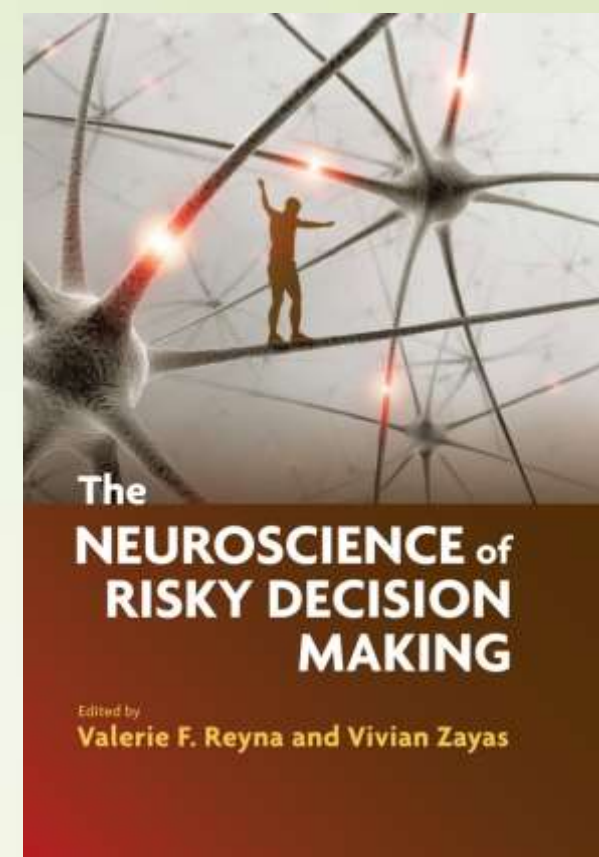
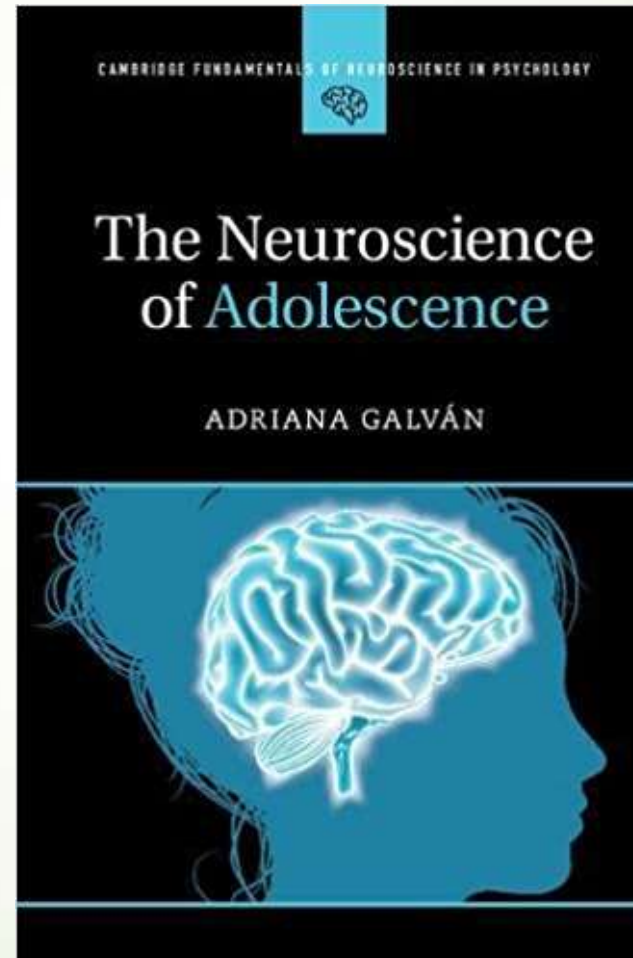
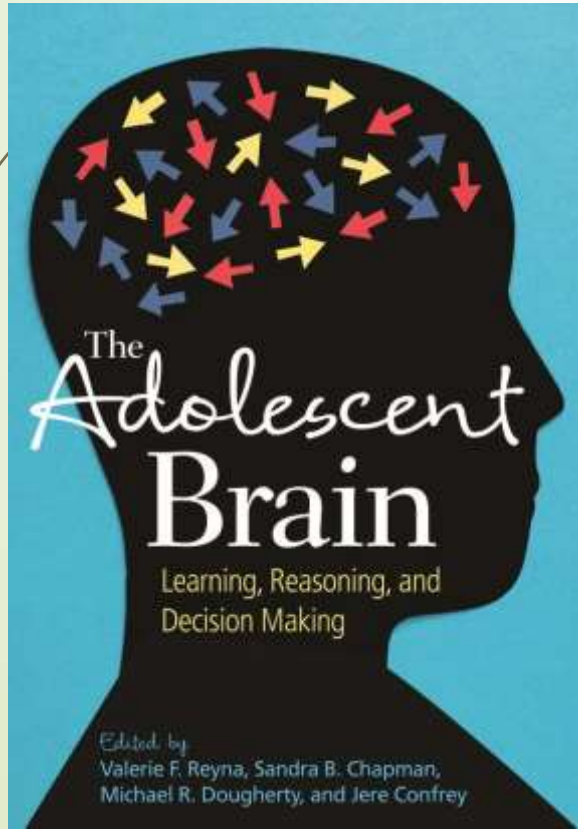
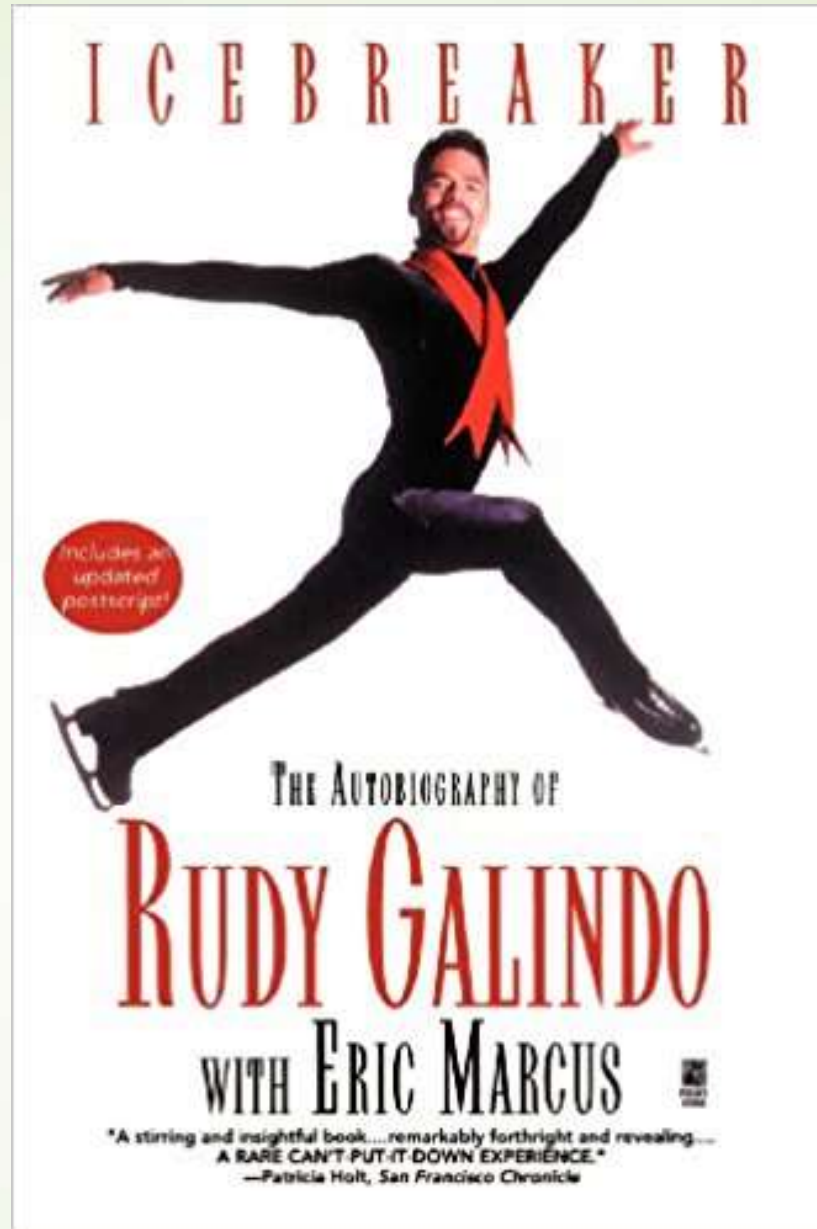


Brain and Behavioral Development from Childhood to Adolescence: Risky Decision Making and Addiction



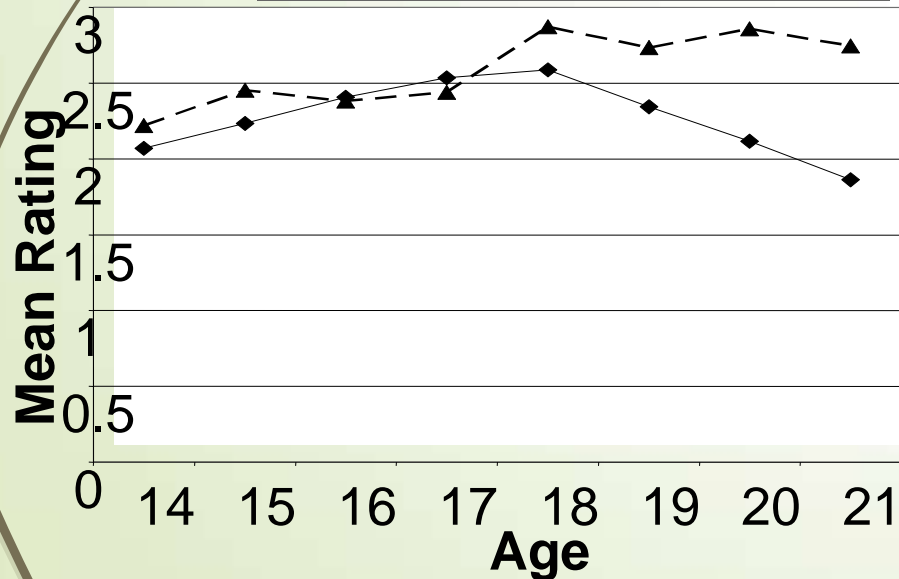
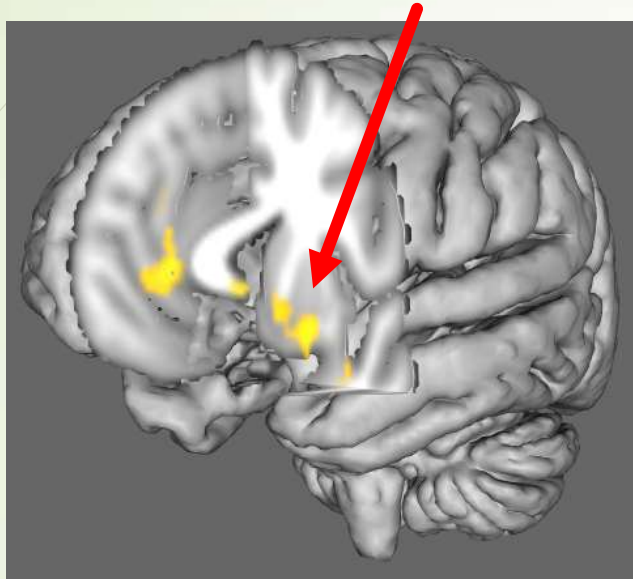
Valerie F. Reyna
Cornell University
2017 NAM ANNUAL MEETING



Why would Rudy take drugs and have unprotected sex when he was a world champion and *both his coach and brother died from HIV-AIDS?*

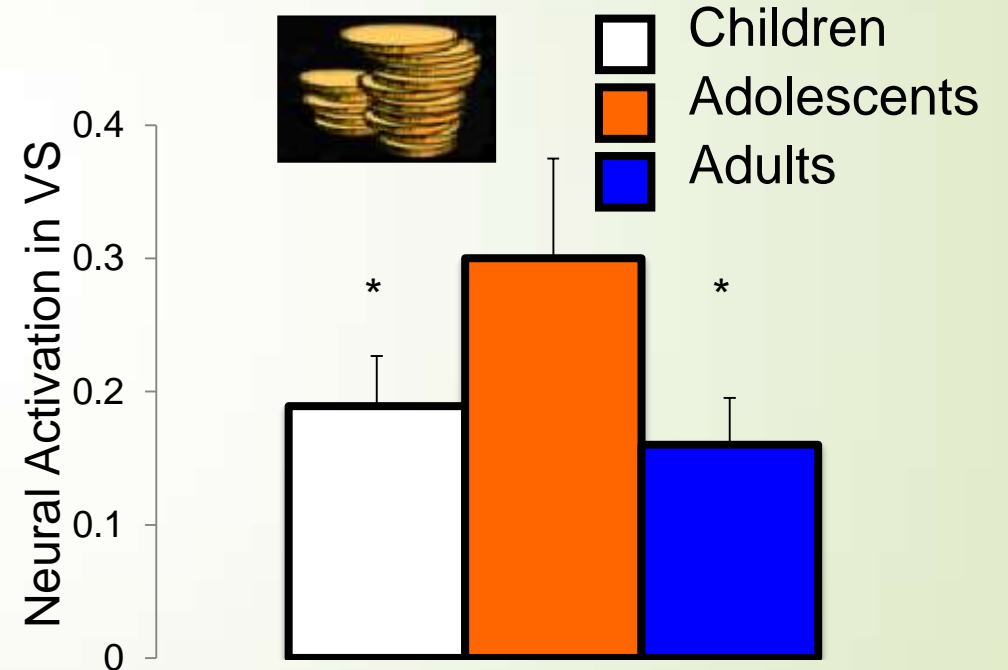
Reward Sensitivity Peaks in Adolescence

Striatum



SS
BIS

Reyna, Estrada et al., 2011



Galván et al, 2016, *J Neuro*

Galván & McGlennen 2013, *J Cog Neuro*

Barkley-Levenson & Galván, 2014, *PNAS*

Mechanisms Matter

- ▶ During adolescence, **social, cognitive, and biological factors combine** to create inordinate vulnerabilities to substance misuse and, ultimately, addiction (Casey et al., 2011, 2015; Ernst, 2014; Reyna & Farley, 2006; Rudolph et al., 2017; Steinberg et al., 2017).
 - ▶ Greatest nonmedical use of opioids occurs in emerging adults age 18-25
 - ▶ Risk-taking including experimentation with illicit drugs and alcohol, peaks in adolescence and young adulthood (IOM & NRC, 2011).
 - ▶ Feldstein Ewing et al. (2016) have shown that response to treatment for addiction in adolescents is associated with changing connectivity to the orbito-frontal part of the brain.
- ▶ Drugs hijack the normal reward system, which is already primed and is less likely to be inhibited by cognitive control systems.
- ▶ Plus: Cognitive representations--how people “frame” or interpret the gist of their options—change and explain unique variance in risk-taking.
- ▶ Cognitive representations are modifiable and doing so reduced self-reported risk-taking in adolescents (e.g., Fischhoff, 2008; Reyna & Mills, 2014).

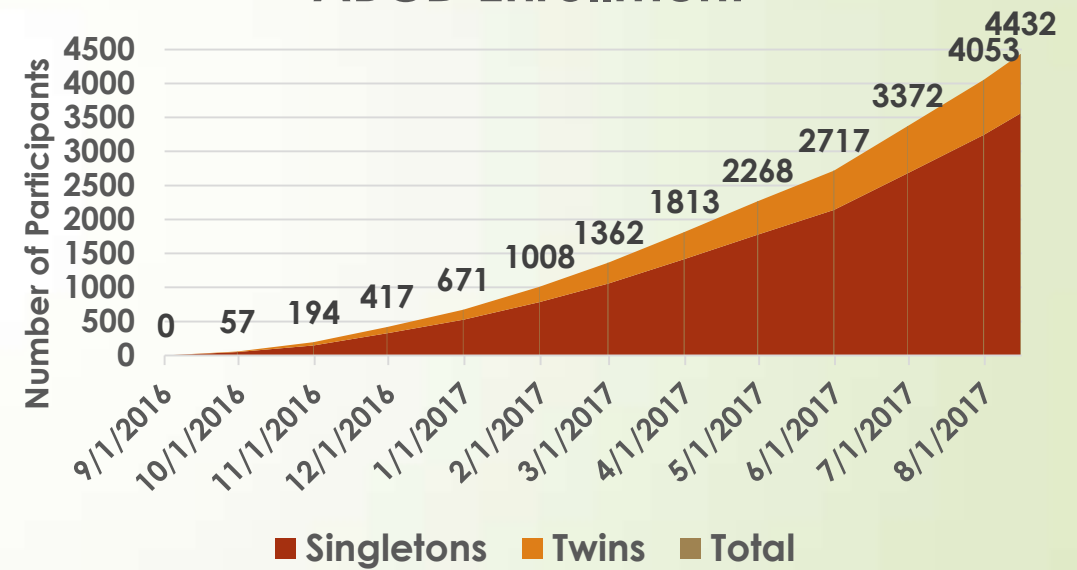
Adolescent Brain Cognitive Development Study

A longitudinal study of about 10,000 children from ages 9-10 through early adulthood to assess factors that influence individual brain development trajectories and functional outcomes

Locations of ABCD Study Sites in the United States



ABCD Enrollment



ABCD participants as of August 15, 2017: ~4,400 youth and their families, including nearly 900 twins, have been enrolled at 21 research sites across the Country.

Recommendations

- Understanding these **developmental factors** is an essential part of designing effective risk communications, public health programs, and policies to combat nonmedical use of opioids.
- Effective prevention and treatment of opioid addiction **requires** a deeper mechanistic understanding of how cognitive representation, reward responsiveness, and cognitive control interact in the developing brain; how these factors are shaped by the social context of risk-taking in youth (risk opportunity); and how these factors can be changed to reduce unhealthy risk-taking.
- Prevention and intervention at this stage of life has tremendous potential for improving **lifelong** educational, economic, and health outcomes.