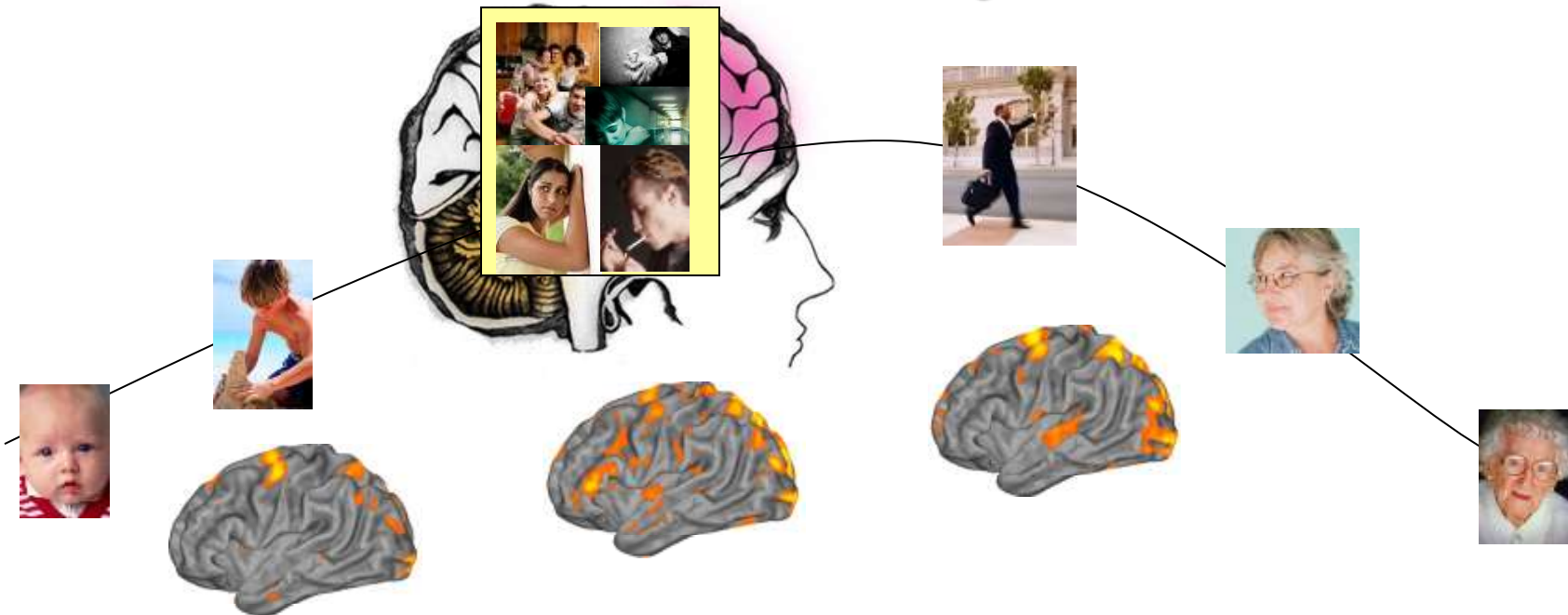


Adolescent Brain Development: *Risk and Resilience*

Beatriz Luna, PhD

Staunton Professor of Psychiatry and Pediatrics
Laboratory of Neurocognitive Development
University of Pittsburgh Medical Center



Age of Onset of Psychiatric Disorders



Paus et al., 2008

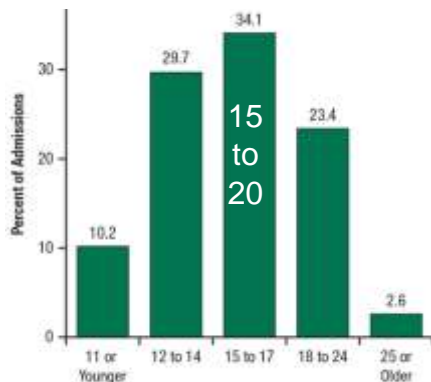


- Major psychopathology emerges and intensifies during adolescence

Adolescence: Vulnerabilities

- There is a peak in sensation seeking that can lead to risk-taking undermining survival
 - Despite peak physical health there is a twofold increase in mortality (Dahl 2004) - Substance abuse, unprotected sex, extreme sports, suicide
 - Present across societies and species – Biological Adaptive Stage

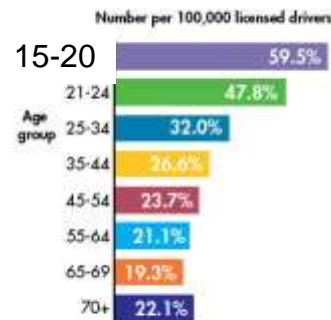
Age of Substance Use Initiation



Source: SAMHSA Treatment Episode Data Set (TEDS), 2011.

SAMHSA

Age of Fatal Car Crashes

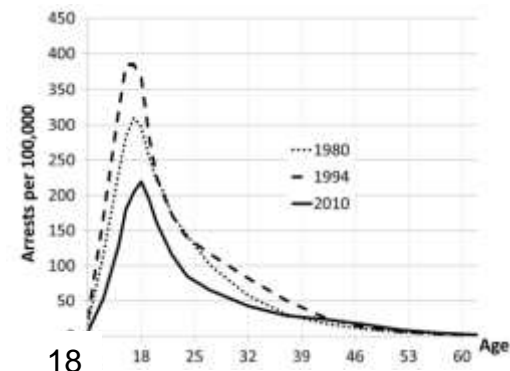


Source: True Driver Crashes: A Report to Congress, July 2008, National Highway Traffic Safety Administration.

© National Center for Children in Poverty (www.nccp.org). Adolescent, Young Adult, and Generational Equity in the United States: Facts for Policymakers

NCCP

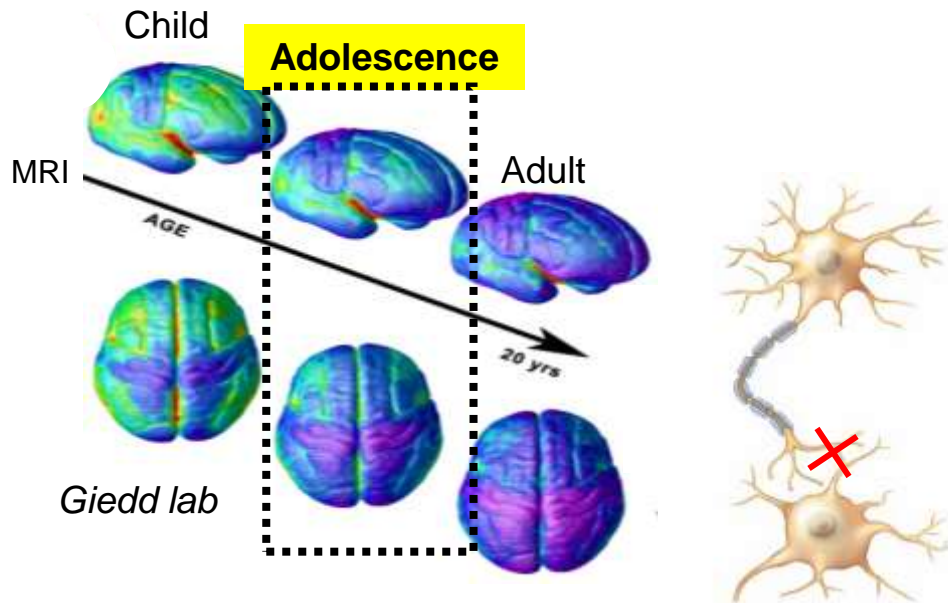
Robbery Arrests



Farrell et al, 2015

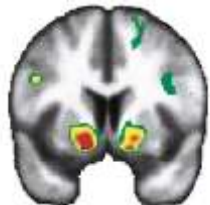
Brain Maturation

Gray Matter

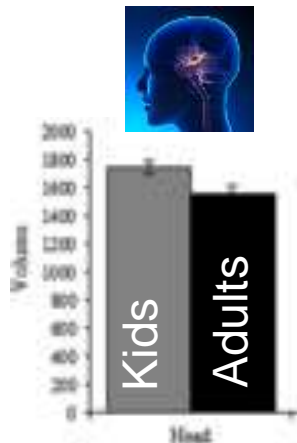


Hippocampus

Striatum



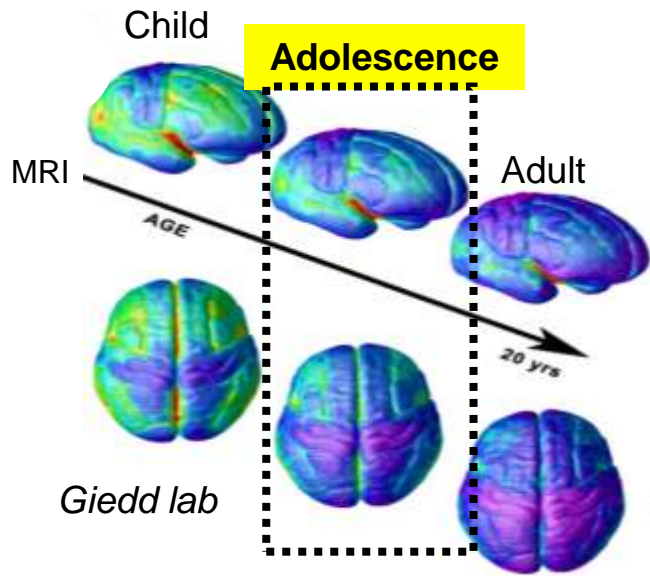
Sowell Lab



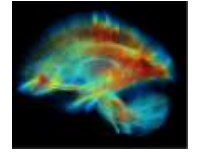
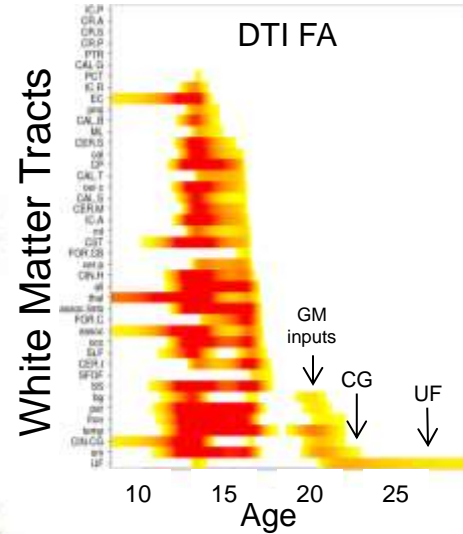
Ghetti Lab

Brain Maturation

Gray Matter



Connectivity

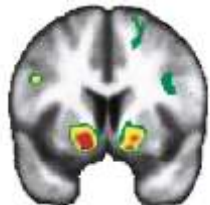


Luna lab

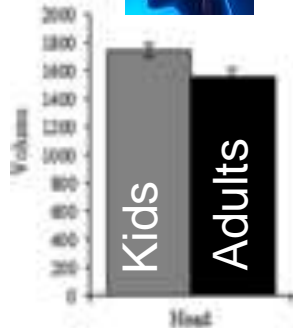


Hippocampus

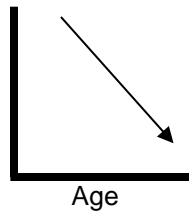
Striatum



Sowell Lab

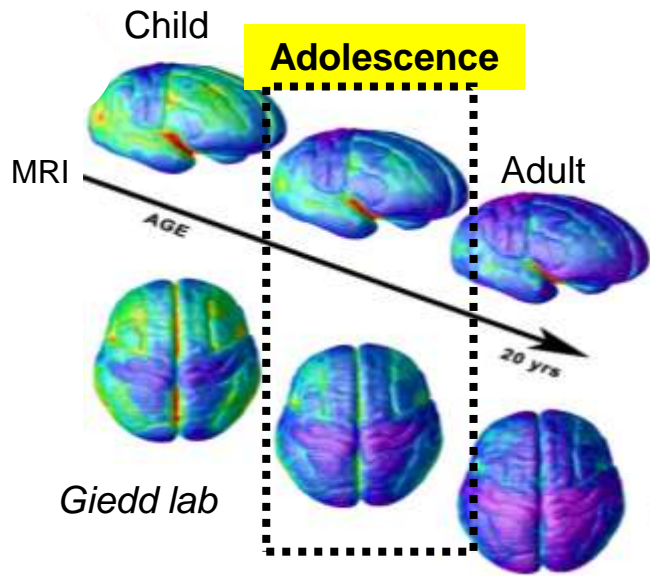


Ghetti Lab

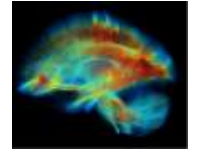
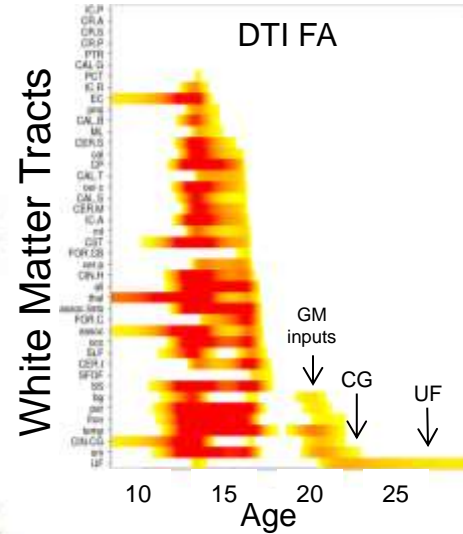


Brain Maturation

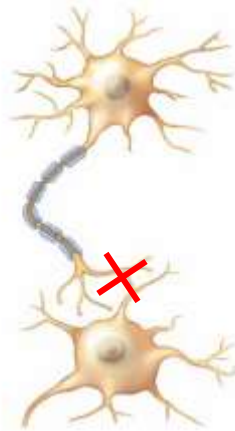
Gray Matter



Connectivity



Luna lab

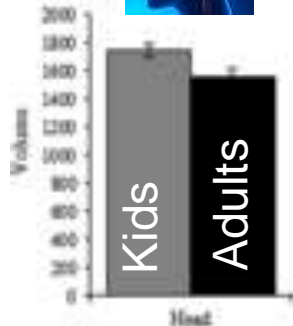


Hippocampus

Striatum

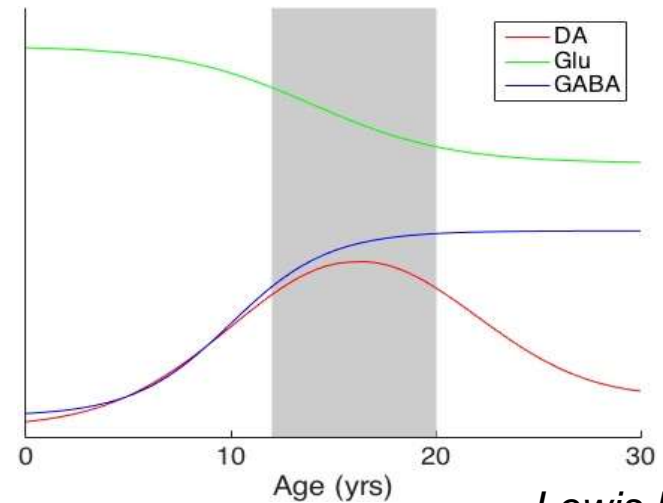


Sowell Lab



Ghetti Lab

Neurochemistry



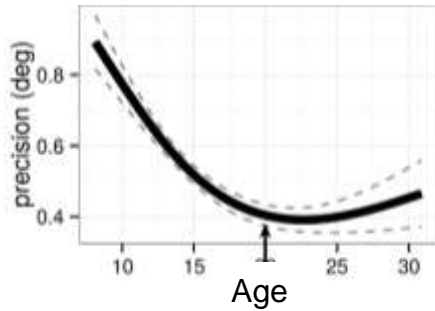
Lewis Lab

Cognition and Brain Function

Response Inhibition

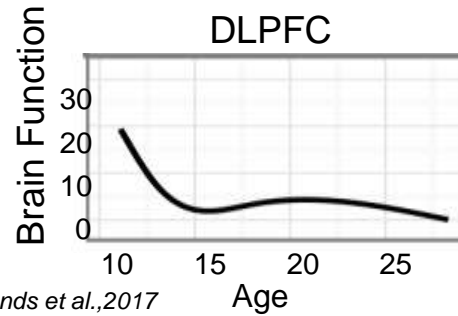


Behavior

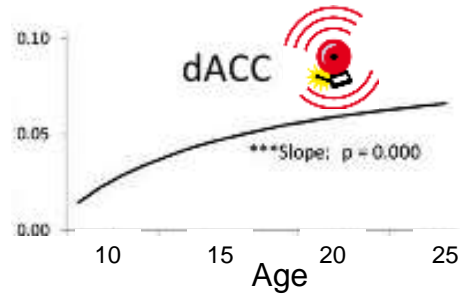


Ordaz et al., 2013

Working Memory



Simmonds et al., 2017

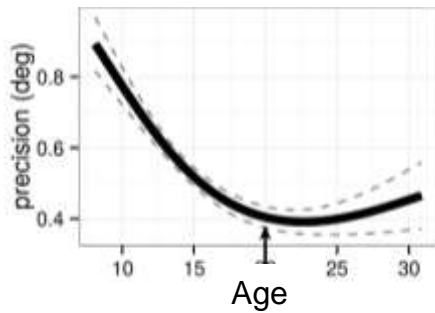


Cognition and Brain Function

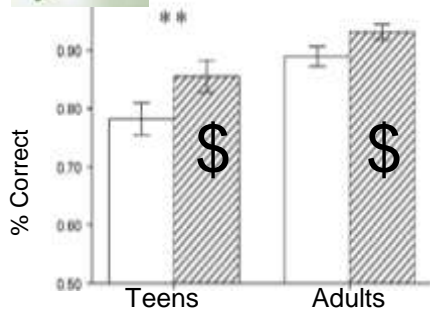
Response Inhibition



Behavior

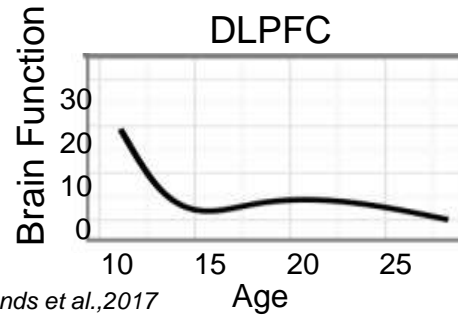


Ordaz et al., 2013

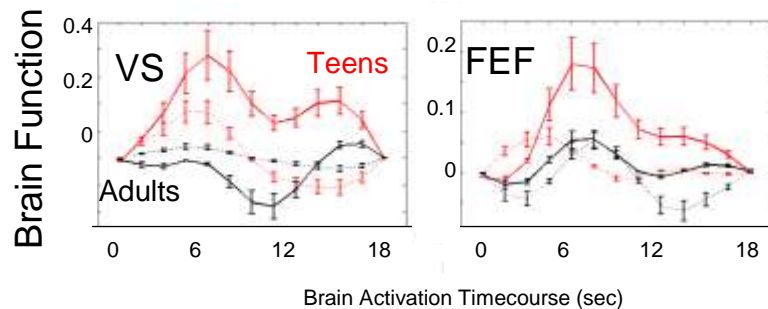
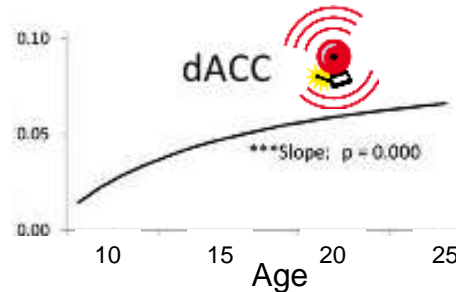


Geier et al., 2009

Working Memory



Simmonds et al., 2017

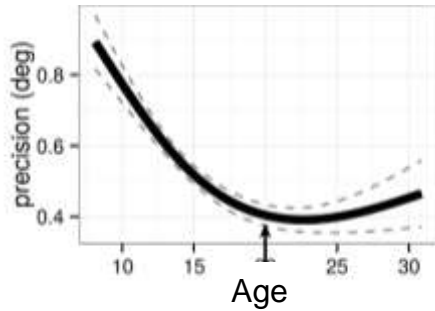


Cognition and Brain Function

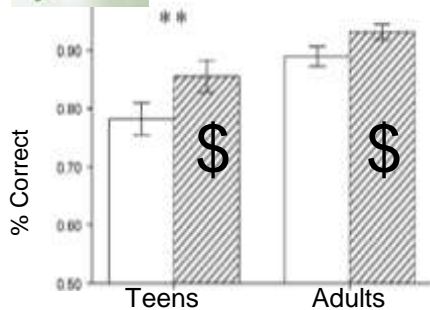
Response Inhibition



Behavior

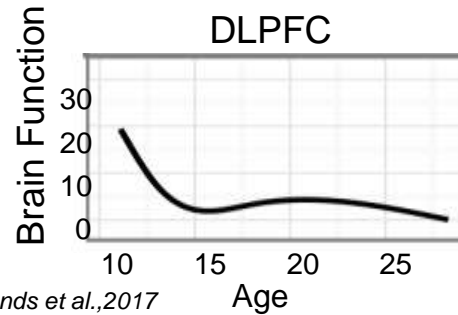


Ordaz et al., 2013

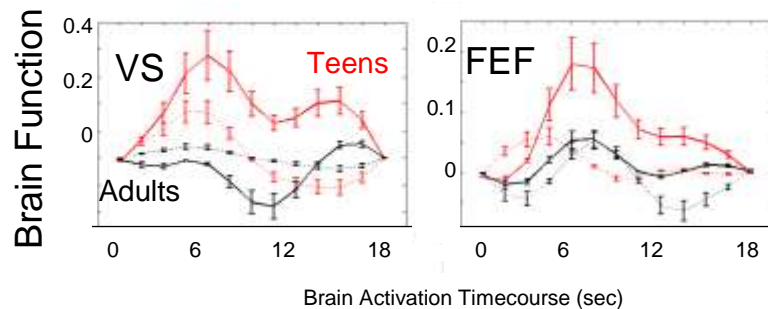
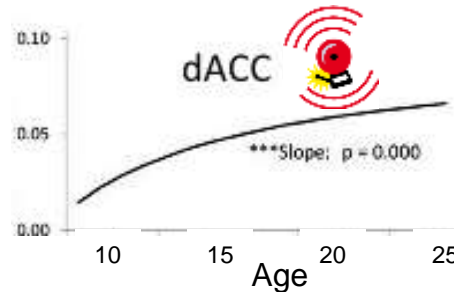


Geier et al., 2009

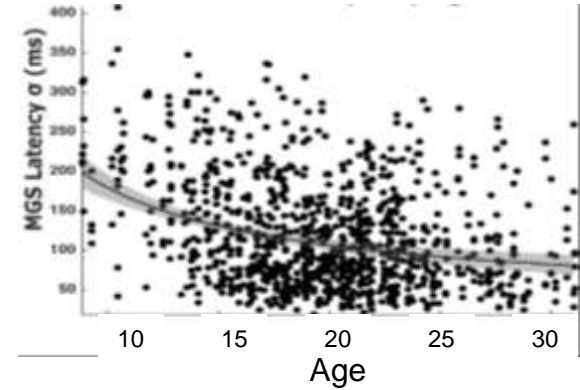
Working Memory



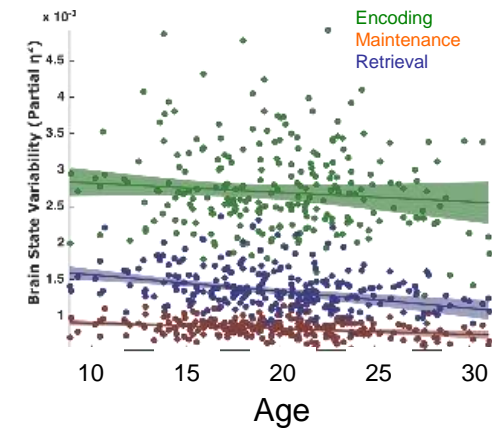
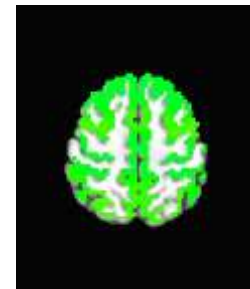
Simmonds et al., 2017



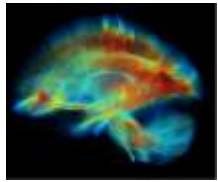
Variability



Brain State Expression



Montez et al., 2017

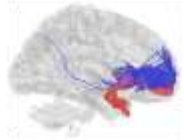


Brain Connectivity



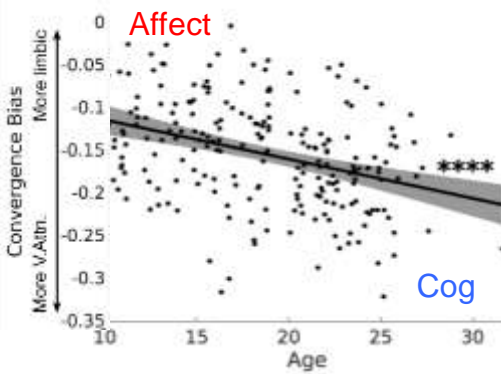
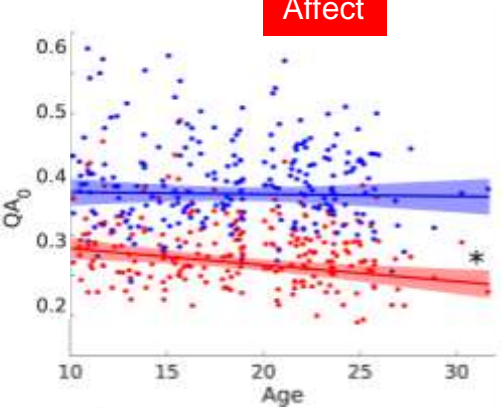
Affect

Frontolimbic

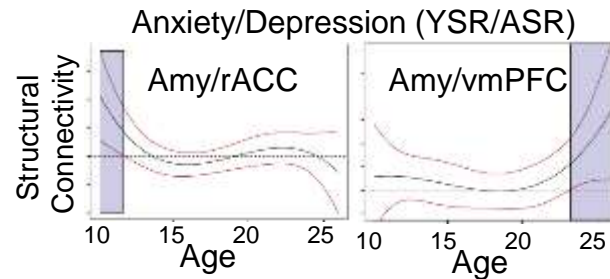
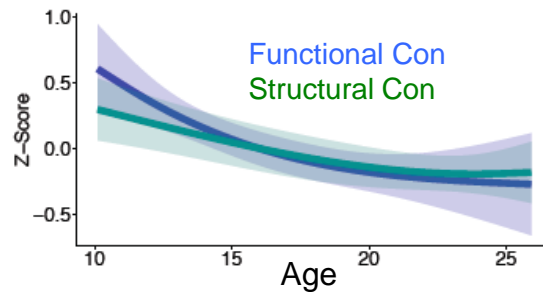
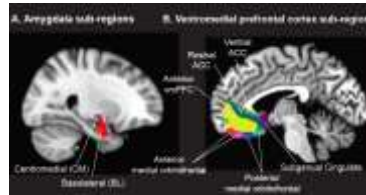


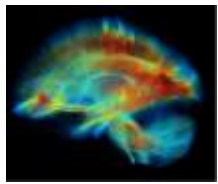
Cognitive

Affect

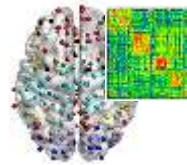


Frontoamygdala



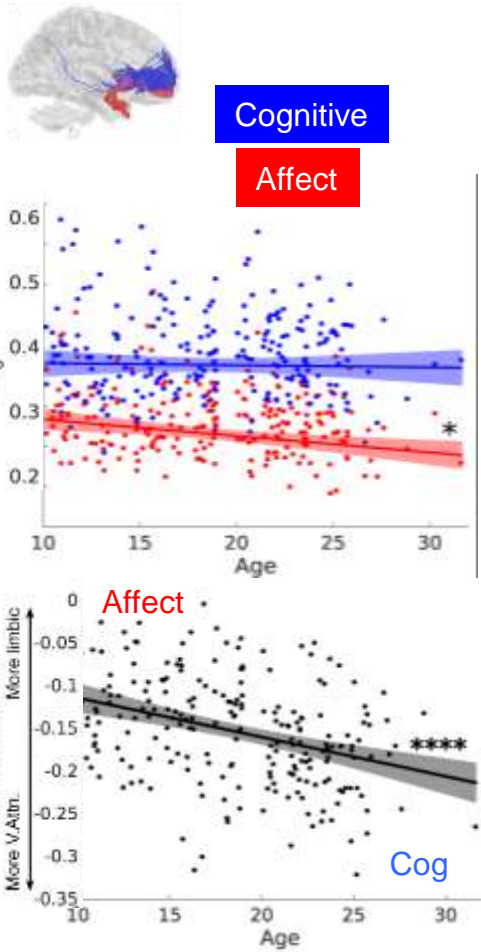


Brain Connectivity

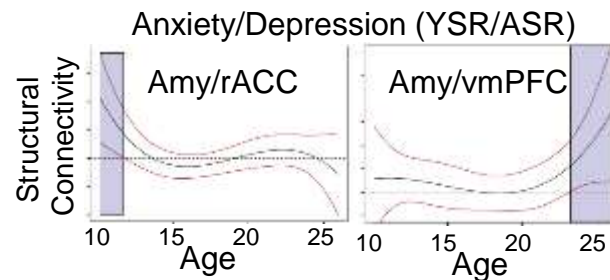
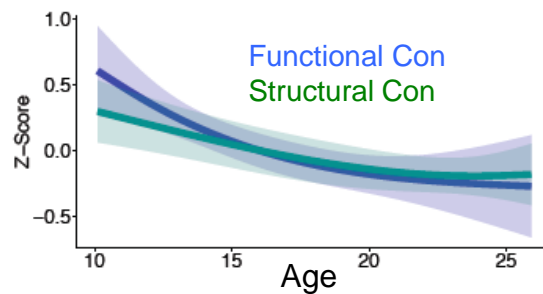
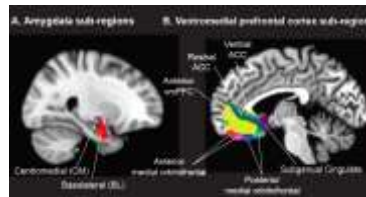


Affect

Frontolimbic



Frontoamygdala

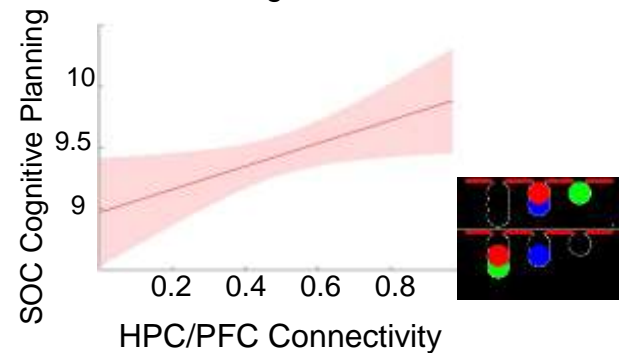
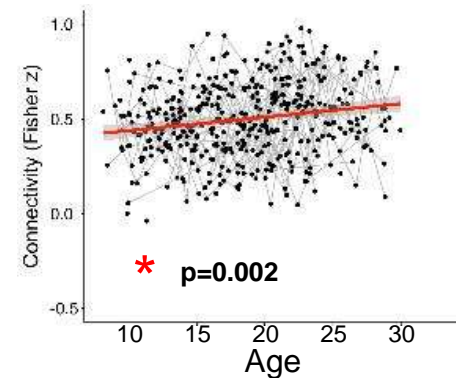
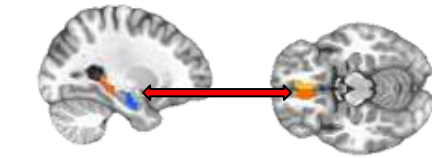


Larsen et al., 2017

Jalbrzikowski et al., 2017

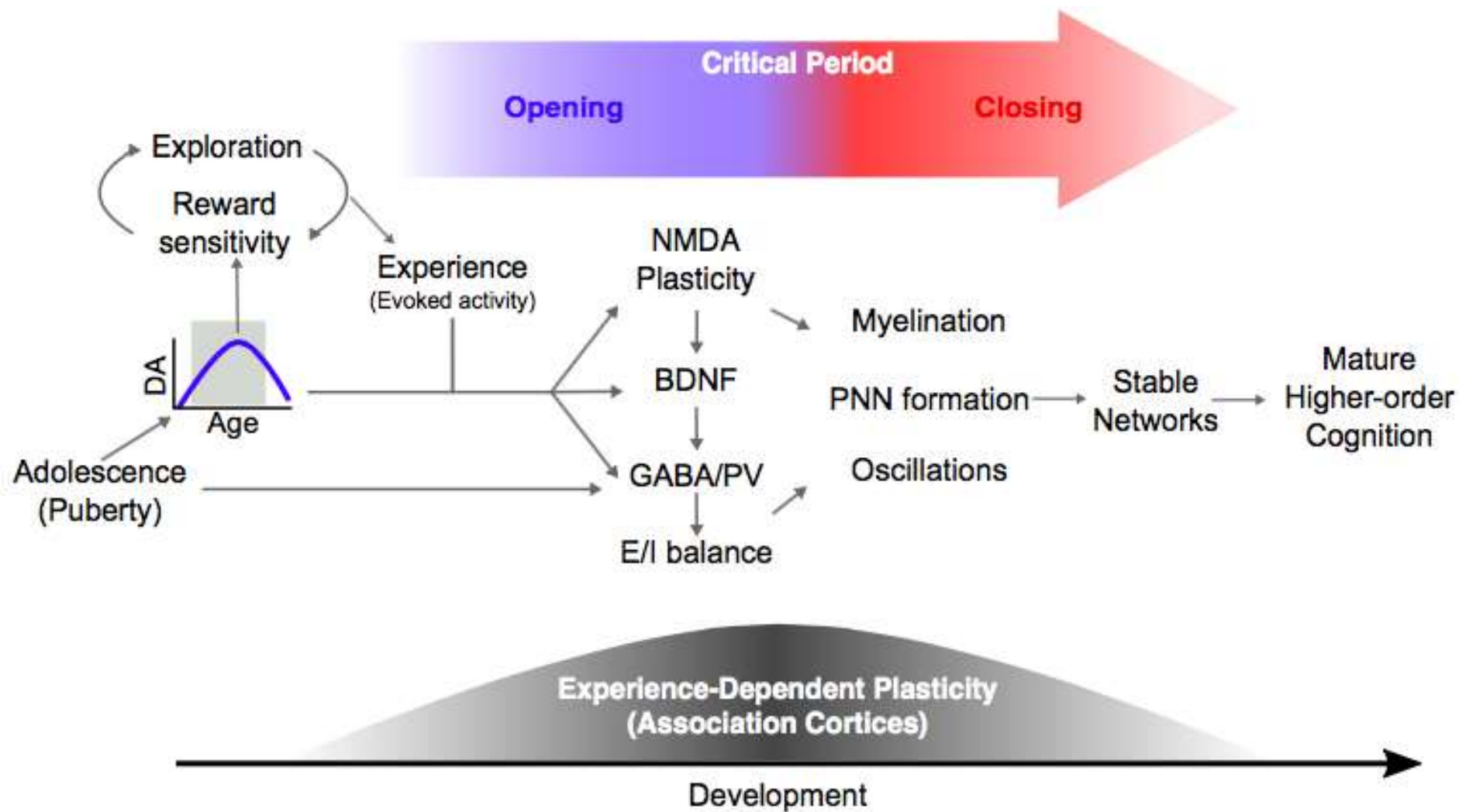
Experience

Frontohippocampal

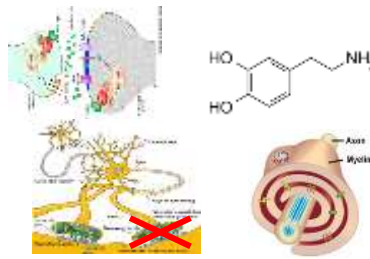


Calabro et al., (under review)

Adolescent CP of Association Cortices



Genes



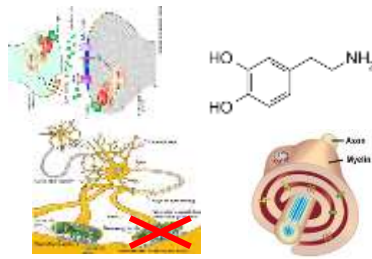
Adolescent
Brain Maturation

Adult Trajectories

Environment



Genes



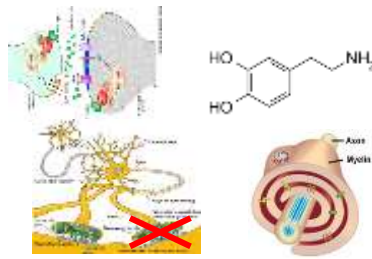
Adolescent
Brain Maturation

Adult Trajectories

Environment



Genes



Adolescent
Brain Maturation

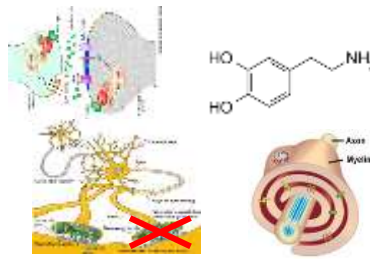
Adult Modes of
Operation



Environment



Genes

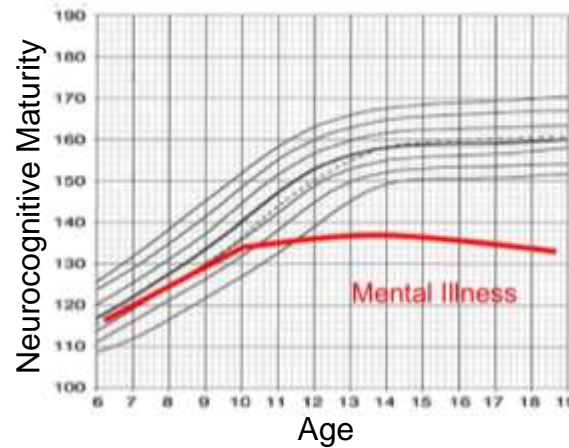


Adolescent Brain Maturation

Adult Modes of Operation



Environment





Thank you!



MH067924
 MH080243
 K23 NS 052234
 K01 MH081191
 K01 MH082123



- Finn Calabro PhD - Faculty
- Maria Jalbrzikowski PhD – Faculty
- Vishnu Murty PhD - Faculty
- Bart Larsen – PhD Student
- Scott Marek – PhD Student
- David Montez – PhD Student
- Brenden Tervo-Clemmens – PhD Student

- Sarah Ordaz PhD
- Dani Simmonds MD PhD
- Will Foran- MS
- Julia Lekht -Res Assistant
- Jen Fedor-Res Assistant