

Alcohol, Cannabis, Nicotine, and the Teen Brain

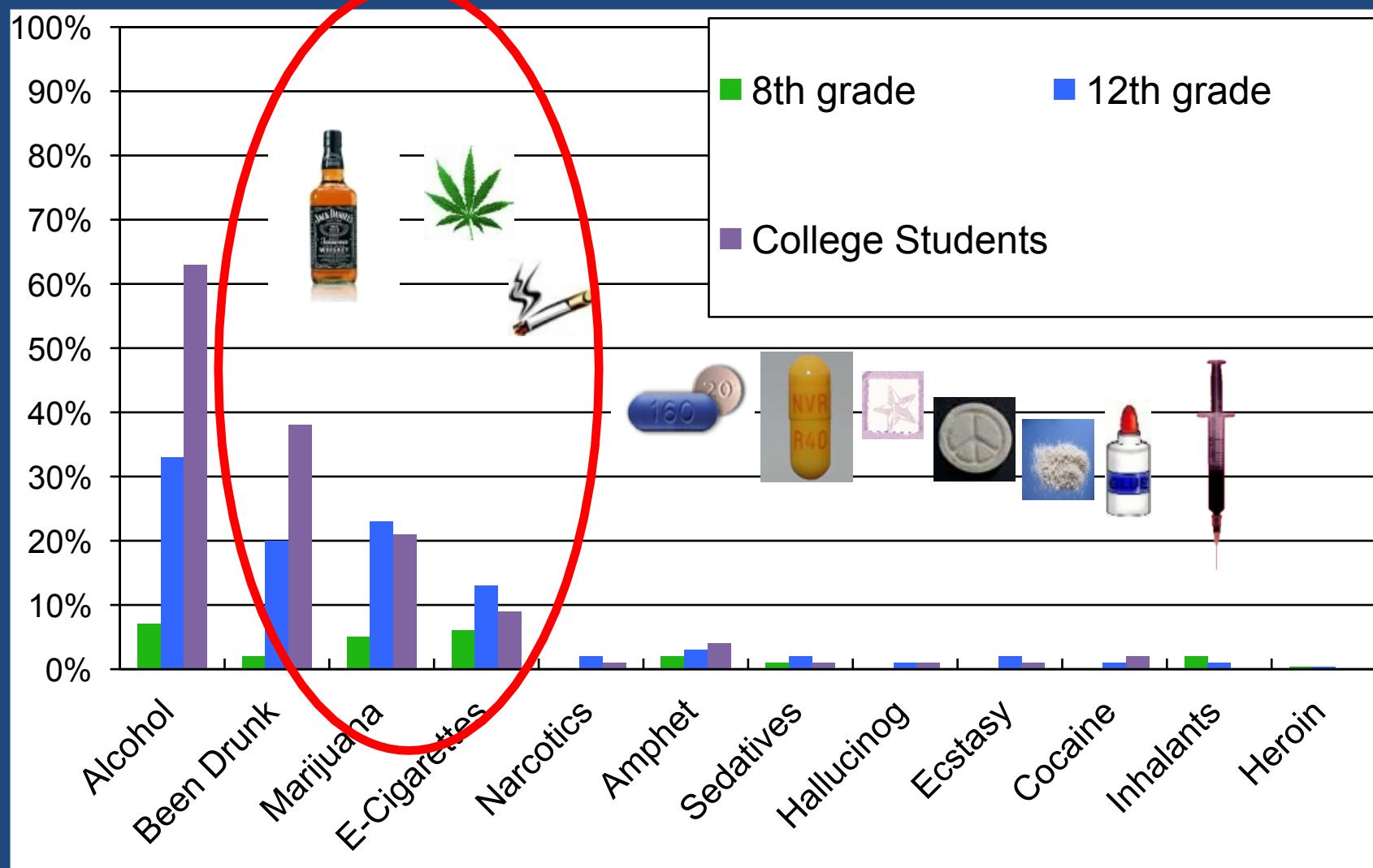


Why is studying development important?

- § The brain grows very much from ages 9-20+.
- § Much is still unknown about how child experiences and substance use affect development.

FACT: The brain continues to develop until the 3rd decade of life!

Past Month Use of Intoxicants



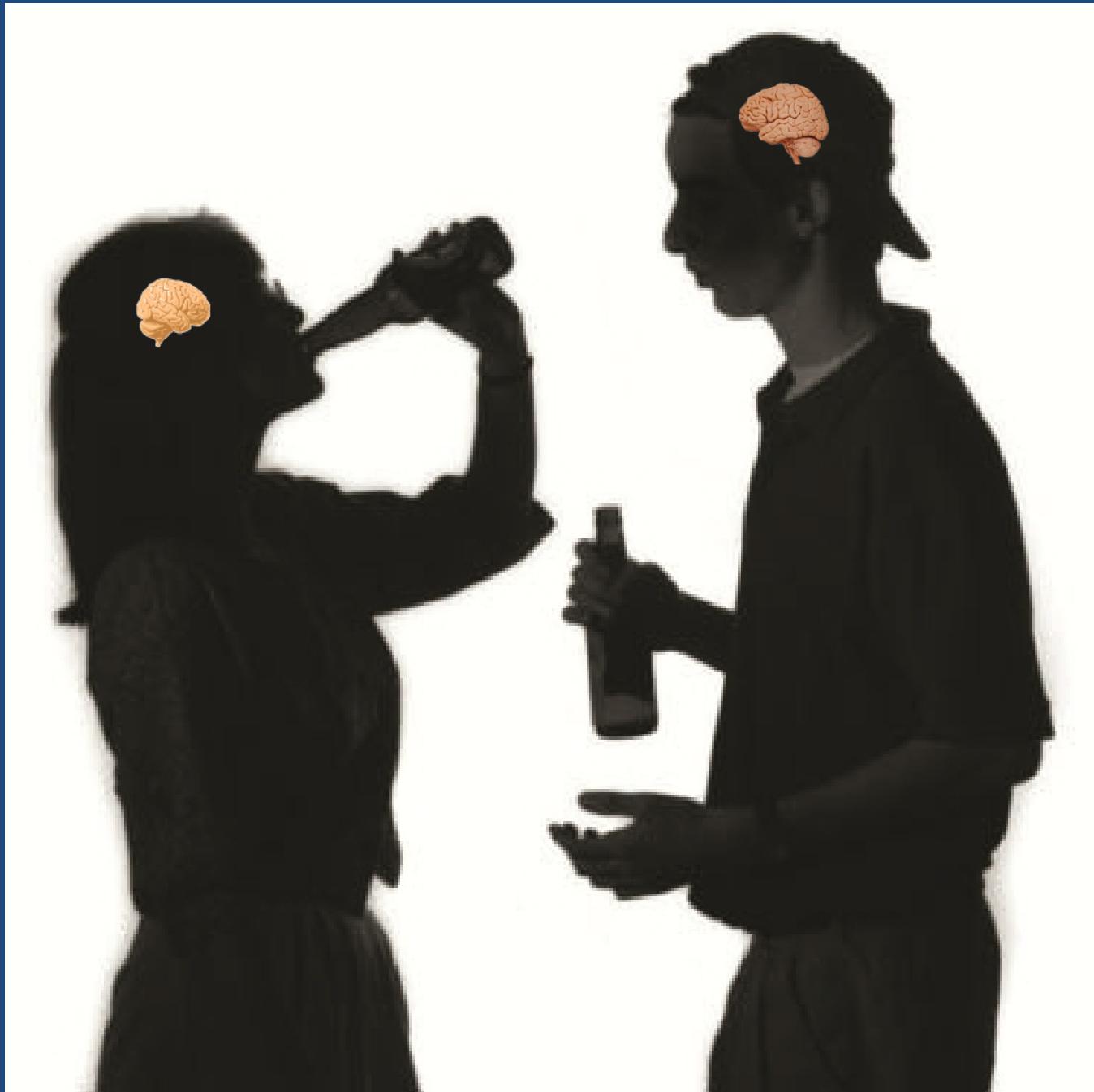
Binge Drinking



Girls=
4+ drinks

Boys=
5+ drinks

20% of high school seniors binge drank in the past 2 weeks!

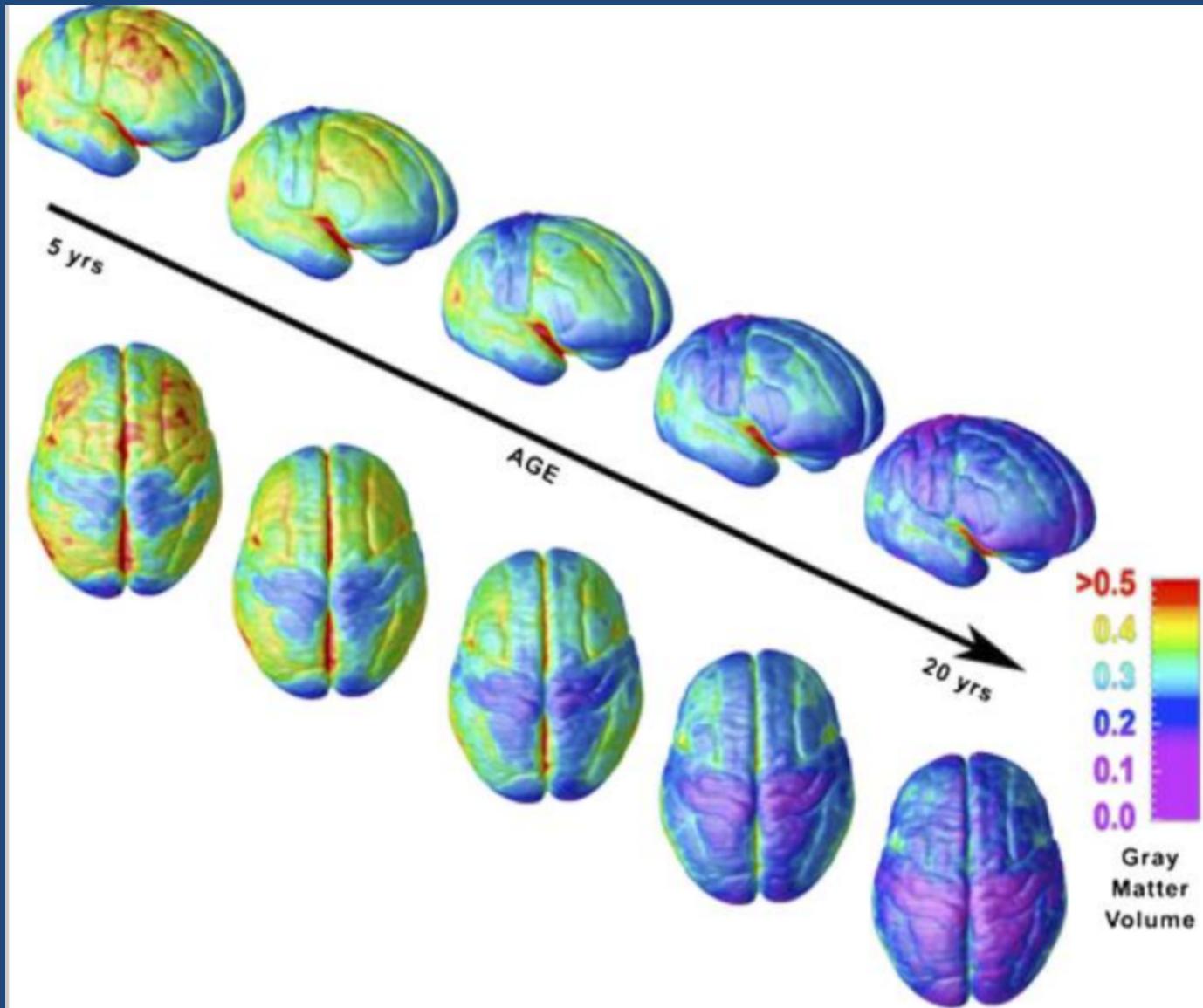


MRI

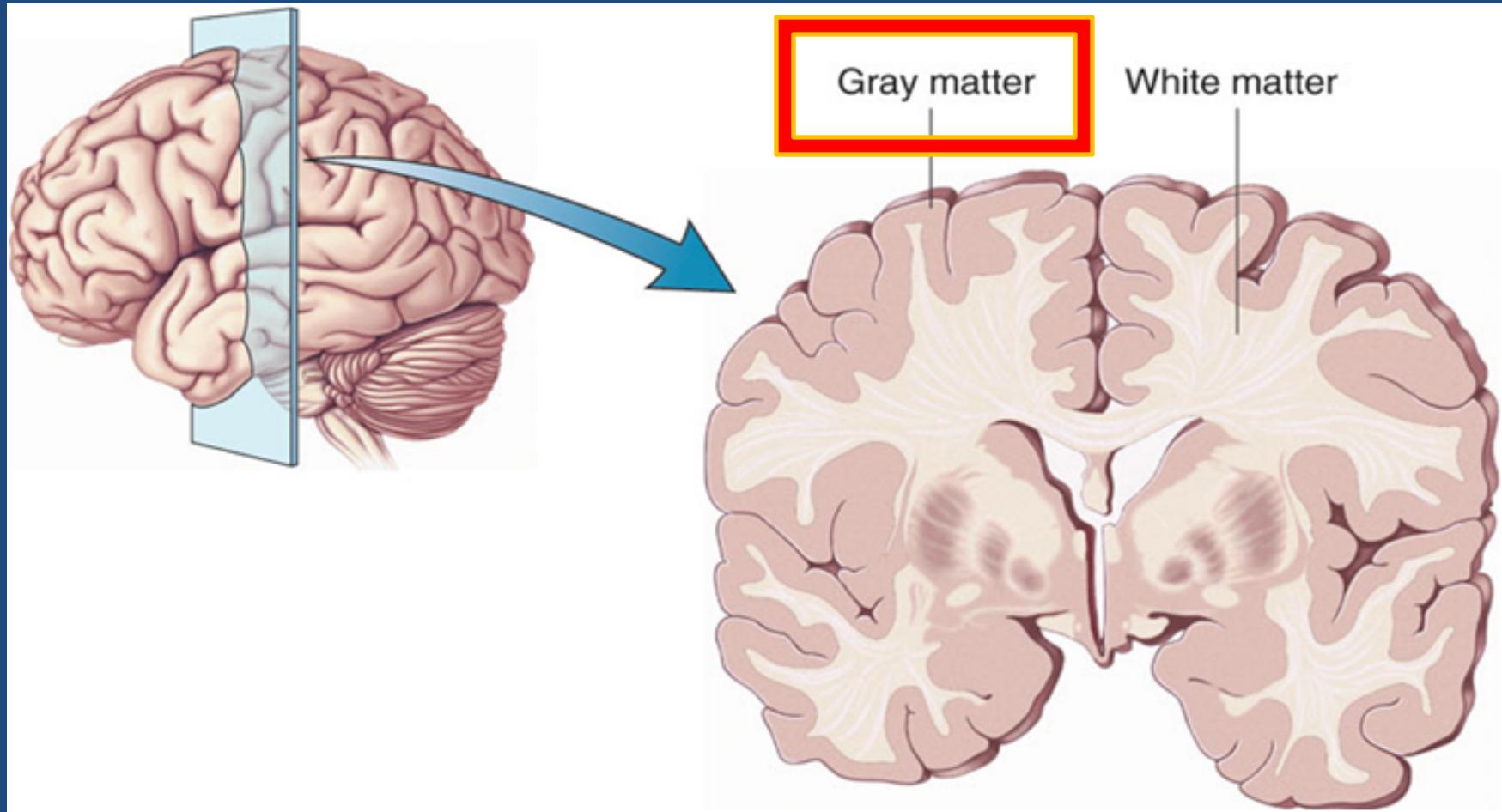
- § Non-invasive
- § Safe
- § Structural MRI:
measures brain
structure
- § Functional MRI:
measures brain activity



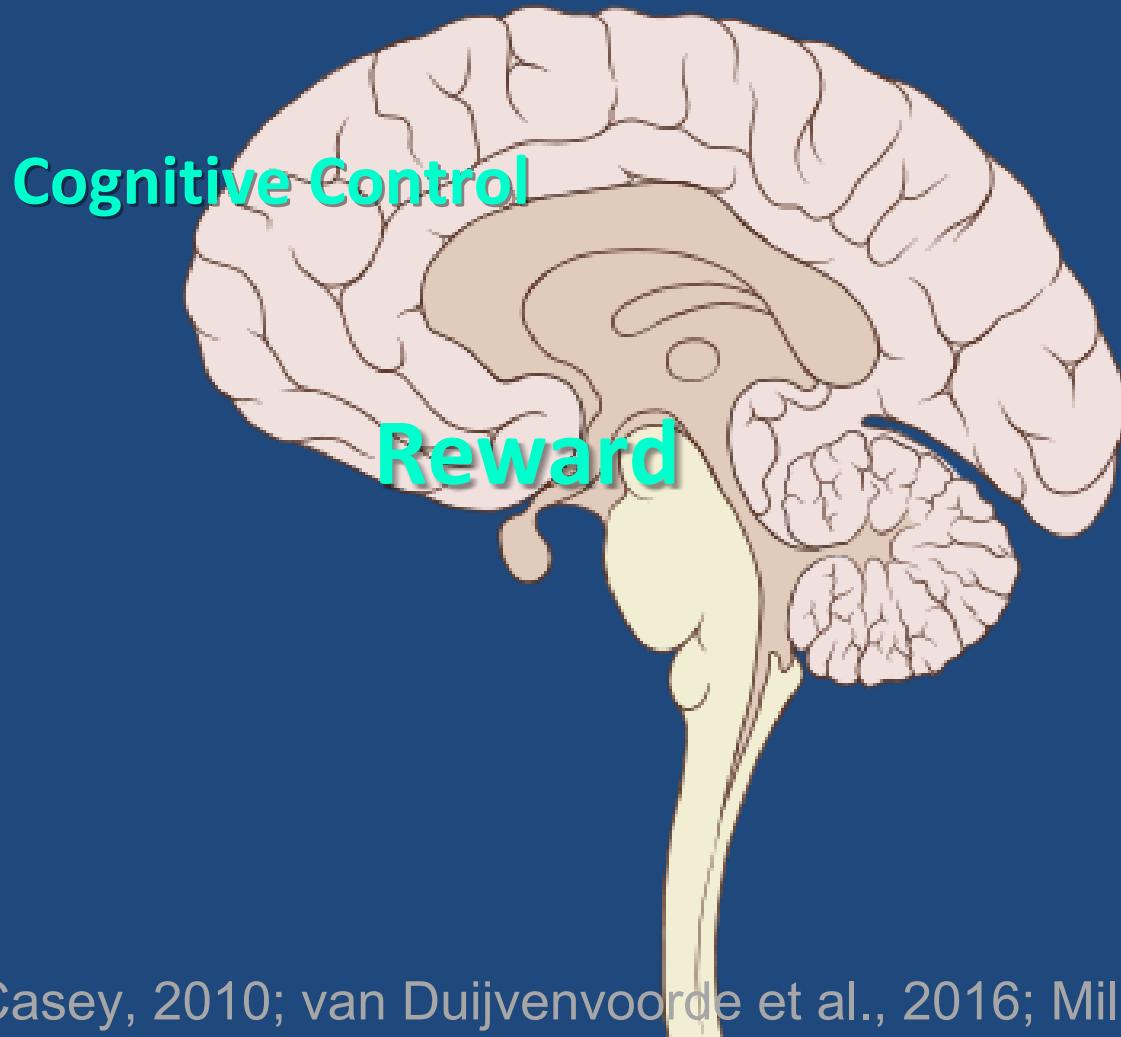
The Developing Brain



Brain Basics: Gray Matter



Reward Regions Develop before Cognitive Control Regions



Somerville & Casey, 2010; van Duijvenvoorde et al., 2016; Mills et al., 2014;
Baker et al., 2015

Youth At Risk Study

Baseline:

Age 12-14

Year 1:

13-15

Year 2:

14-16

Year 13:

25-27

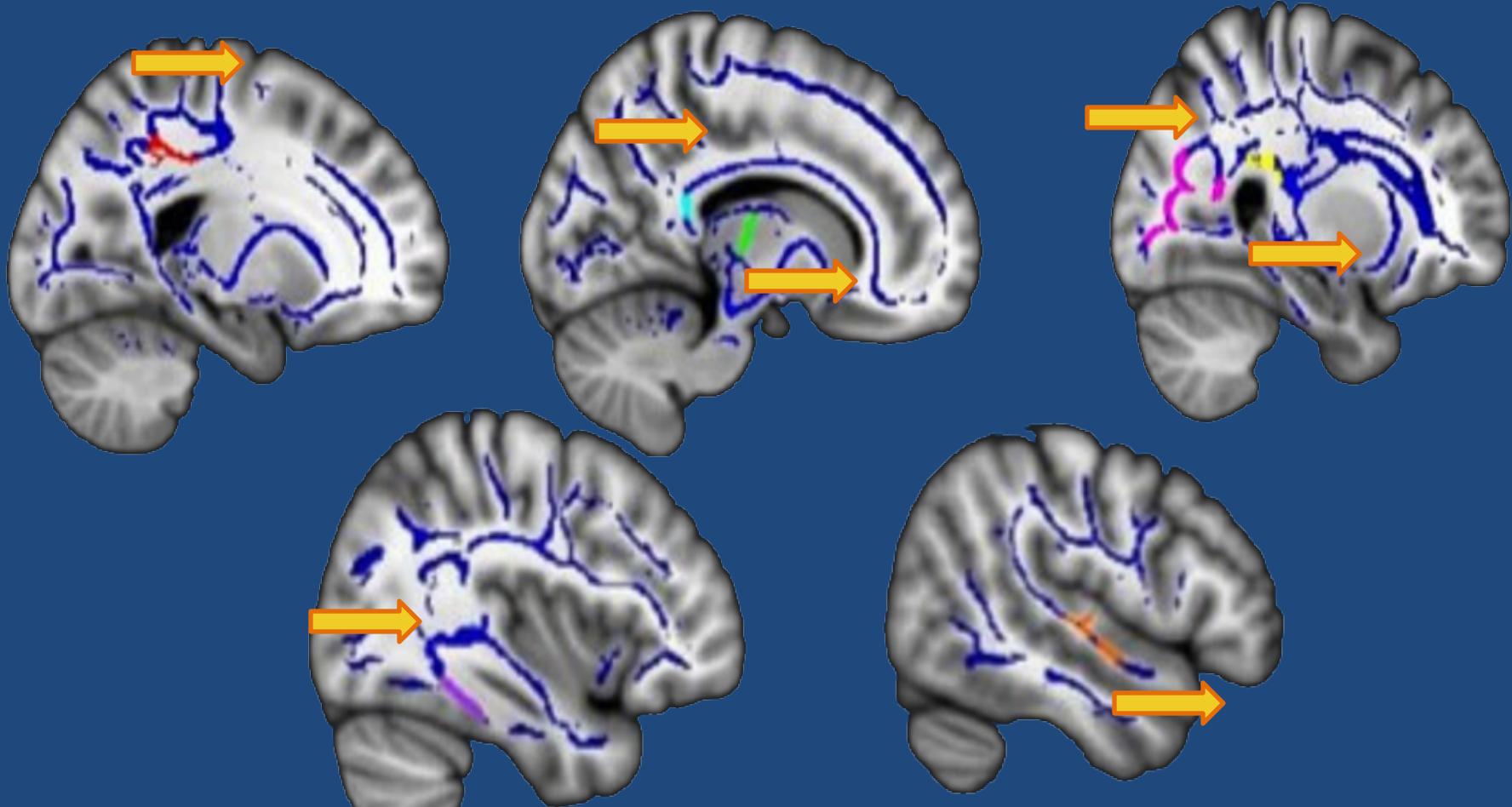


=Non-drinker

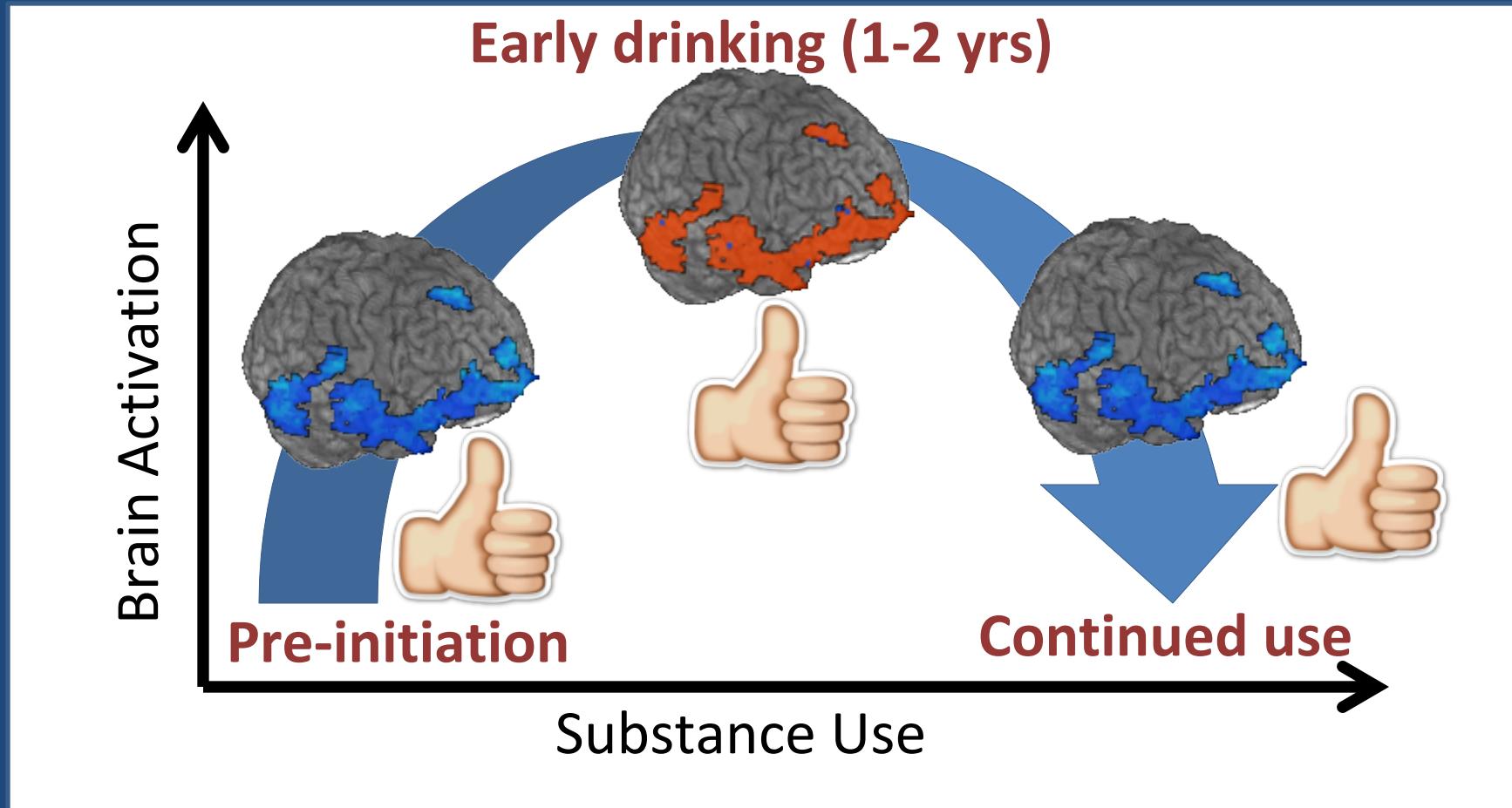


= Drinker

Brain Structure and Youth Substance Use



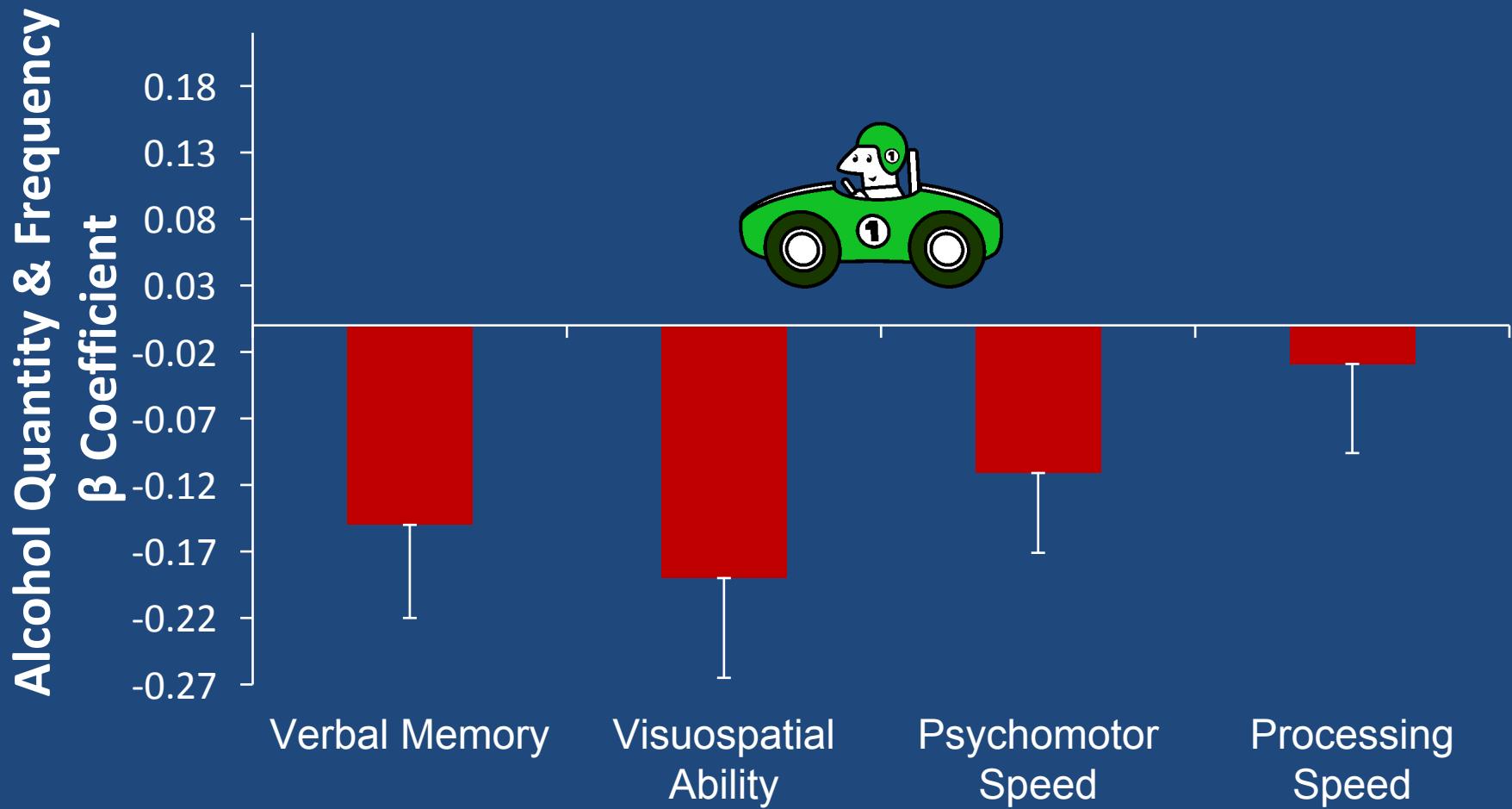
Brain Function and Substance Use



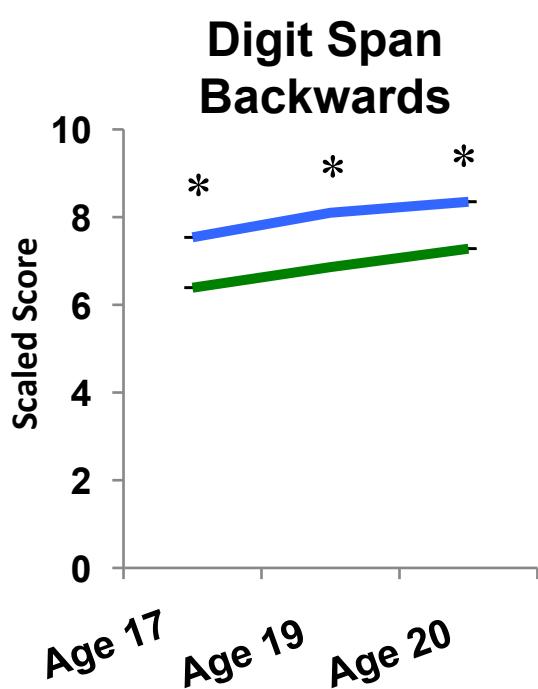
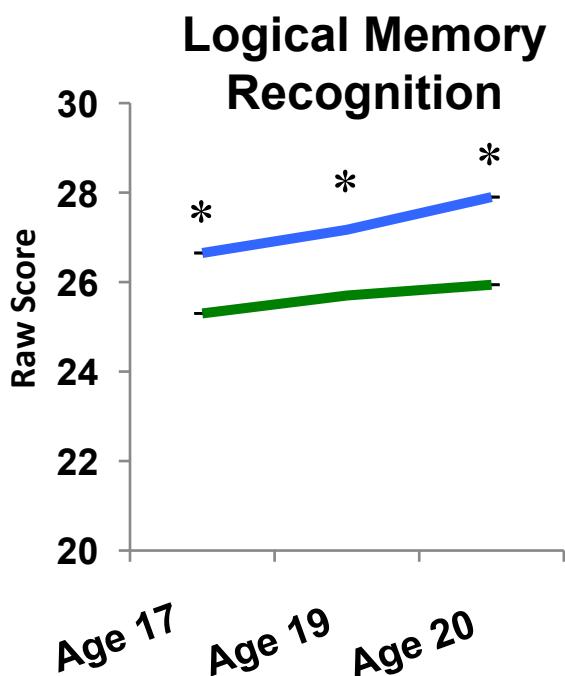
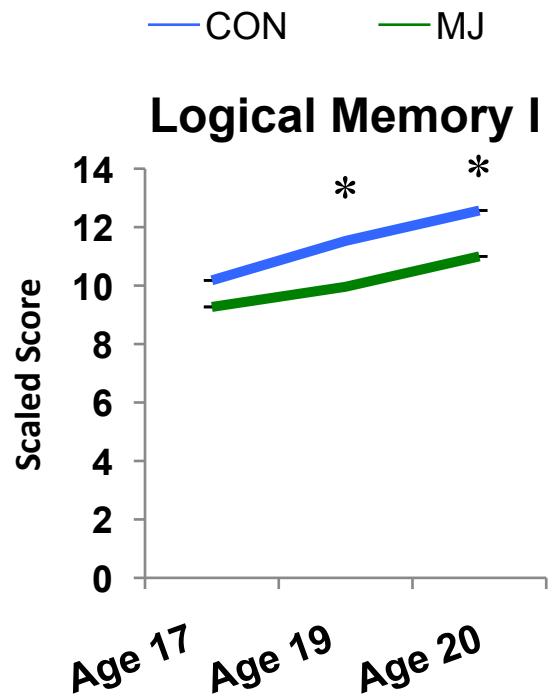
Tapert et al., 2001, *ACER*; Tapert et al., 2004, *ACER*; Squeglia et al., 2012, *JSAD*

Alcohol and Neurocognition during Adolescence/Young Adulthood

Alcohol Quantity/Frequency

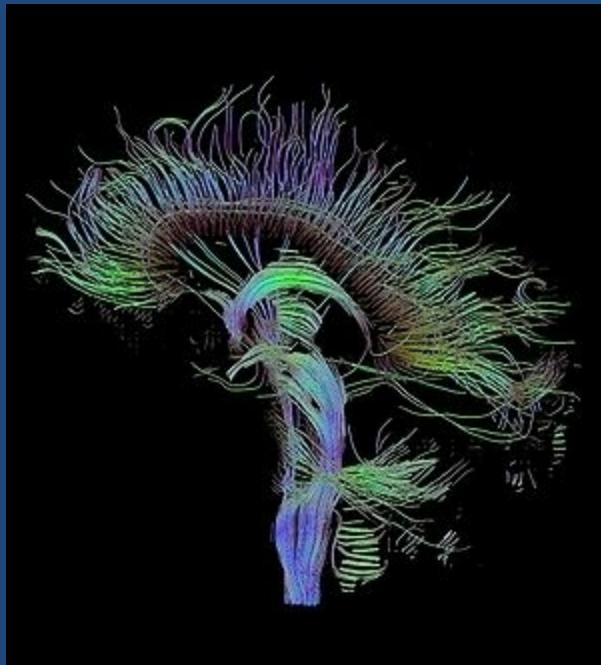


Neurocognitive Performance (age 17, 19, 20 years old)



* $p < .05$

Brain Health Predicts Future Use



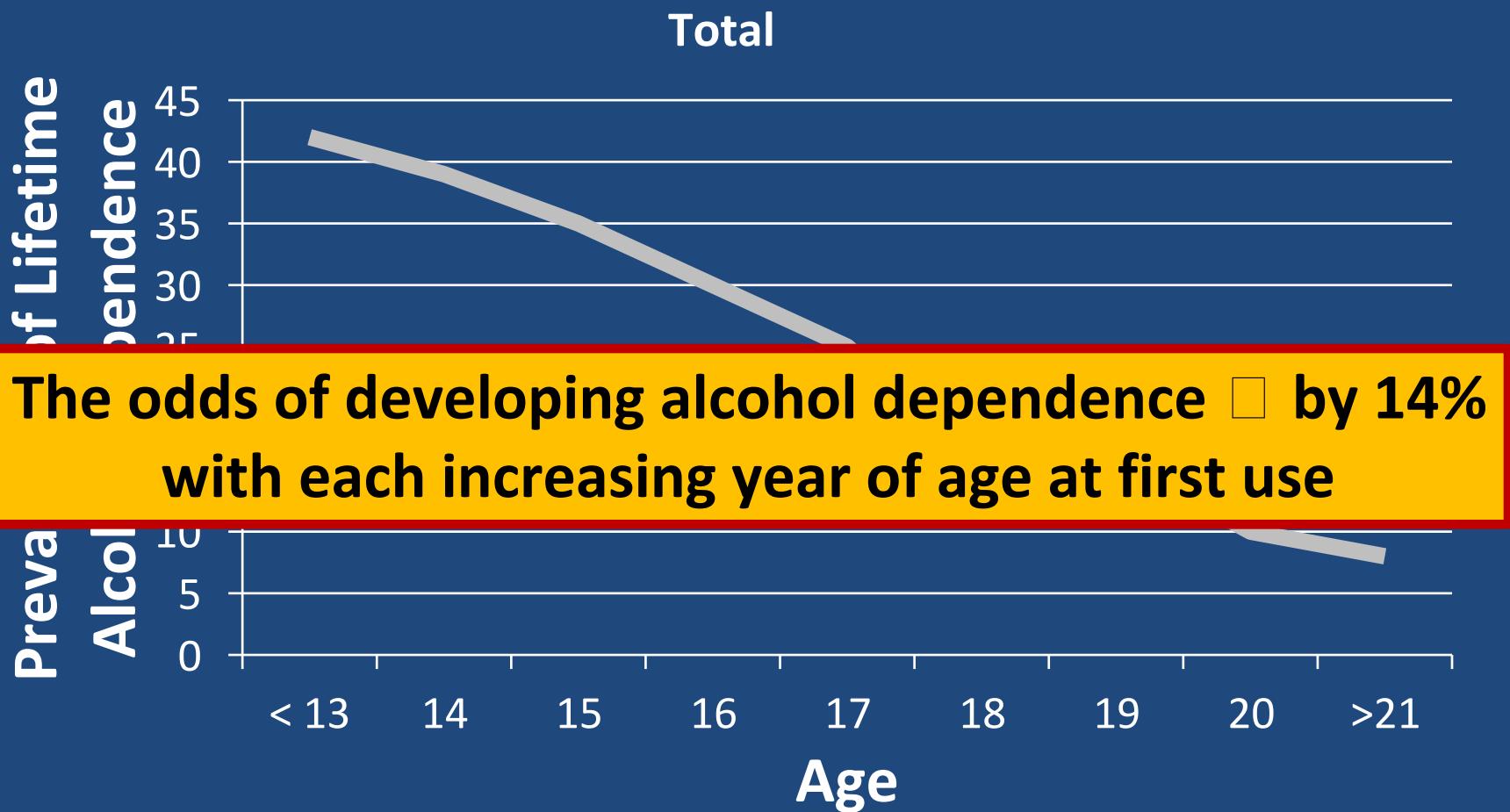
Ages 12-16

Substance Use

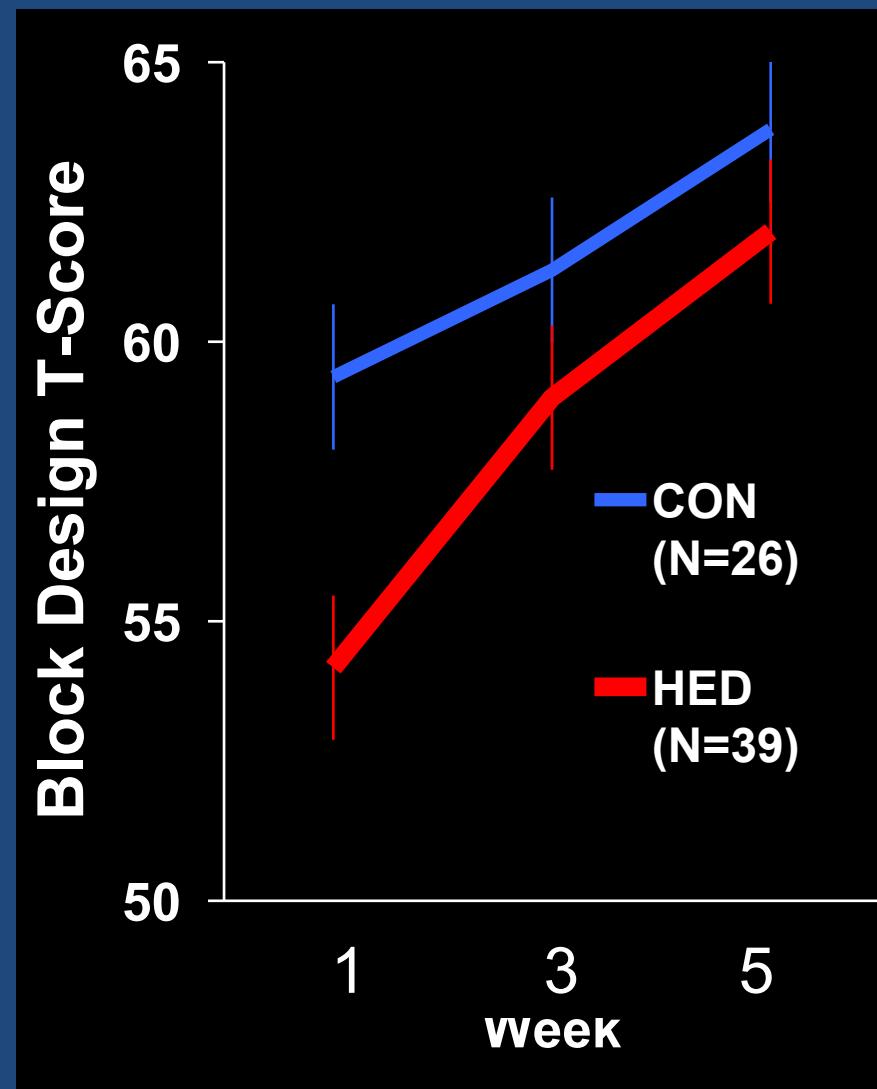
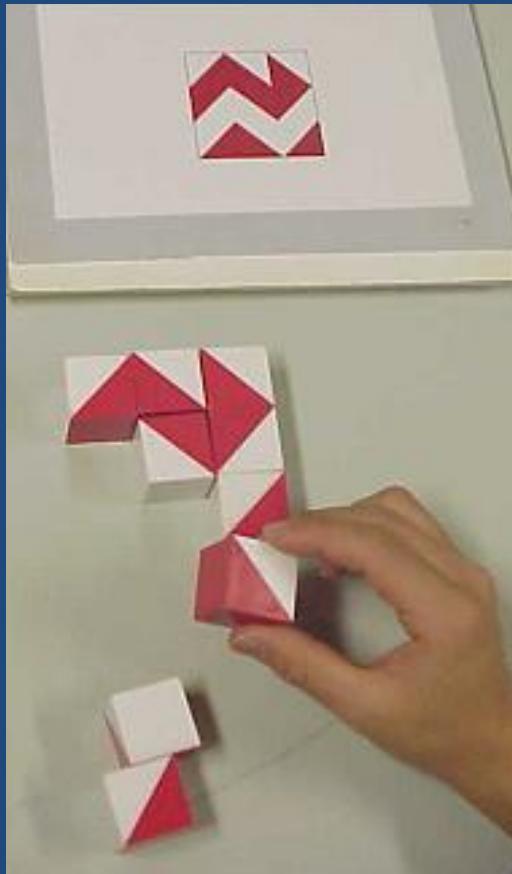


Ages 19-22

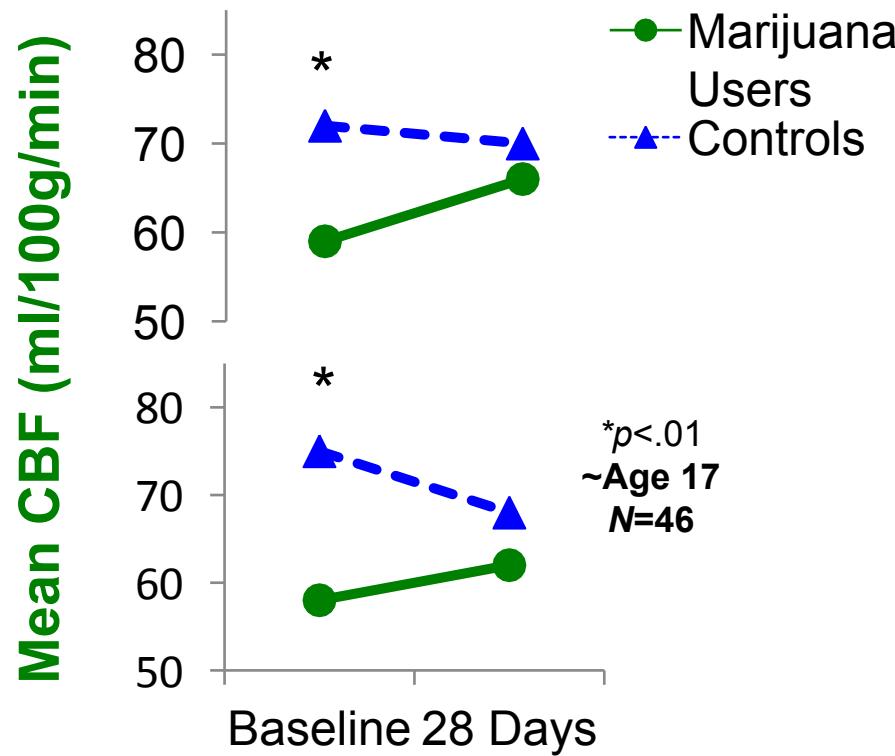
Earlier Onset=More Problems



Recovery of Spatial Skills

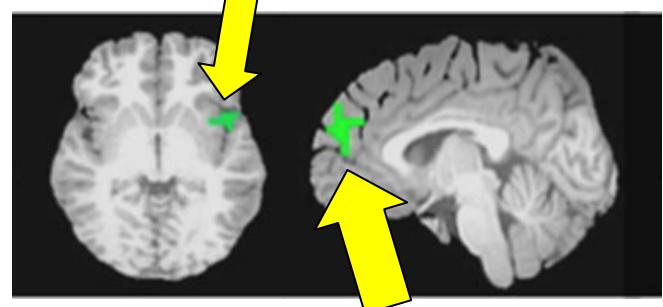


Recovery with Abstinence



Brain blood flow after 28 days
of monitored abstinence

Left Insula

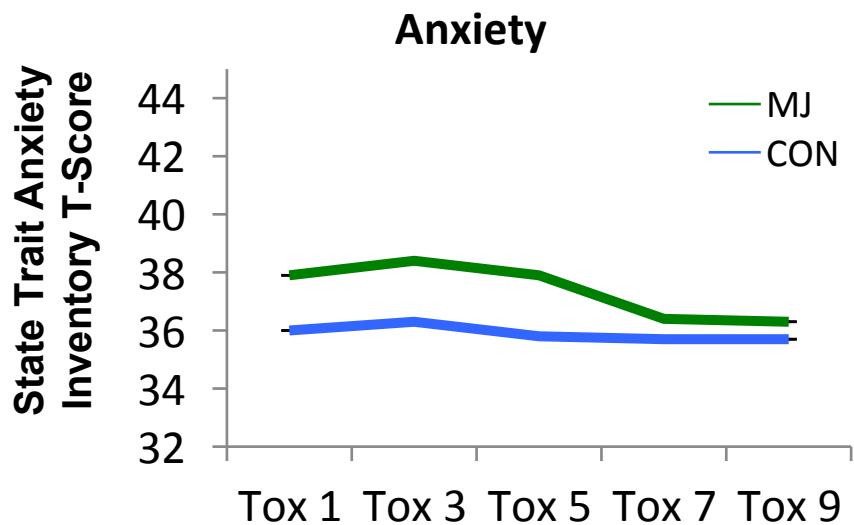
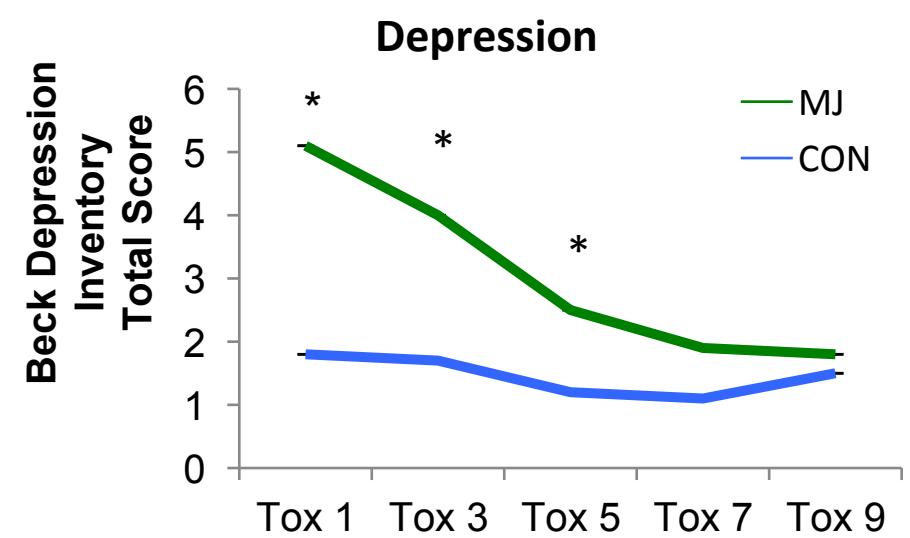


Medial Frontal Gyrus

Mood Changes

- § Negative mood
- § Depression
- § Anxiety

Recovery with Abstinence



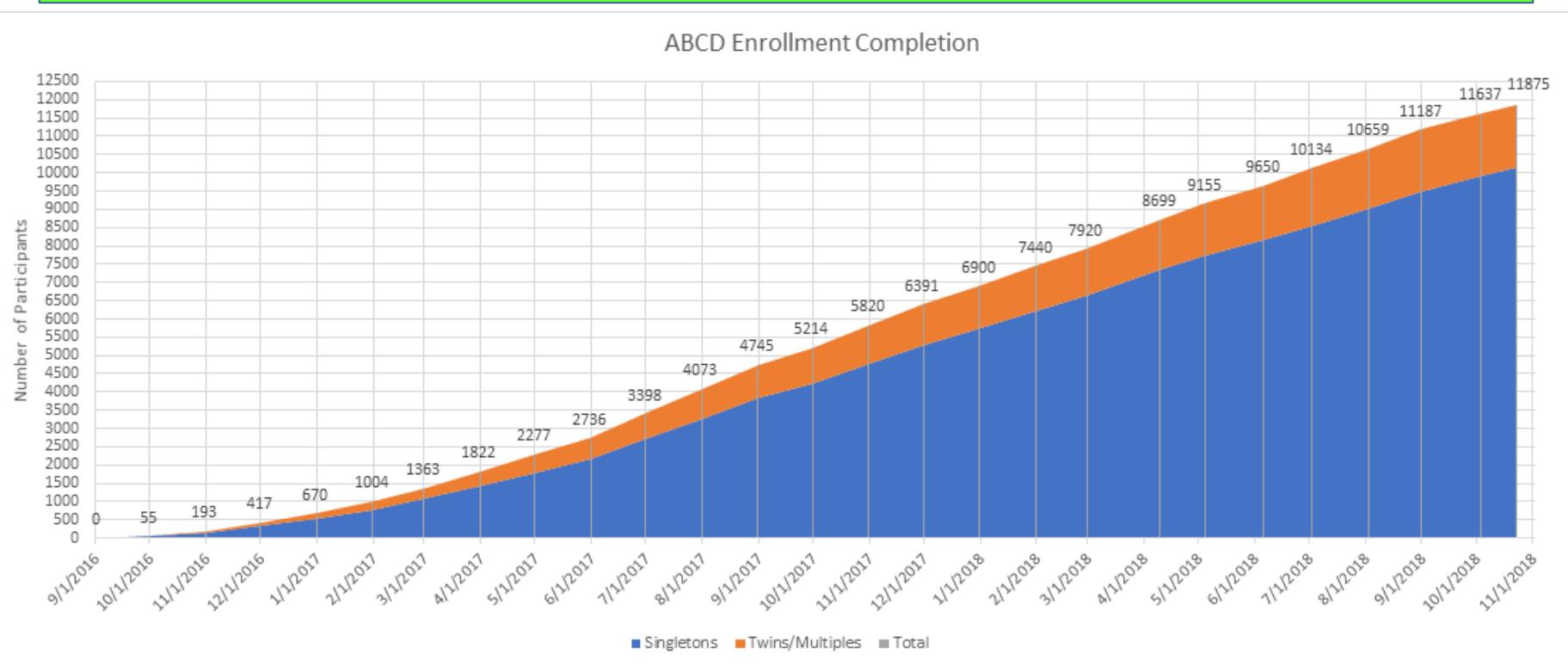
* $p < .05$



Adolescent Brain Cognitive Development

Teen Brains. Today's Science. Brighter Future.

A longitudinal study of 11,875 children from ages 9-10 through early adulthood to assess factors that influence individual brain development trajectories and functional outcomes



TOCAN STUDY

- Targeting 200 Teens!
- Ages 16-22
- MRI
- \$80 for 4 hours + referral bonus
- Picture of YOUR BRAIN!!

TOCAN@UCSD.EDU

