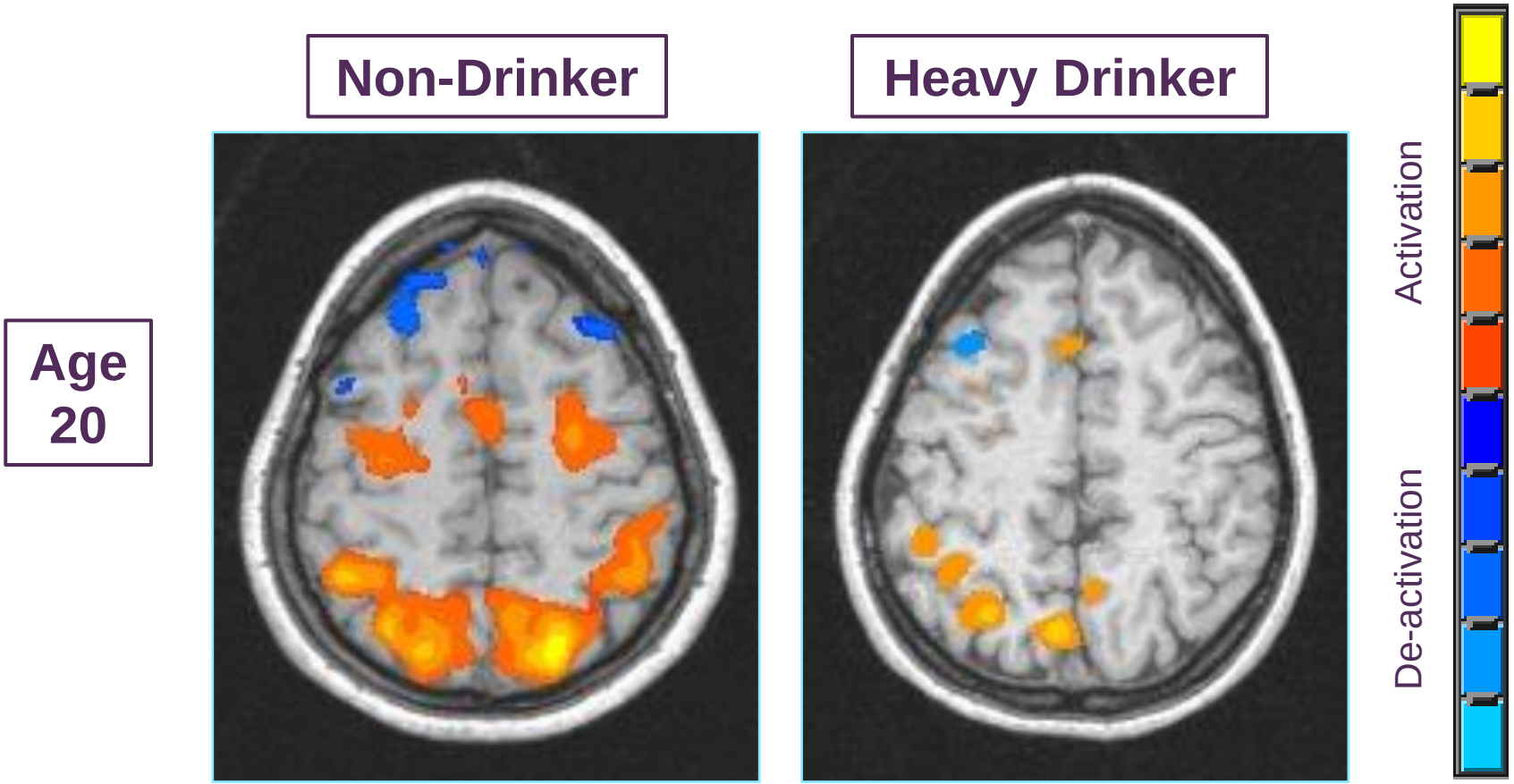
Slide courtesy of Susan Tapert, PhD.

At Age 16, Heavy Drinkers Recruit More Brain Tissue to Accomplish a Task



Tapert SF, Brown GG, Kindermann SS, Cheung EH, Frank LR, Brown SA (2001). fMRI measurement of brain dysfunction in alcohol-dependent young women. *Alcohol Clin Exp Res* 25(2):236-245. Tapert SF, Brown GG, Baratta MV, Brown SA (2004). fMRI BOLD response to alcohol stimuli in alcohol dependent young women. *Addict Behav* 29(1):33-50.

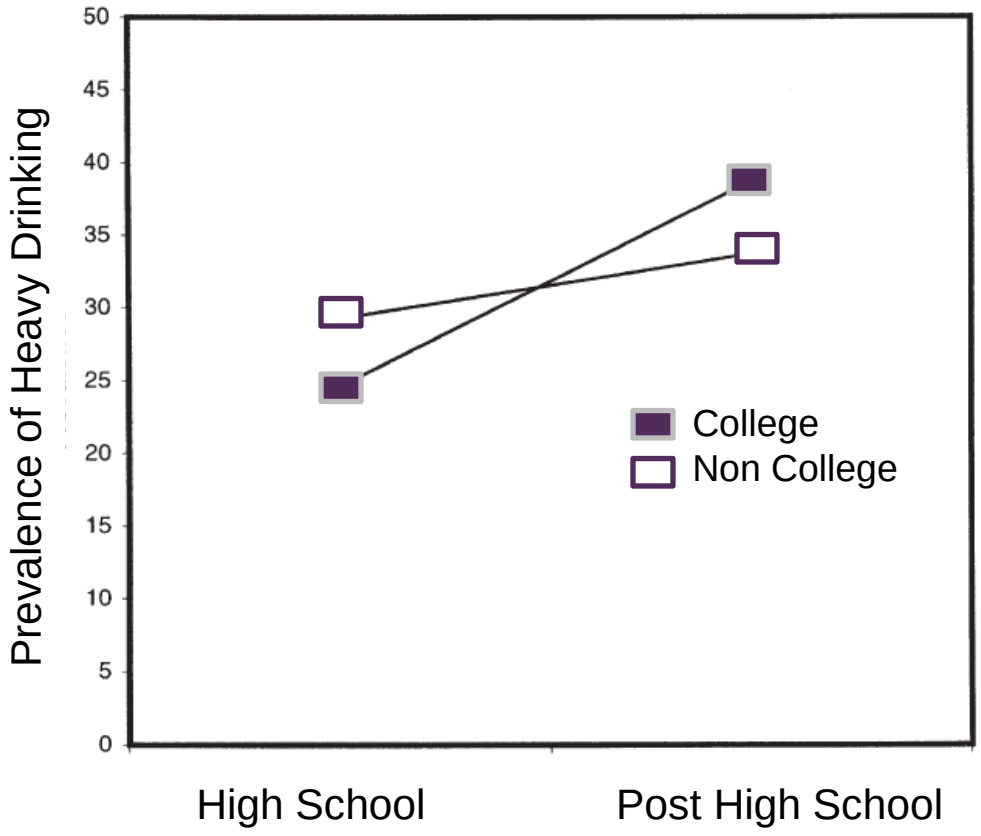
By Age 20, Heavy Drinkers No Longer as Able to Recruit Tissue and Performance Declines



Tapert SF, Brown GG, Kindermann SS, Cheung EH, Frank LR, Brown SA (2001). fMRI measurement of brain dysfunction in alcohol-dependent young women. *Alcohol Clin Exp Res* 25(2):236-245. Tapert SF, Brown GG, Baratta MV, Brown SA (2004). fMRI BOLD response to alcohol stimuli in alcohol dependent young women. *Addict Behav* 29(1):33-50.

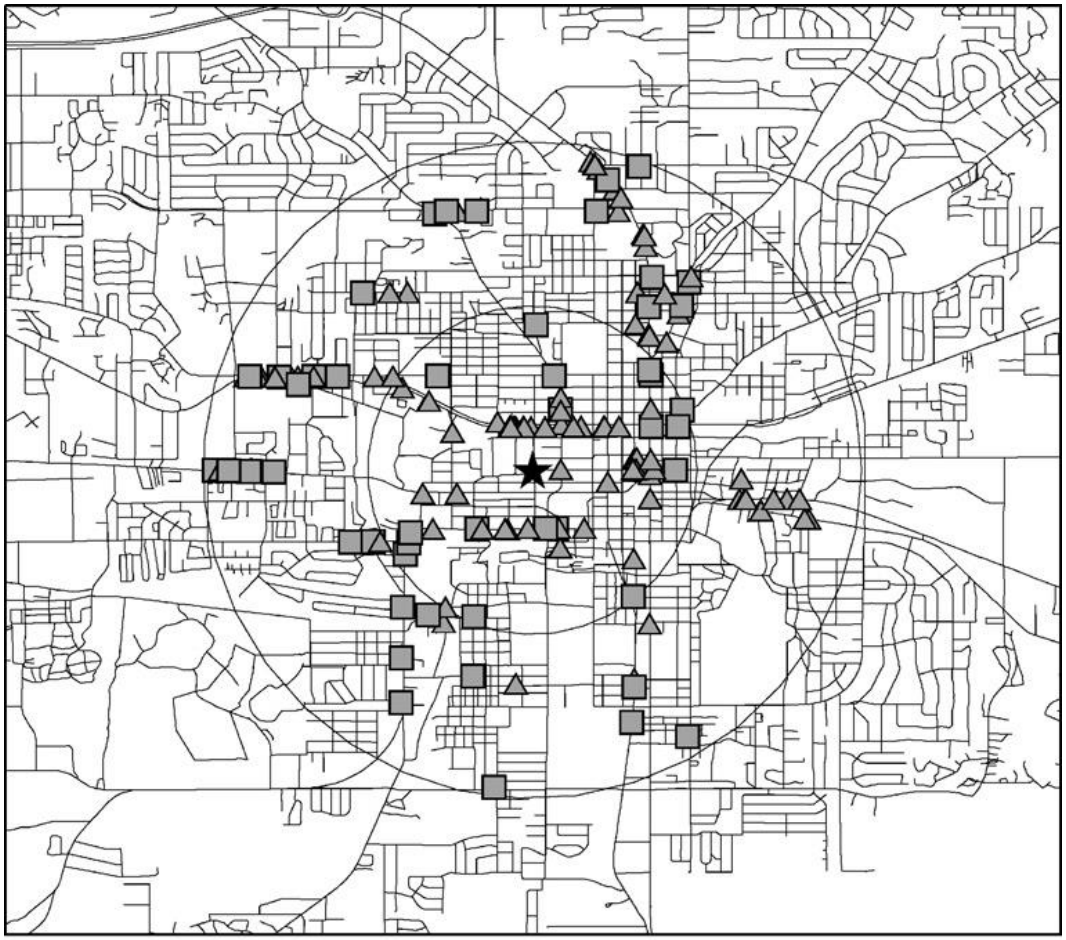
College Alcohol Use

College-bound HS Students Drink Less but College Students Drink More than Peers



O'Malley PM, Johnston LD (2002). Epidemiology of alcohol and other drug use among American college students. *J Stud Alcohol Suppl* (14):23–39.

Alcohol Outlet Density in 2-mile Radius of A University Campus



Weitzman ER, Folkman A, Folkman KL, & Wechsler H (2003). *Health Place* 9(1):1–6.

Almost **75% of campus bars offered specials on weekends…**The availability of large volumes of alcohol, low sale price, and frequent promotions were associated with higher binge drinking rates and positively associated with consumption.

Kuo M, Wechsler H, Greenberg P, & Lee H (2003). The marketing of alcohol to college students: the role of low prices and special promotions. *Am J Prev Med* 25(3):204–11.

The Marketing of Alcohol to College Students

The Role of Low Prices and Special Promotions

Meichun Kuo, ScD, Henry Wechsler, PhD, Patty Greenberg, MA, Hang Lee, PhD

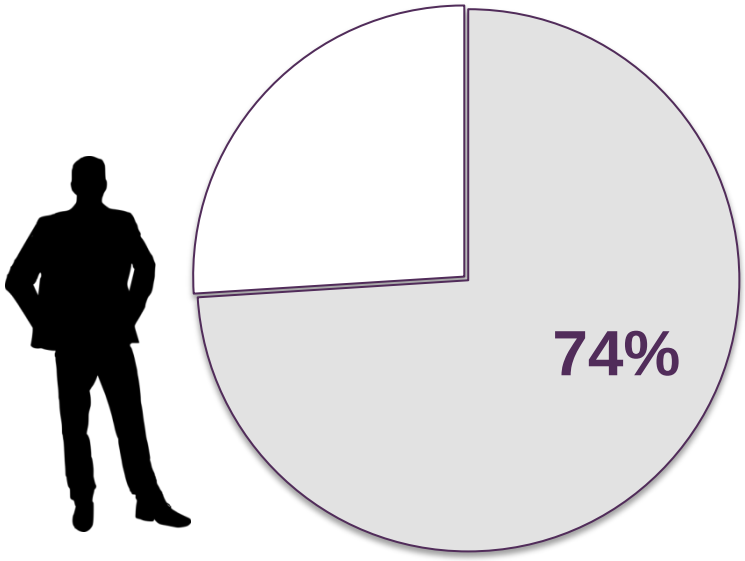
Table 3. Total alcohol environment and colleges' drinking rate (n=118)

	Total alcohol environment score	
Variables	Correlation coefficient	p value
Binge-drinking rate	0.49	<0.001
Past 30-days drinking rate	0.41	<0.001
Annual drinking rate	0.35	<0.001

The perfect beer for removing “no” from your vocabulary for the night.

Alcohol and Sexual Victimization

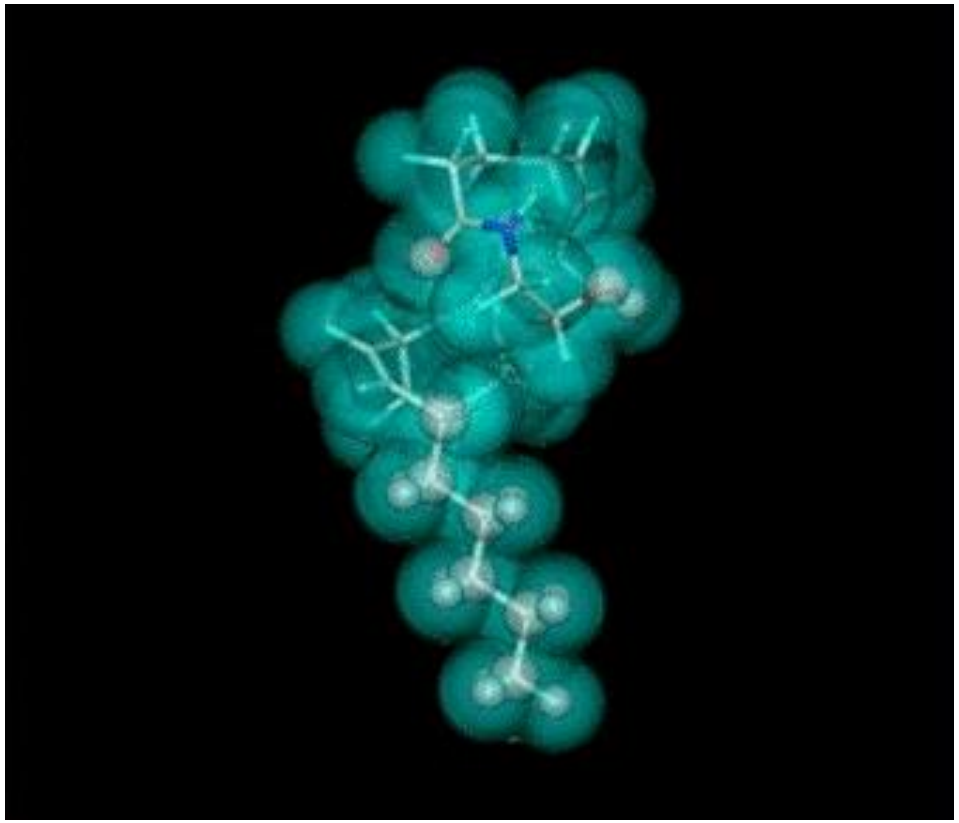
Up to **74%** of assaults are committed by men who have been drinking



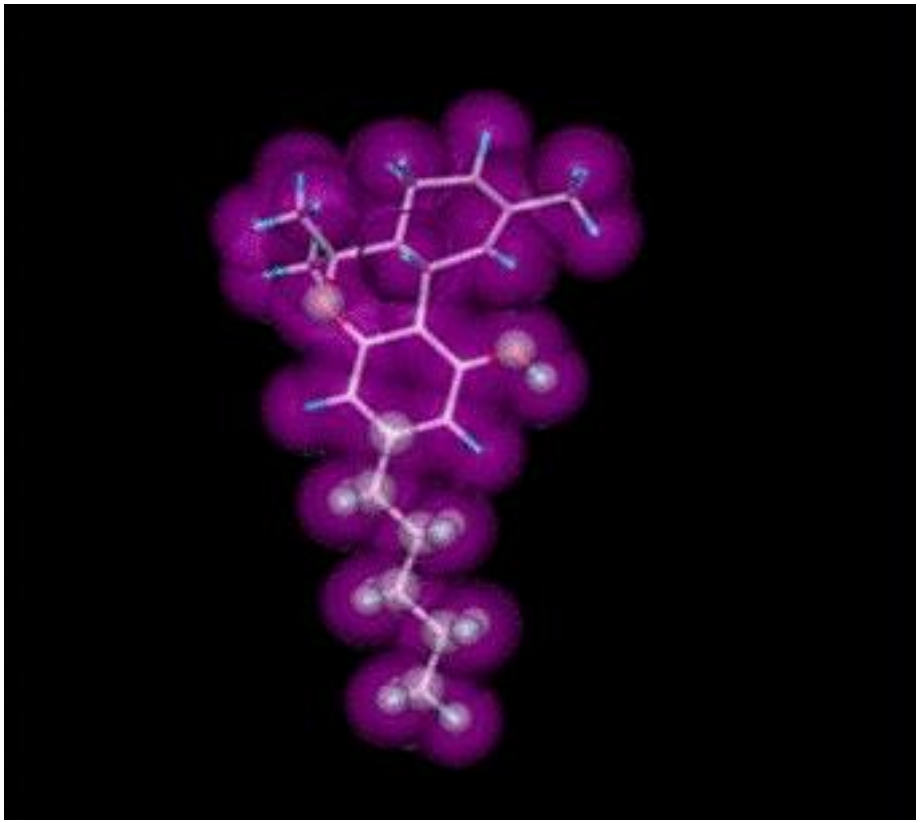
Abbey A et al. Alcohol and Sexual Assault. National Institute on Alcohol Abuse and Alcoholism. https://pubs.niaaa.nih.gov/publications/arh25-1/43-51.htm

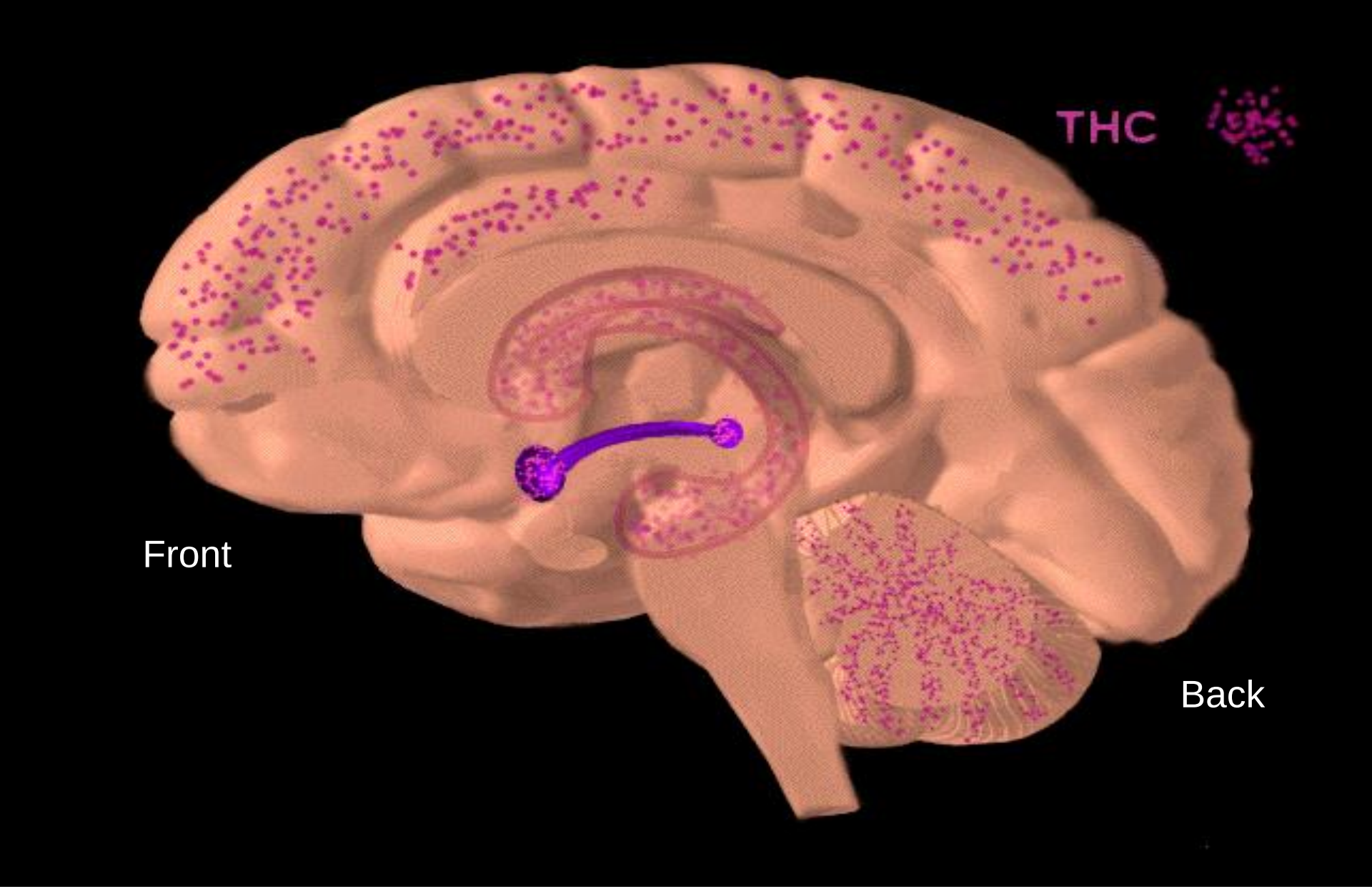
Marijuana

Anandamide



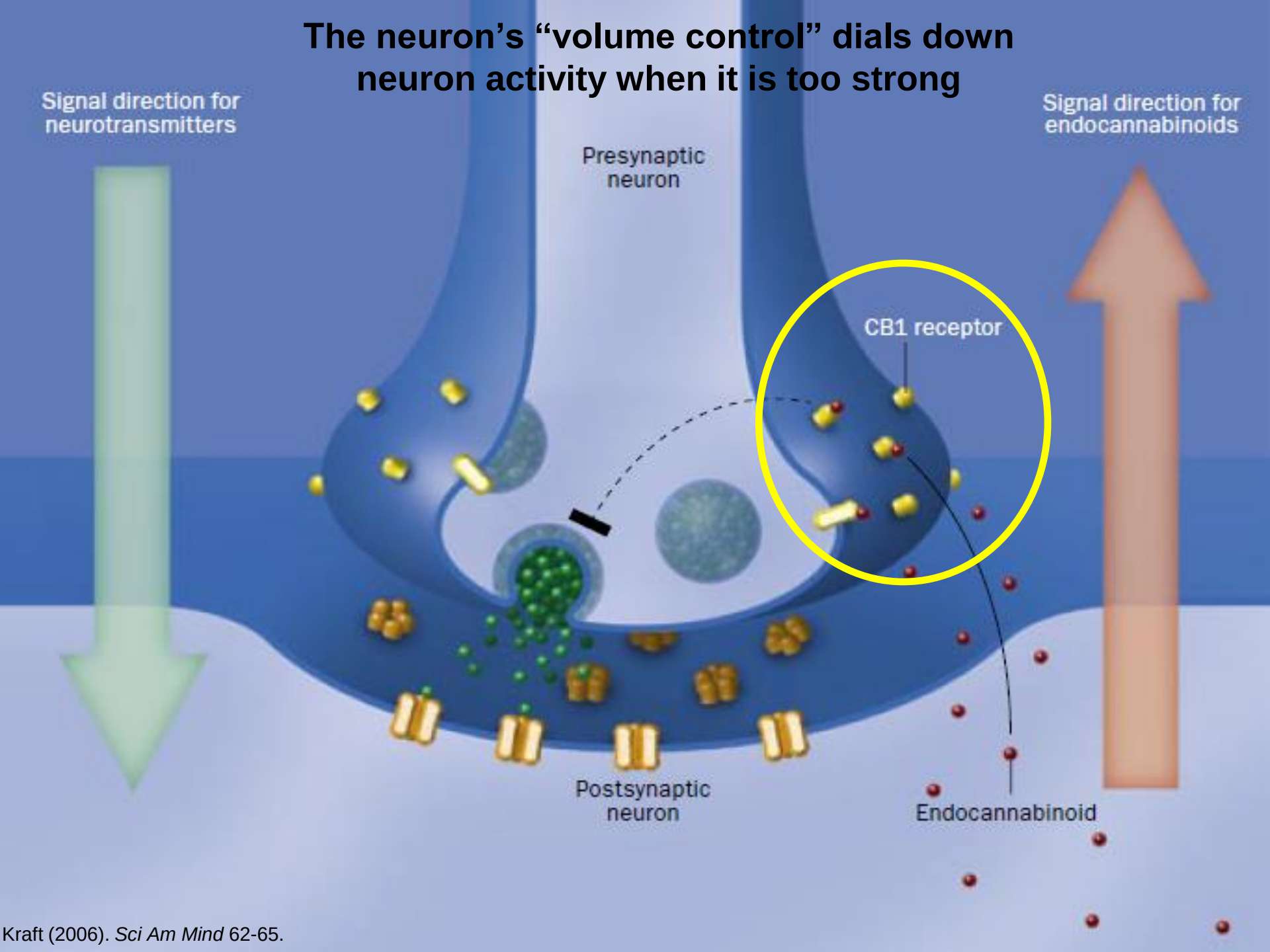
THC





NIDA

The neuron's "volume control" dials down neuron activity when it is too strong



Kraft (2006). *Sci Am Mind* 62-65.

Receptor Binding in Brain Tissue

Compound	Potency relative to THC
(-)-Delta9-THC	1
Anandamide	.47*

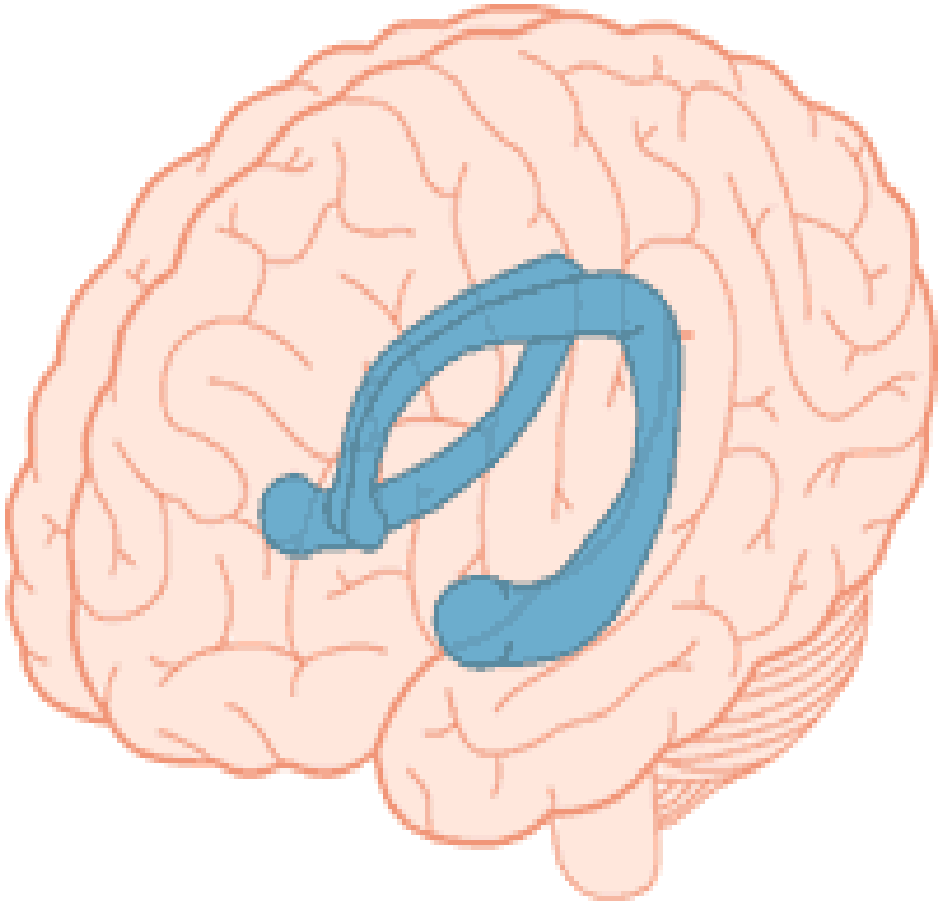
***The affinity of anandamide for cannabinoid receptors ranges from about one-fourth to one-half that of THC. The differences depend on the cells or tissue that are tested and on the experimental conditions, such as the binding assay used.

Joy J, Watson SJ, Benson JJ, eds. (1999). Cannabinoids and animal physiology. In: *Marijuana and Medicine: Assessing the Science Base*. Washington, DC: Division of Neuroscience and Behavioral Health -Institute of Medicine. National Academies Press.

THC vs. Anandamide

Joy J, Watson SJ, Benson JJ, eds. (1999). Cannabinoids and animal physiology. In: *Marijuana and Medicine: Assessing the Science Base*. Washington, DC: Division of Neuroscience and Behavioral Health -Institute of Medicine. National Academies Press.

Memory Impairment



Iversen L (2004). How cannabis works in the brain. In *Marijuana and Madness*. Ed. Castle & Murray. Oxford University Press.

The Dunedin Study

N = 1,037

13 years
Pre-initiation

18 year

21 years

32 years

38 years

1 2 3 4 5

Assessment Ages

The Dunedin Study

N = 1,037

13 years
Pre-initiation

18 year

21 years

32 years

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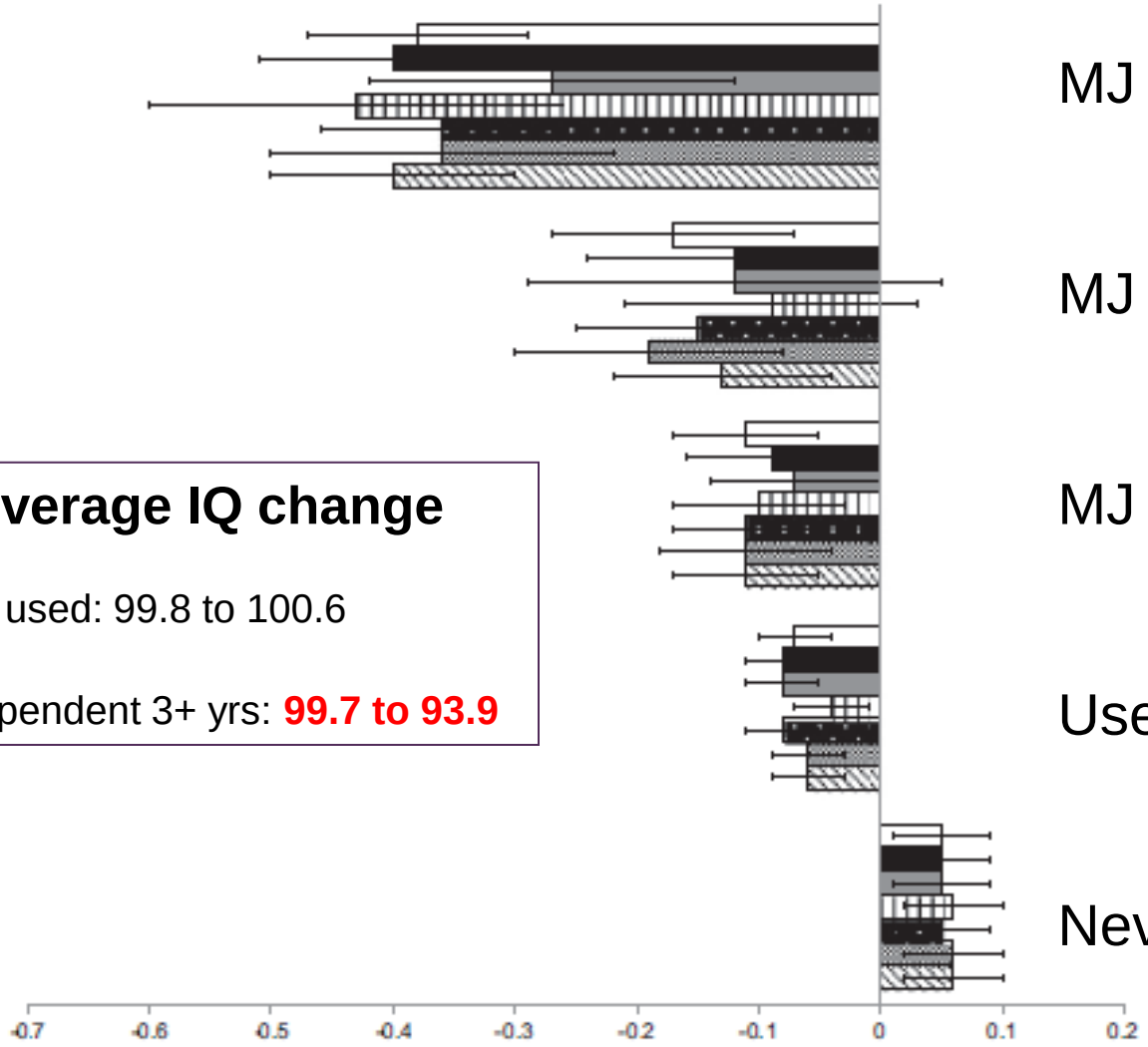
1 2 3 4 5

Assessment Ages



Average IQ change

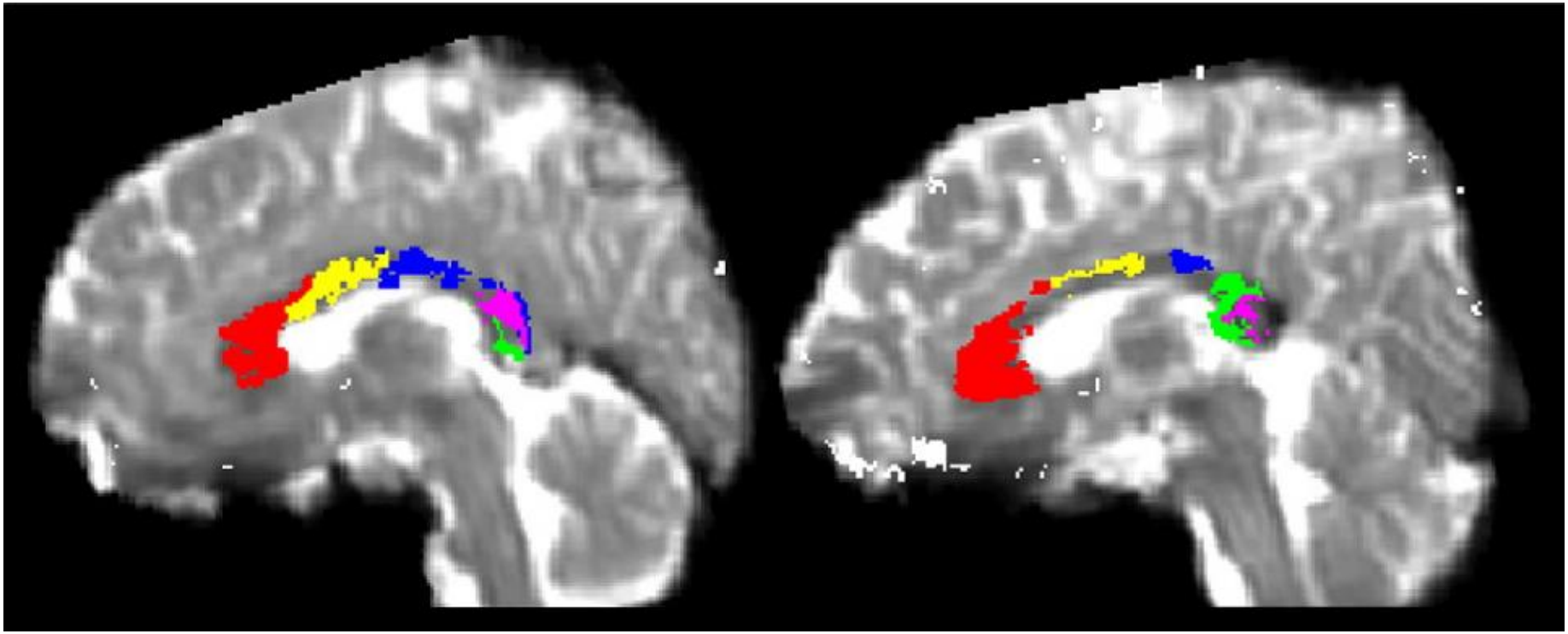
Never used: 99.8 to 100.6

MJ dependent 3+ yrs: **99.7 to 93.9**

Meier et al. (2012). Persistent cannabis users show neuropsychological decline from childhood to midlife. *P Nat Acad Sci* 109(40):E2657–E2664.

Healthy participant w/no MJ use

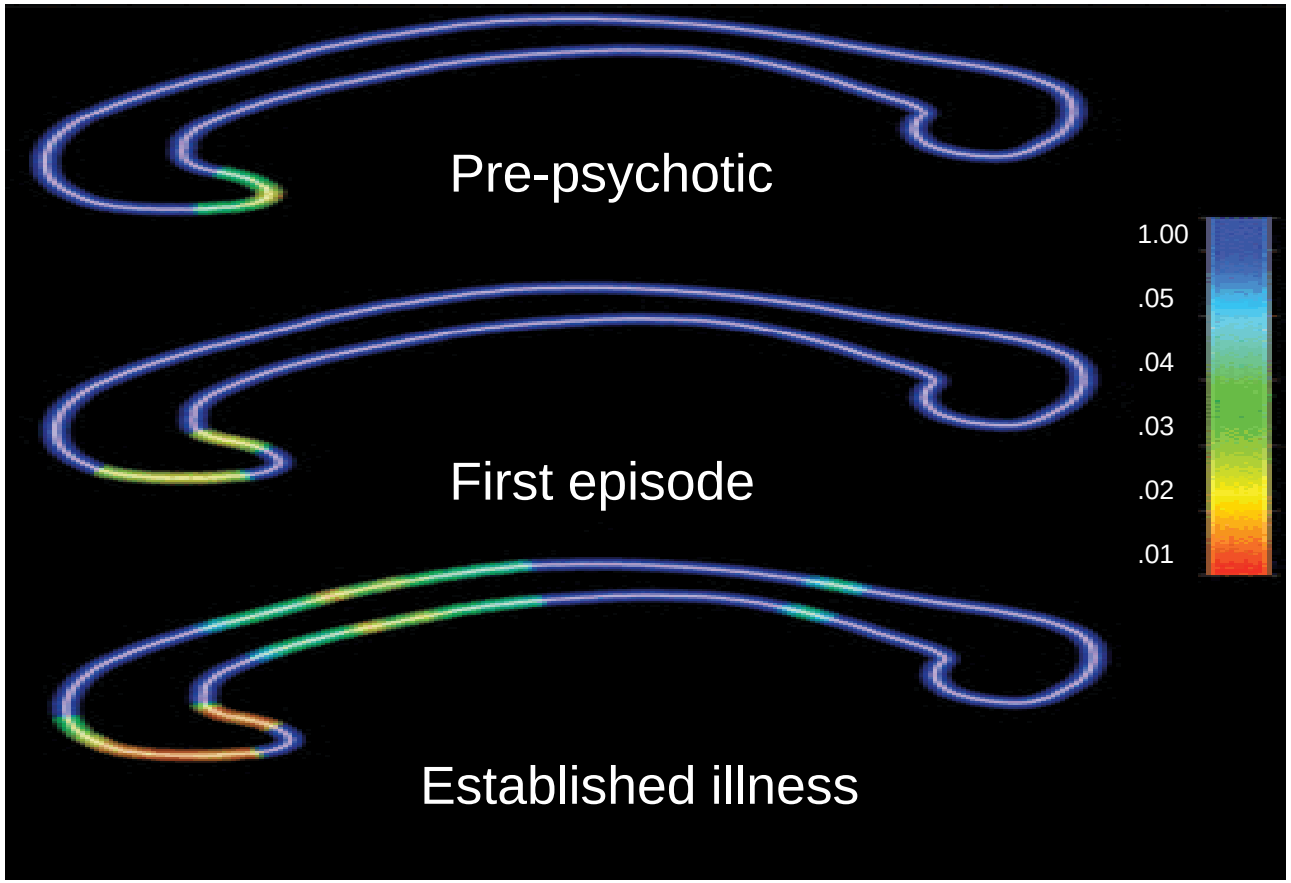
Participant w/daily MJ use



Arnone D, Barrick TR, Chengappa S et al. (2008). Corpus callosum damage in heavy marijuana use: Preliminary evidence from diffusion tensor tractography and tract-based spatial statistics. *Neuro Image* 41:1067-1074.

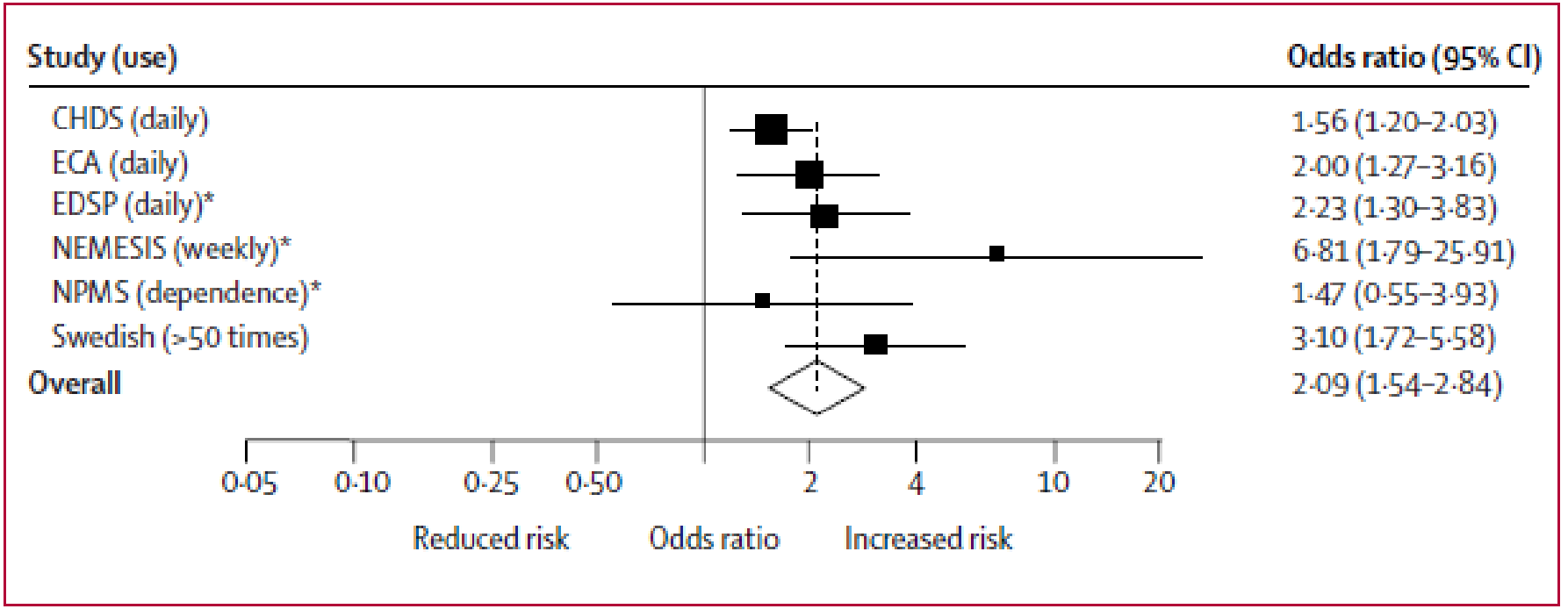
Corpus Callosum in Schizophrenia

Callosal significance maps of regional thickness reductions



Arnone D, Barrick TR, Chengappa S et al. (2008). Corpus callosum damage in heavy marijuana use: Preliminary evidence from diffusion tensor tractography and tract-based spatial statistics. *Neuro Image* 41:1067-1074.

Cannabis Use and Psychotic Disorders



A meta-analysis of 6 studies found an increased risk of psychotic outcome among those who used cannabis most frequently compared with those who did not use cannabis (Adjusted Odds Ratio: 2.09, 95% CI: 1.54-2.84).

Moore et al. (2007). Cannabis use and risk of psychotic or affective mental health outcomes: a systematic review. *Lancet* 370(9584):319–28.

BMJ

RESEARCH

Continued cannabis use and risk of incidence and persistence of psychotic symptoms: 10 year follow-up cohort study

Rebecca Kuepper, research psychologist,[1] Jim van Os, professor,[1] visiting professor,[2] Roselind Lieb, professor,[3,4] Hans-Ulrich Wittchen, professor,[4,5] Michael Höfler, research statistician,[5] Cécile Henquet, lecturer[1]

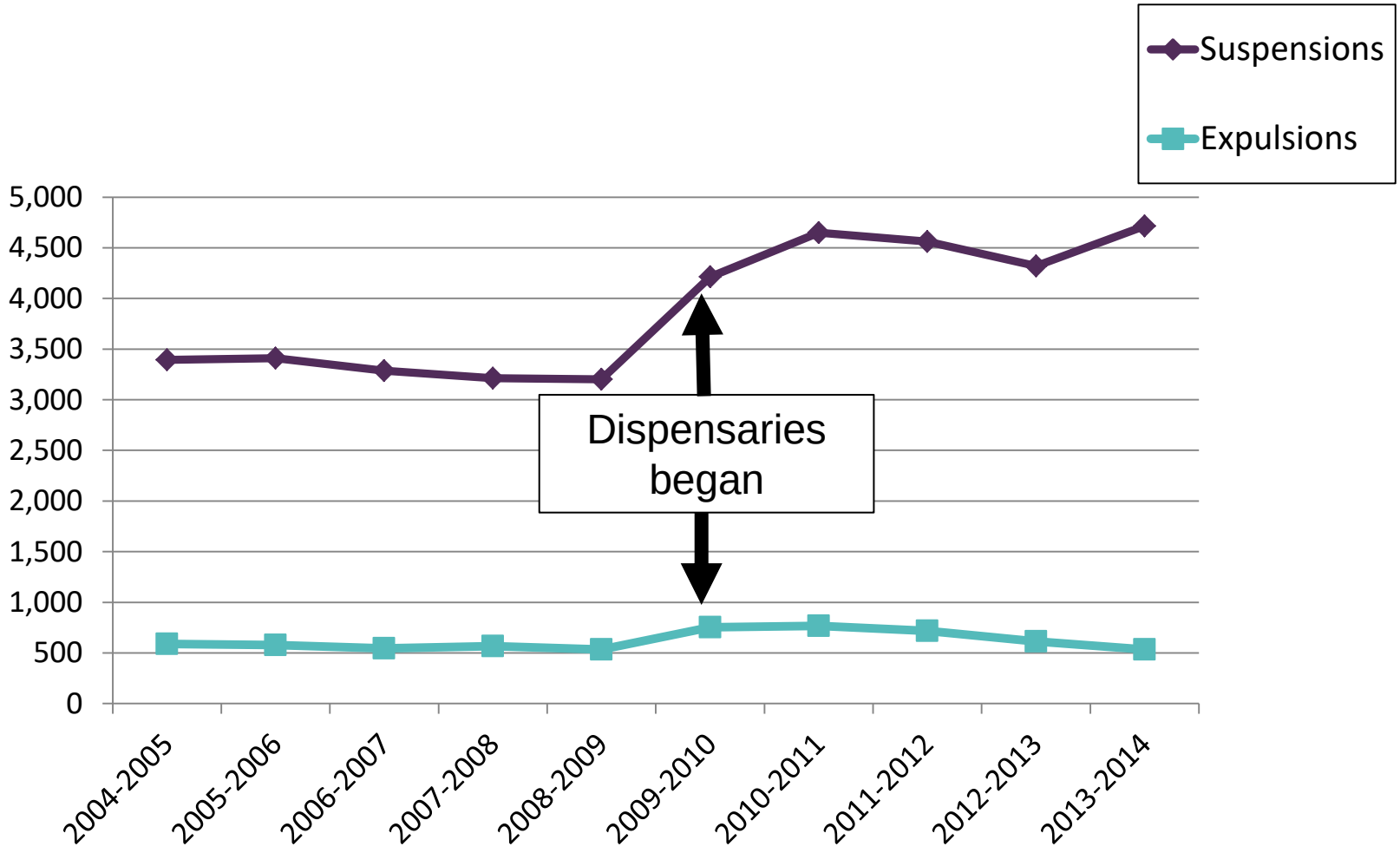
Conclusion: Cannabis use is a risk factor for the development of incident psychotic symptoms. Continued cannabis use might increase the risk for psychotic disorder by impacting the persistence of symptoms.

Kuepper R, van Os J, Lieb R, Wittchen H-U, Höfler M, Henquet C (2011). Continued cannabis use and risk of incidence and persistence of psychotic symptoms: 10 year follow-up cohort study. *BMJ*.

Risks of tobacco use

Risks of cannabis use

Drug-Related School Suspensions and Expulsions in Colorado, 2002-2014



JAMA Pediatrics

VIEWPOINT

Building a Learning Marijuana Surveillance System

Sharon Levy, MD, MPH; Elissa Weitzman, ScD, MSc

Published online January 19, 2016

Substance Abuse and Mental Health Services Administration

SAMHSA

Thursday, September 8, 2016

National report shows less underage drinking and smoking, but overall substance use and mental illness levels remain constant.

A new report provides special focus on the misuse of prescription pain relievers.

150
120

POLICY STATEMENT Organizational Principles to Guide and Define the Child Health Care System and/or Improve the Health of all Children

American Academy of Pediatrics

DEDICATED TO THE HEALTH OF ALL CHILDREN™

Substance Use Screening, Brief Intervention, and Referral to Treatment

COMMITTEE ON SUBSTANCE USE AND PREVENTION

POLICY STATEMENT Organizational Principles to Guide and Define the Child Health Care System and/or Improve the Health of all Children

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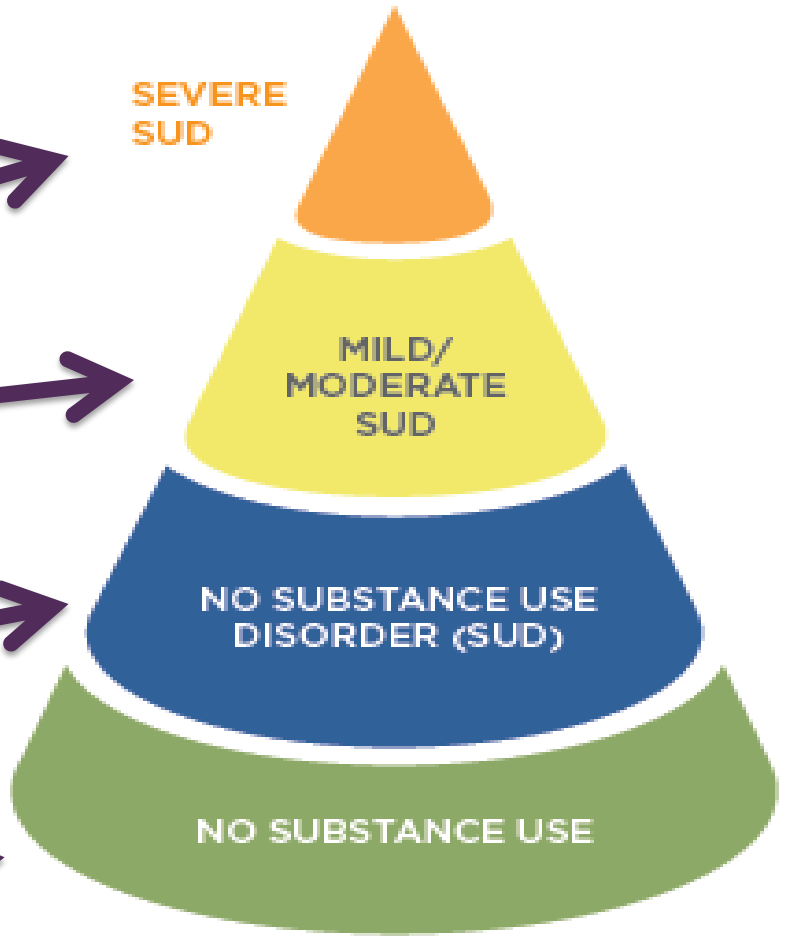
COMMITTEE ON SUBSTANCE USE AND PREVENTION

"The nonuse message should be reinforced by pediatricians through clear and consistent information presented to patients, parents, and other family members."

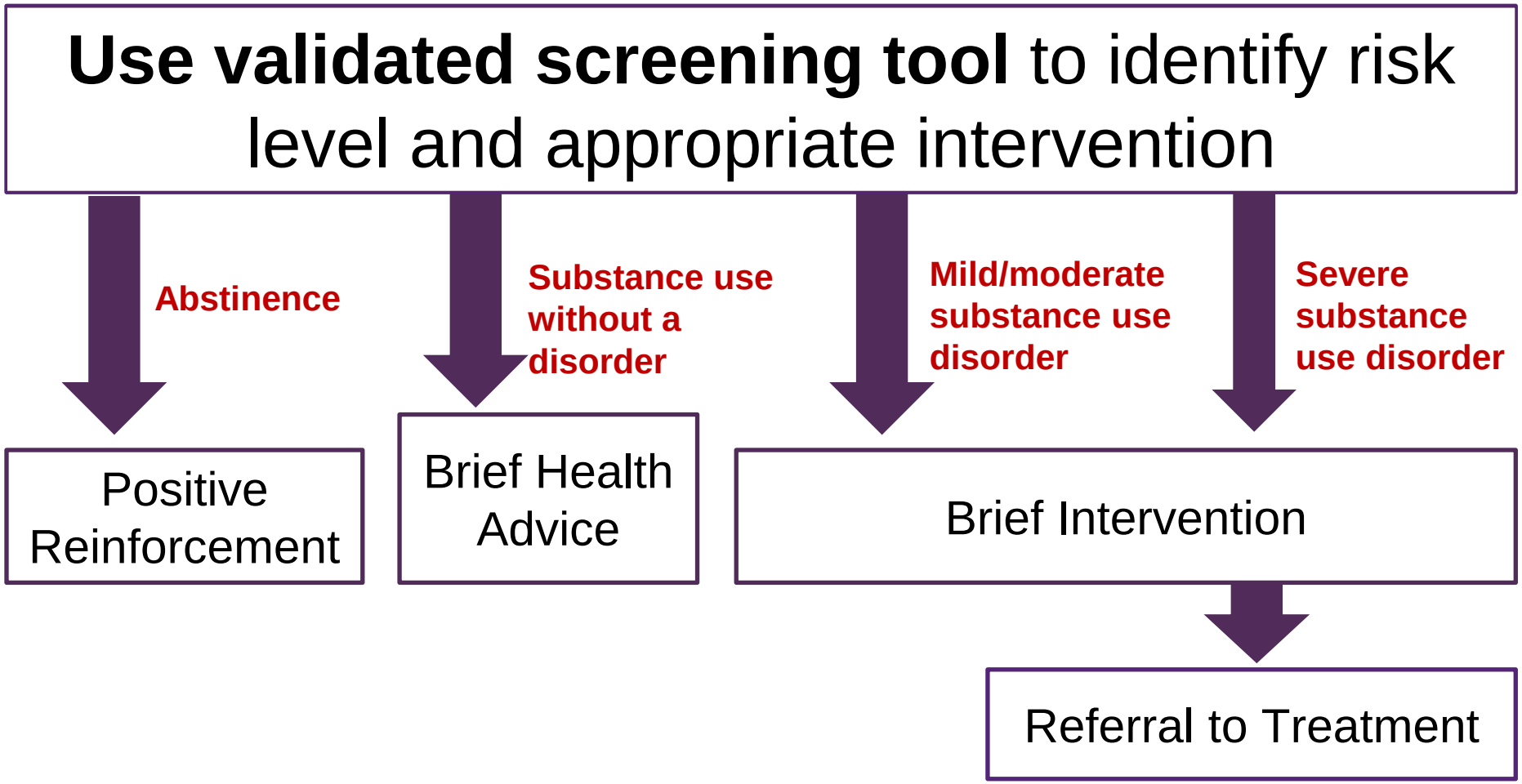
S2BI In the past year, how many times have you used:	
• Tobacco? • Alcohol? • Marijuana?	• Weekly • Monthly • Once or twice • Never

S2BI
In the past year, how many times have you used:

• Tobacco?	• Weekly
• Alcohol?	• Monthly
• Marijuana?	• Once or twice
	• Never



AAP SBIRT Guidelines



Levy SJL, Williams JBW. Substance Use Screening, Brief Intervention, and Referral to Treatment. Pediatrics. June 2016.

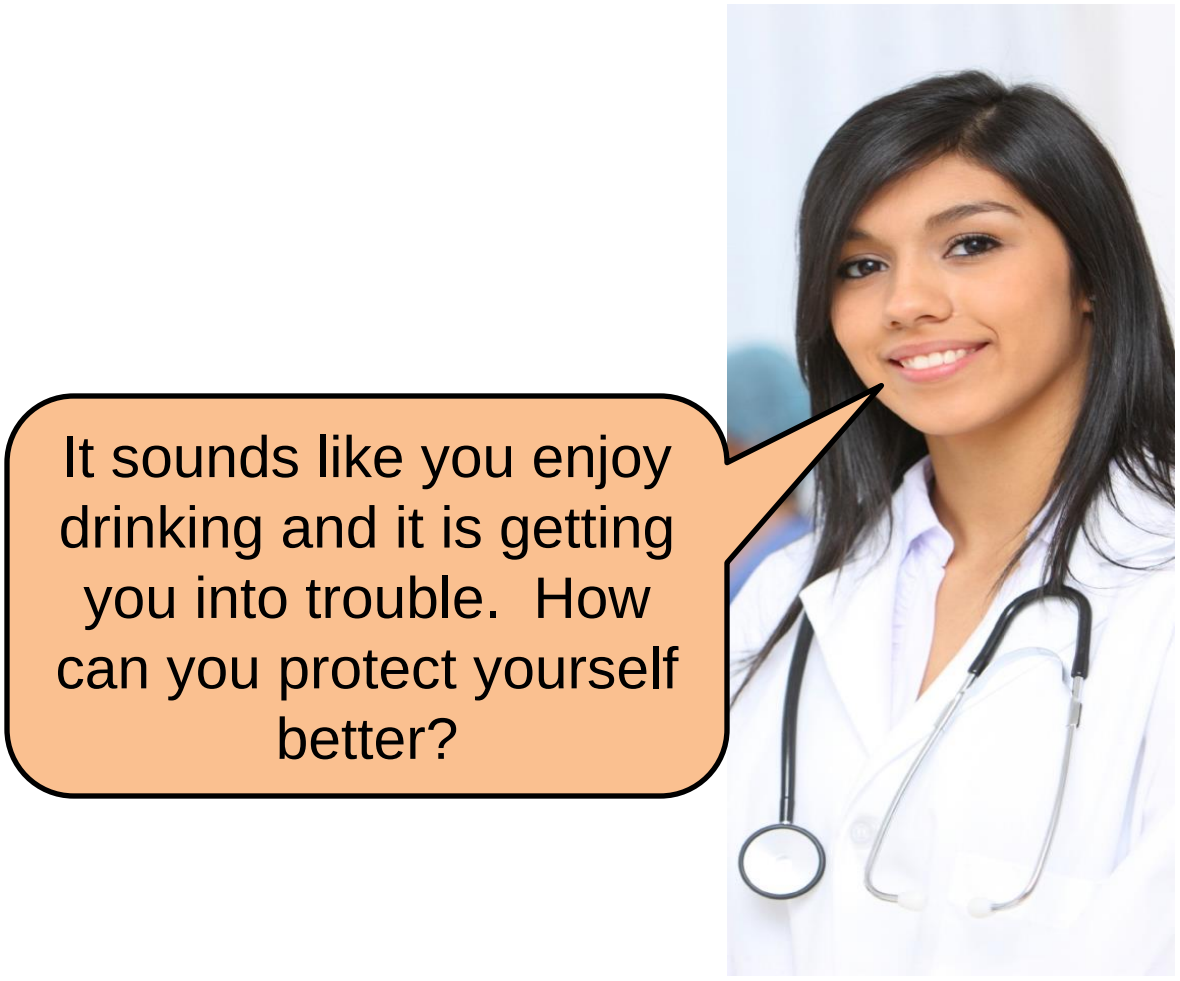
PCSS MAT TRAINING
PROVIDERS' CLINICAL SUPPORT SYSTEM For Medication Assisted Treatment

No use: prevention message

You have made a really good decision in deciding not to drink.

No SUD: cessation message

Mild-moderate SUD: intervention to stop or reduce use



<u>Severe SUD:</u>
intervention to engage in treatment

It sounds like your marijuana use helps you manage stress and you are tired of getting into trouble with your parents and at school. A counselor could help with your stress, and your marijuana use

Decision Support for SUD treatment

Is the youth at risk for withdrawal and/or in need of inpatient detox or stabilization?

- YES → Willing to engage in services?
  - NO → Is youth at risk for harm to self through ongoing substance use that interferes with capacity to provide self-care? **If yes,** refer to state policies on involuntary civil commitment of youth. If state laws support this, discuss option with parent/caregiver. **If no,** provide referral info and follow-up.
  - YES → Is youth over 18?
    - YES → Contact SAMHSA's National Helpline/Treatment Referral Routing Service at **1-800-662-HELP (4357)** or use SAMHSA's online treatment locator (**https://findtreatment.samhsa.gov/**) to find a facility that fits the patient's needs and/or call insurance carrier regarding detox services
    - NO → **Options:**
      - Contact Department of Public Health for consultation
      - Contact SAMHSA's National Helpline/Treatment Referral Routing Service at **1-800-662-HELP (4357)** or use SAMHSA's online treatment locator (**https://findtreatment.samhsa.gov/**) to find a facility that fits the patient's needs **and is appropriate for adolescents**.
      - Inpatient detoxification/youth stabilization
      - Outpatient medication-assisted treatment for opioid dependent adolescents – SAMHSA Treatment Provider may be helpful
      - For patients at risk of withdrawal from alcohol or benzodiazepines: Refer to ED for medical clearance/referral or admission
- NO → Willing to engage in services?
  - YES → Refer to local outpatient provider, insurance carrier, or Youth Central Intake
  - NO → Willing to reduce substance use?
    - NO → If under 18, discuss with parent option of seeking support through the juvenile court and/or Department of Children and Families to obtain supervision from the court system and services by calling local police station
    - YES →
      - Monitor and follow up with youth
      - Refer family to Youth Central Intake
      - Suggest self-help groups for caregiver and for youth

Evidence-Based Treatments for Youth

Brief Interventions

Project	Substance	Results
BNI	Alcohol	Intervention group did better on reducing drinking "being careful" [1]
	Marijuana	No difference at 3 months, but increased abstinence in intervention group at 12 months[2]
5 A's	Tobacco	Study 1 (smokers in 5 A's vs control): Intervention group did better at 3 months but effects faded over time. [3]
		Study 2 (smokers in 5 A's vs control): Intervention group did better at 6 months but effects faded by 12 months. [4]
CHAT	Alcohol/MJ	Decreased perception of peer alcohol and mj use[5]
U-Connect	Alcohol/MJ	Significant changes in alcohol/mj attitudes in in-person and online interventions compared with the control. [6]

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2. Bernstein, E., Edwards, E., Dorfman, D., Heeren, T., Bliss, C., & Bernstein, J. (2009). Screening and brief intervention to reduce marijuana use among youth and young adults in a pediatric emergency department. *Academic Emergency Medicine,* 16(11), 1174-1185.
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Medications for Opioid Use Disorders

Medication	Level of Evidence (for adults)	Comments
Methadone	High[1]	• Full agonist • Limited access under age 18 • Effect on developing brain unknown
Buprenorphine	High[2]	• Partial agonist • Indicated for patients ≥ 16 years old • Can be prescribed in medical office • Abuse potential less than full agonist • Effects on developing brain unknown
XR-Naltrexone	Moderate-High[3]	• Antagonist • Hepatotoxic risk

1. injectable naltrexone for opioid use disorder. Fullerton CA, et al. *Psychiatric Services*, 2014: 65(2): 146-157.
2. Thomas CP, et al. Medication-Assisted Treatment with Buprenorphine: Assessing the Evidence. *Psychiatric Services,* 2014: 65(2): 158-170.
3. Jarvis BP, et al. Extended-release opioid use disorder: a systematic review. *Addiction,* 2018.

Medications for Alcohol Use Disorders

Medication	Level of Evidence	Comments
Naltrexone	Moderate for decreasing alcohol consumption[1] Moderate for preventing return to heavy drinking[1]	Consider for: • Adolescents with concurrent OUD and AUD • Adolescents with strong family history of AUD
Acamprosate	Moderate for decreasing alcohol consumption[1] Low for preventing return to heavy drinking[1]	• Rarely used in adolescents due to limited evidence

1. https://www.effectivehealthcare.ahrq.gov/ehc/products/477/1908/alcohol-misuse-drug-therapy-report-140513.pdf

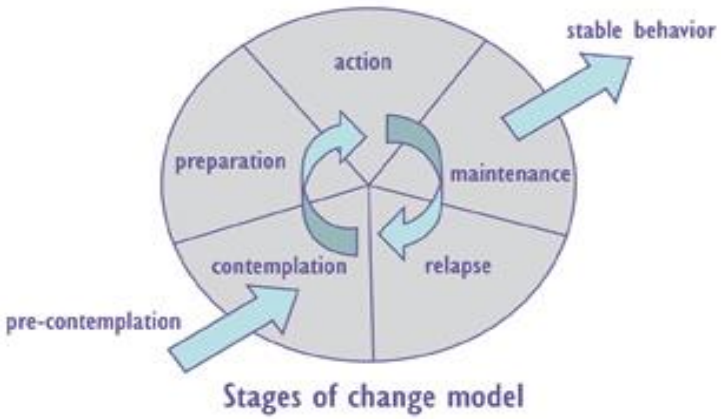
Medications for Cannabis Use Disorders

Medication	Level of Evidence	Comments
N-acetylcysteine	Low [1-4]	• Available as over-the-counter supplement • Not FDA approved for CUD

1. Gray, AM J Psychiatry 2012
2. McClure EA, *Contemp Clin Trials,* 2014: 39(2): 211-223.
3. Laprevote V, J. *Curr Pharm Des,* 2015: 21(23): 3298-3305.
4. Sherman BJ, *Pharmacotherapy*, 2016: 36(5): 511-35.

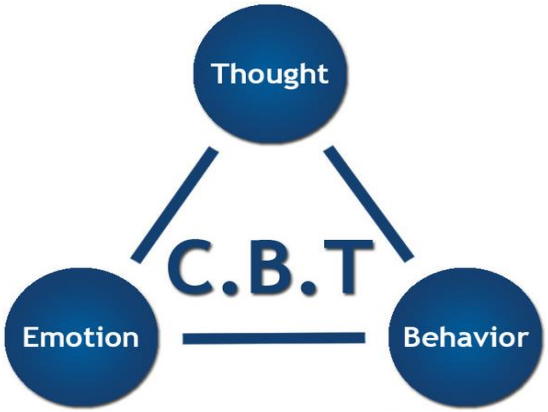
Counseling for Adolescent SUD

Motivational Interviewing

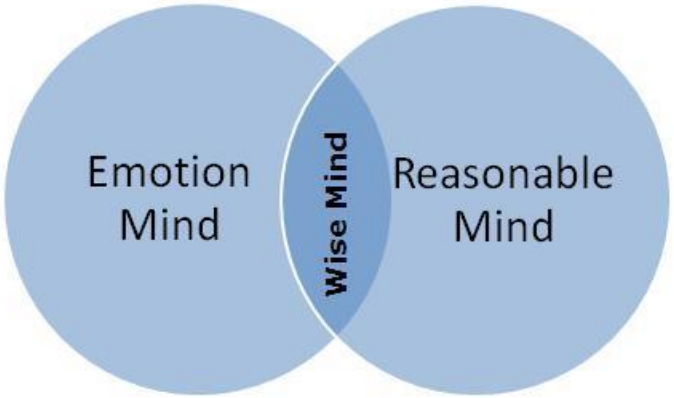


Stages of change model

Cognitive Behavioral Therapy



Dialectical Behavior Therapy



Contingency Management

Behavior → Consequence

Counseling for Adolescent SUD

Technique	Level of Evidence	Comments
Motivational Interviewing	Moderate[1]	Foundational basis of brief interventions
Cognitive Behavioral Therapy	Moderate[2]	Support for teens motivated for behavior change
Dialectical Behavior Therapy	Moderate[3]	Useful for patients with co-occuring mental health or personality disorders
Contingency Management	Moderate[4]	Challenging to implement

1. Jonas DE, *Annals of Internal Medicine,* 2012: 157(9): 645-654.
2. Kaminer Y, In C. Rowe & H. Liddle (eds.), *Adolescent substance abuse: Research and clinical advances*. New York: Cambridge University Press, pp. 346-419, 2006.
3. Dimeff LA, *Addict Sci Clin Pract,* 2008: 4(2):39-47.
4. Benishek LA, Prize-based contingency management for the treatment of substance abusers: a meta-analysis.

Group Therapy

PROS

- Cost effective
- Allows for peer support
- Developmental preference for many teens

CONS

- Limited availability
- Not well studied
- Contagion

Family Therapy

Technique	Level of Evidence	Comments
Brief Strategic Family Therapy	Moderate [1]	Can be adapted for a range of situations in various settings and treatment modalities
Multidimensional Family Therapy	High [2]	Aims to foster family collaboration with school/juvenile justice and facilitate reentry of juvenile detainees into community
Multi-Systemic Family Therapy	High [3]	Effective with adolescents who have severe SUD and other delinquent/violent behavior
Functional Family Therapy	Moderate [4]	Aims to improve communication, parenting skills, problem solving, conflict resolution
Family Behavioral Therapy	Moderate [5]	Uses contingency management and behavioral contracting

1. Robbins MS, et al. *Journal of Consulting and Clinical Psychology*, 2011: 79(6):713-727.
2. Liddle HA, et al. *International Journal of Offender Therapy and Comparative Criminology,* 2011: 55(4):587-604.
3. Sheidow AJ, In N. Jainchill (Ed.), *Understanding and Treating Adolescent Substance use Disorders.* Civic Research Institute, pp. 9-1-9-22, 2012.
4. Donohue B, et al. Family Behavior Therapy. In D. Springer; and A. Rubin (eds.), *Substance Abuse Treatment for Youth and Adults.* Wiley & Sons, Inc. pp 205-255, 2009.
5. Waldron HB, et al.. *Addictive Behaviors*, 2005:30(9): 1775-1796.

Levels of Care: Outpatient[1,2]

Program	Length	Who is this best for?	Benefits
Outpatient	Weeks-years	Patients who can independently manage their substance use but benefit from medication, therapy and/or monitoring	• Doesn't interfere with school • Provides support as patient learns to manage own recovery
Intensive Outpatient Programs	3-4 weeks	Patients who need more than standard outpatient treatment while they participate in work or school	• Doesn't interfere with school • Practice skills in the community
Partial Hospital Programs	1-6 weeks	Patients who need intensive care	• Allows teens to sleep at home • Less expensive than residential treatment
Recovery High School	1-2 years	Students committed to sobriety in need of isolation from community	• Combines academics and treatment resources under one roof

1. Bukstein OG. Practice Parameter for the Assessment and Treatment of Children and Adolescents With Substance Use Disorders. J Am Acad Child Adolesc Psychiatry. 2005;44(6):609-621. http://www.jaacap.com/article/S0890856709616415/fulltext. Accessed March 30, 2016.
2. Levy SJL, Williams JBW. Substance Use Screening, Brief Intervention, and Referral to Treatment. Pediatrics. June 2016.

Levels of Care: Inpatient[1,2]

Program	Length of stay	Who is this best for?	Benefits
Acute Residential Treatment	Days-weeks	Co-occurring mental health disorders, patients in need of stabilization	• Stabilization of mental health crises • Medically monitored withdrawal
Residential Treatment	30-90 days	Cannot maintain abstinence in their community, homeless adolescents	• Intensive treatment • Generally no access to substances
Therapeutic Boarding School	Long-term	Mental health/behavioral problems cannot be managed at home or at school	• Constant supervision • Small specialized classes • Social and emotional support

1. Bukstein OG. Practice Parameter for the Assessment and Treatment of Children and Adolescents With Substance Use Disorders. J Am Acad Child Adolesc Psychiatry. 2005;44(6):609-621. http://www.jaacap.com/article/S0890856709616415/fulltext. Accessed March 30, 2016.
2. Levy SJL, Williams JBW. Substance Use Screening, Brief Intervention, and Referral to Treatment. Pediatrics. June 2016.

Summary

- Adolescents are vulnerable to both *substance use* and *addiction*
- The AAP recommends abstinence as the best health advice for adolescents
- Include screening and counseling/intervention as part of routine medical care for adolescents
- Effective evidence-based treatments for adolescent SUD exist and can be delivered at various levels of care

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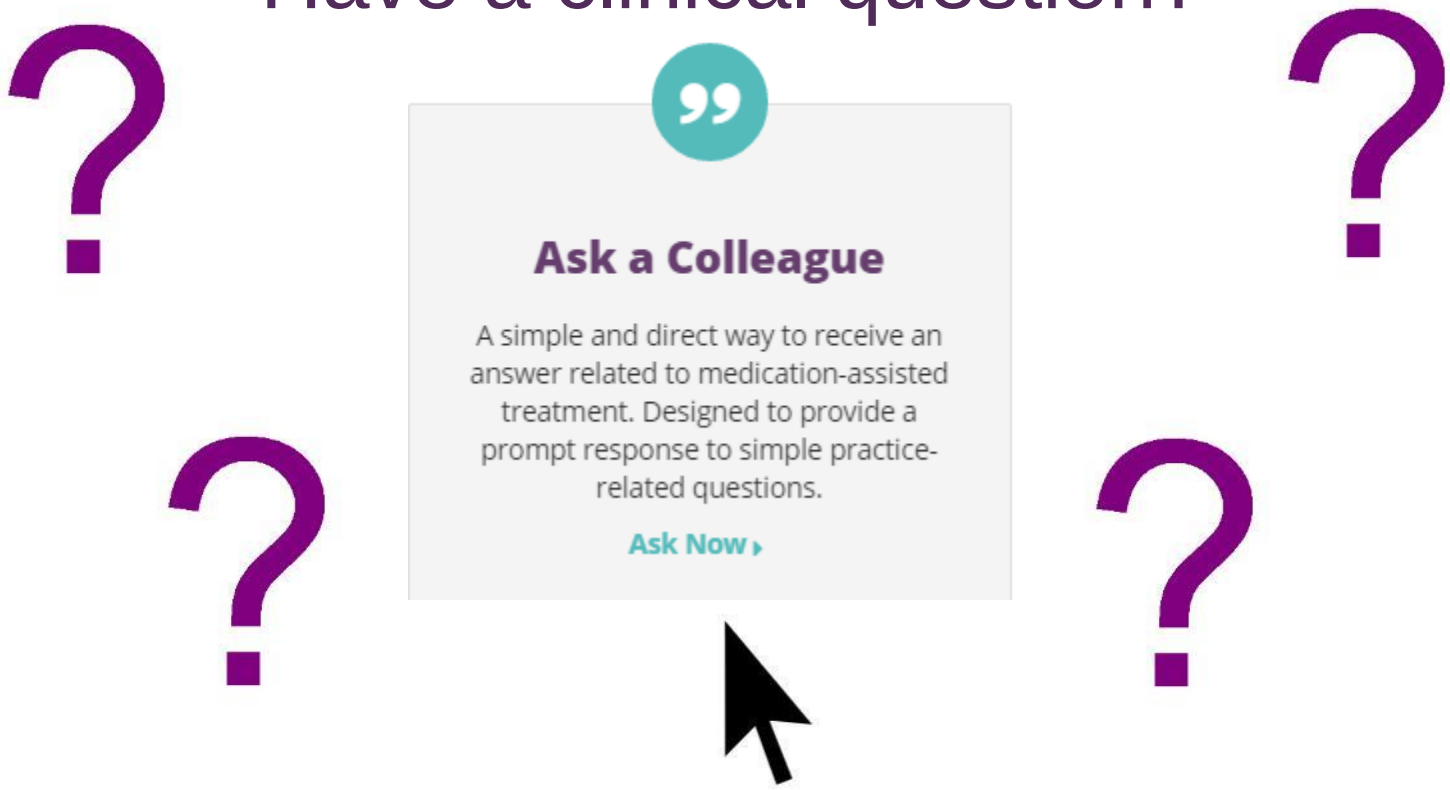

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PCSS MAT TRAINING

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