How the Science of Adolescent Brain Development Informs Legal Policy

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Landmark Cases Involving Science of Adolescence

- *Roper v. Simmons* (2005)
  - Abolished the juvenile death penalty
- *Graham v. Florida* (2010)
  - Prohibits JLWOP for crimes other than homicide
- *Miller v. Alabama* (2012)
  - Prohibits mandatory JLWOP for all crimes
- *Montgomery v. Louisiana* (2016)
  - Makes *Miller* retroactive

Evolution of Supreme Court's Use of Adolescent Brain Science in Cases About Juvenile Culpability

- Pre-Roper
  - No mention
- Roper (2005)
  - Mentioned in oral arguments
- Graham (2010)
  - Mentioned in opinion, in passing
- Miller (2012)
  - Mentioned in opinion, in some detail

Proportionality Analysis

- **Degree of punishment should be in proportion to the nature and circumstances of the crime**
  - Harm caused by the crime
  - Blameworthiness of perpetrator

Legal Issues

- **Does developmental immaturity mitigate juveniles' blameworthiness?**
  - Does the punishment violate the Eighth Amendment's prohibition of "cruel and unusual punishment"?

- **Should the punishment be prohibited categorically or decided on a case-by-case basis?**
  - Juvenile death penalty: Categorical Ban (Roper)
  - JLWOP for non-homicides: Categorical Ban (Graham)
  - JLWOP for homicide: Case-By-Case (Miller)

Problems with the Miller Decision

- **What criteria should be used to sentence someone to LWOP?**
  - Inability to reliably predict future violence
- **Irrelevant factors unconsciously influence sentencing decisions**
  - Race
  - Physical appearance and attire
  - Demeanor

Post-Miller Difficulties

- **If not LWOP, then what?**
  - Life sentences with parole still permitted
  - Very long sentences still permitted (although note recent ruling in *U.S. v. Grant* – U.S. Court of Appeals, 3rd circuit)
- **How do we apply Miller retroactively?**
  - Are individuals currently serving LWOP for crimes committed as juveniles entitled to resentencing?
  - If so, what criteria should be used for resentencing?

Why Are Juveniles Inherently Less Culpable Than Adults?

- Immature judgment leads to "impetuous and ill-considered decisions"
- Susceptibility to external influences, especially peer pressure
- Unformed character makes adolescents better candidates for rehabilitation

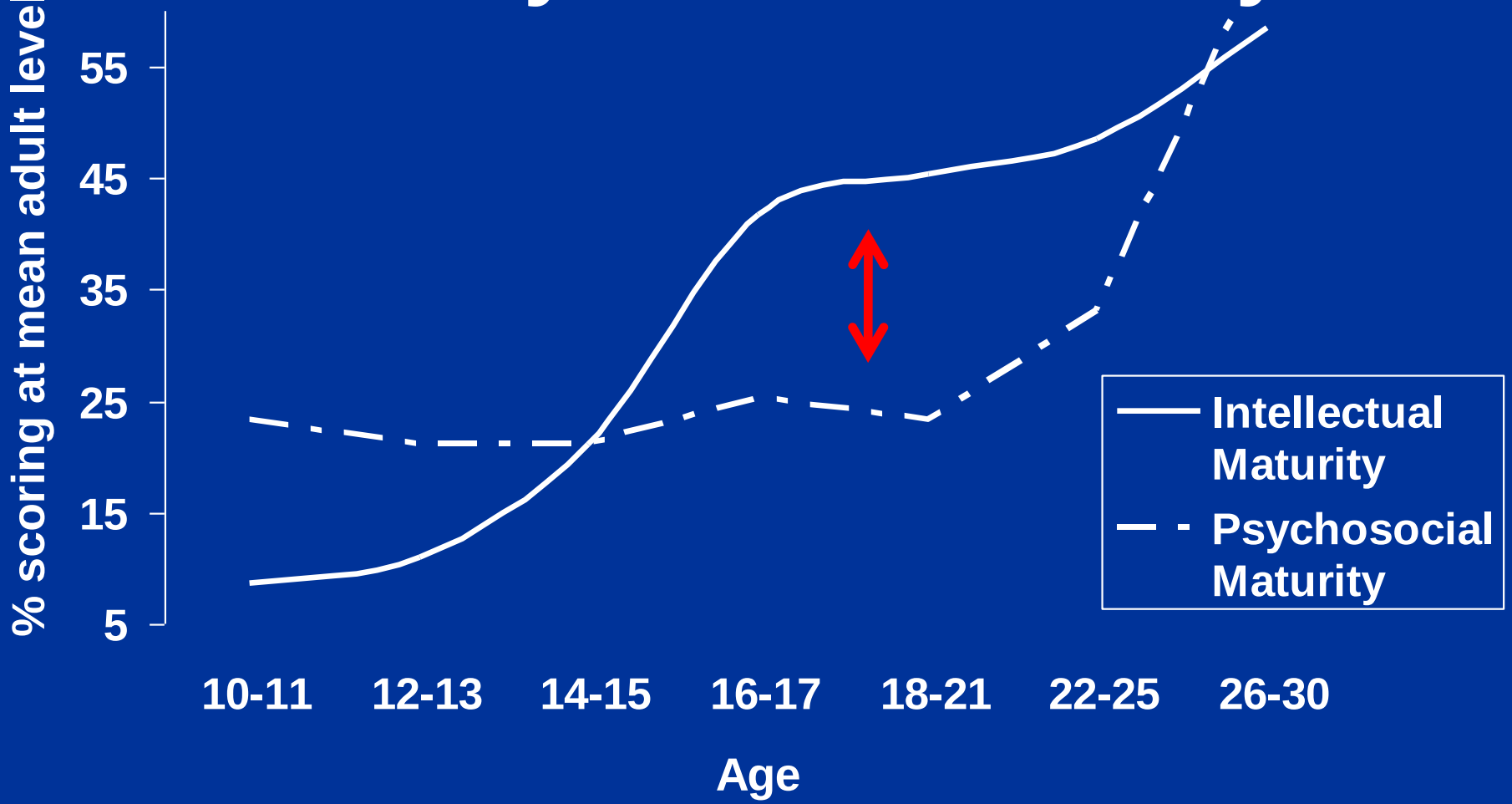
Major Changes in Brain Structure

- Synaptic pruning of prefrontal cortex
- Changes in density and distribution of dopamine receptors
- Increased myelination of prefrontal cortex
- Increased connectivity between cortical and subcortical regions

Major Changes in Brain Function

- Strengthening of systems supporting self-control
- Heightened striatal activity in response to anticipated rewards
- Strengthening of systems supporting “mentalizing”
- Increase in functional connectivity

Individuals Mature Intellectually Before They Mature Socially and Emotionally



Steinberg et al., 2009

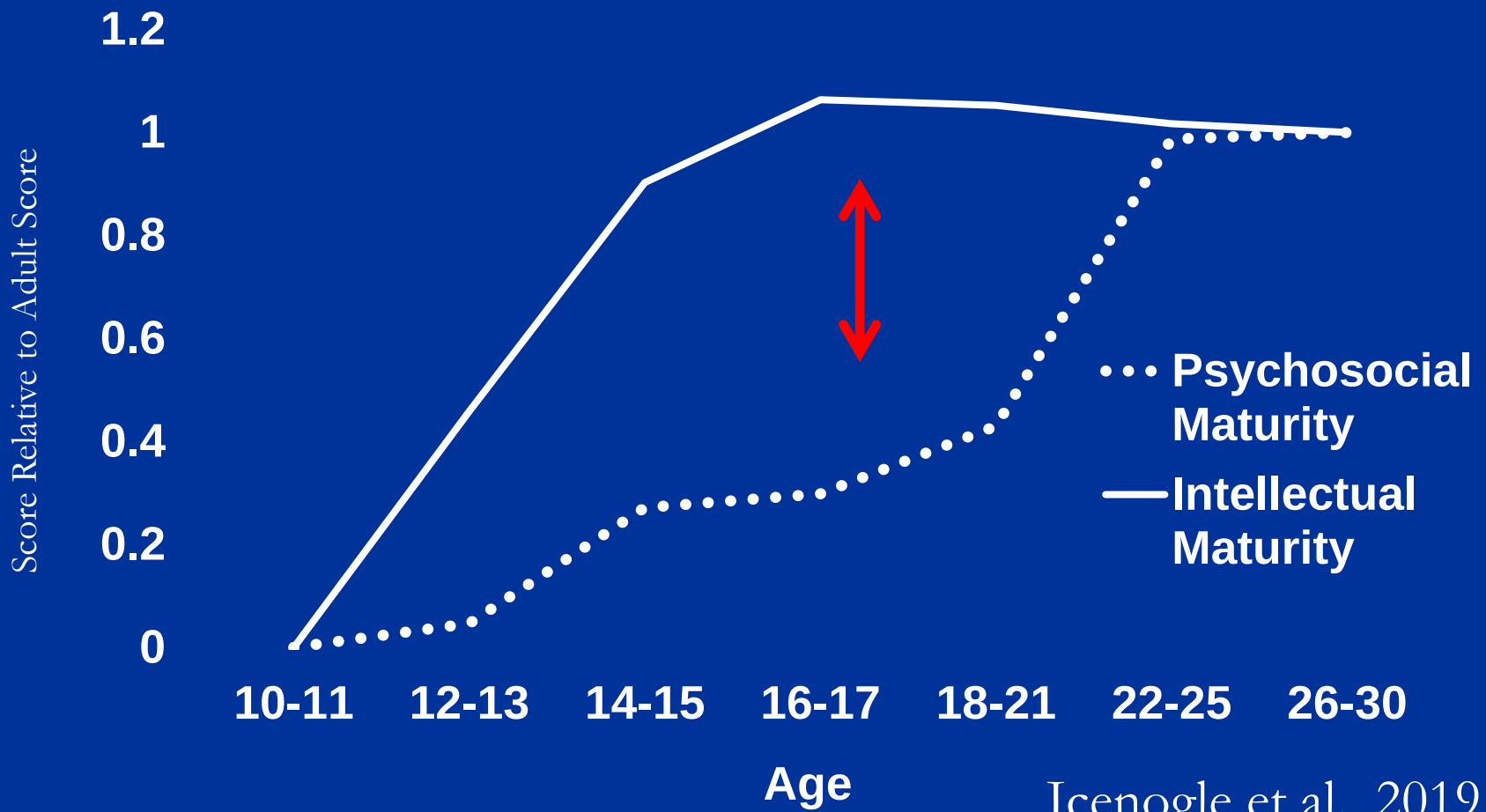

PINK NATION SPRING BREAK BASH
PINK
LA POLLOS

Cross-Cultural Replication

- China (Shanghai)
- Cyprus (Nicosia)
- Colombia (Medellin)
- India (Delhi)
- Italy (Naples/Rome)
- Jordan (Amman)
- Kenya (Maseno)
- Philippines (Manila)
- Sweden (Trollhattan)
- Thailand (Chiang Mai)
- United States (Durham)

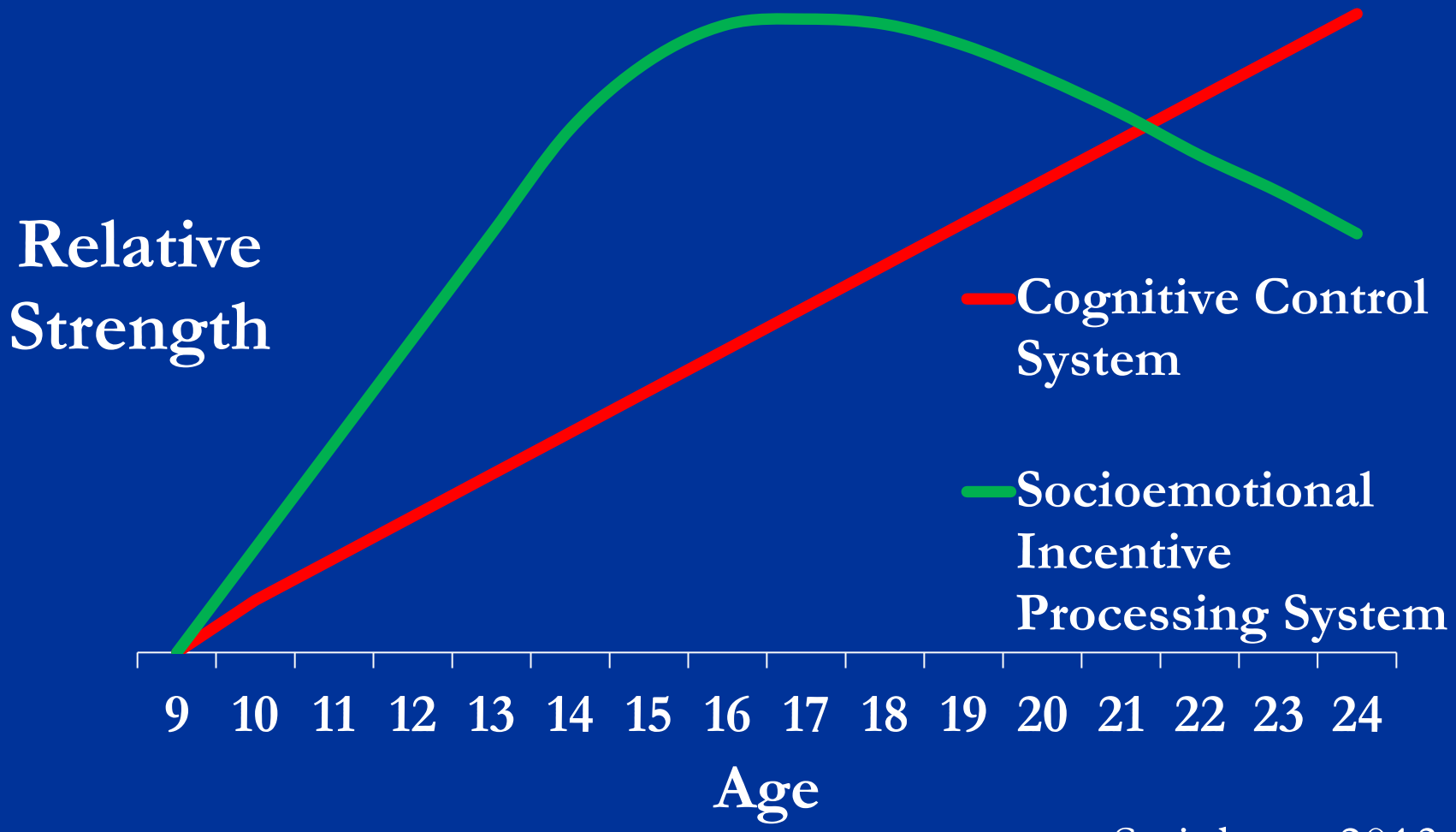
JACOBS FOUNDATION

The Maturity Gap is Not Unique to American Teenagers



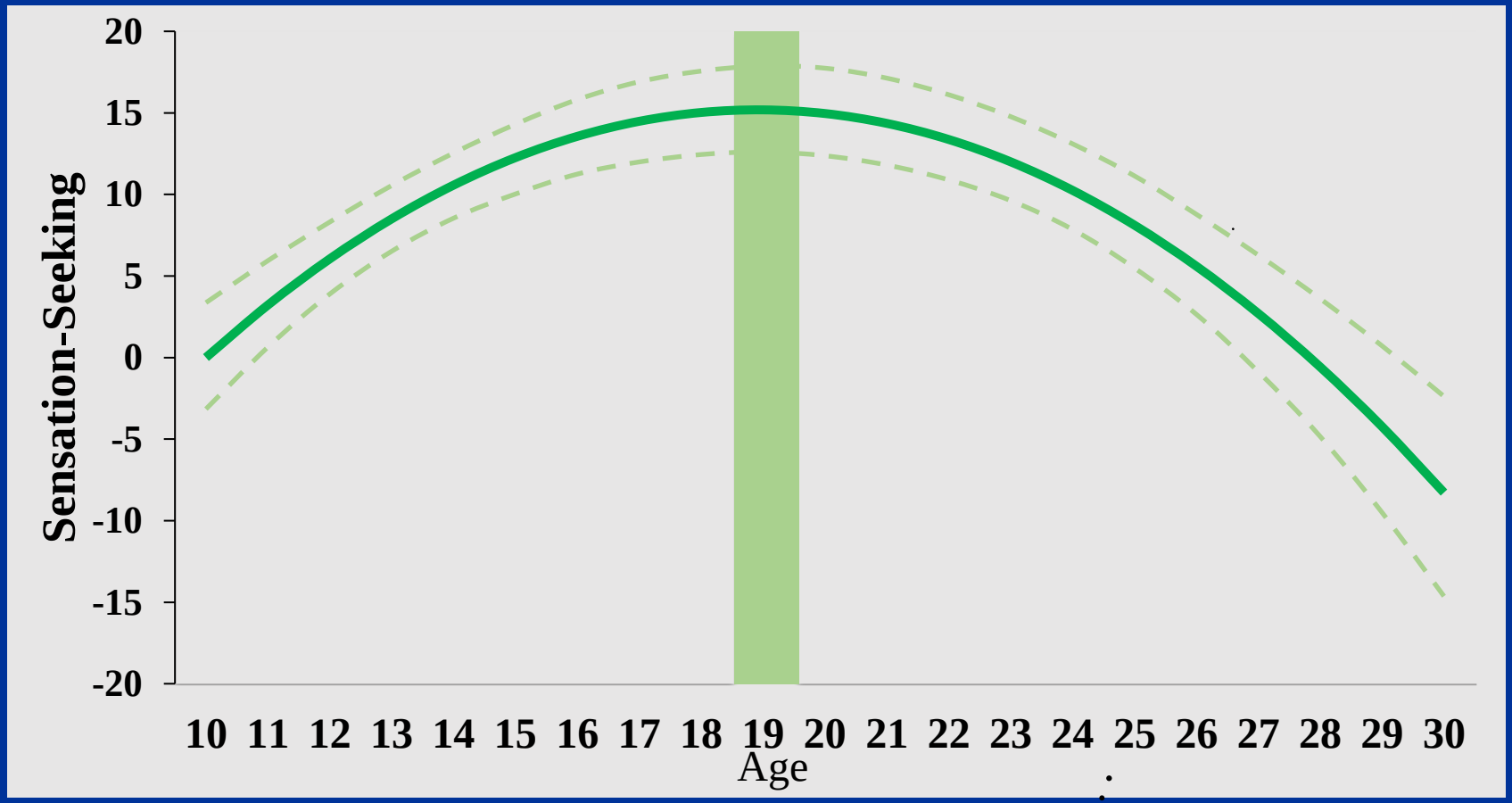
Icenogle et al., 2019

Explaining the Gap
The Dual Systems Model



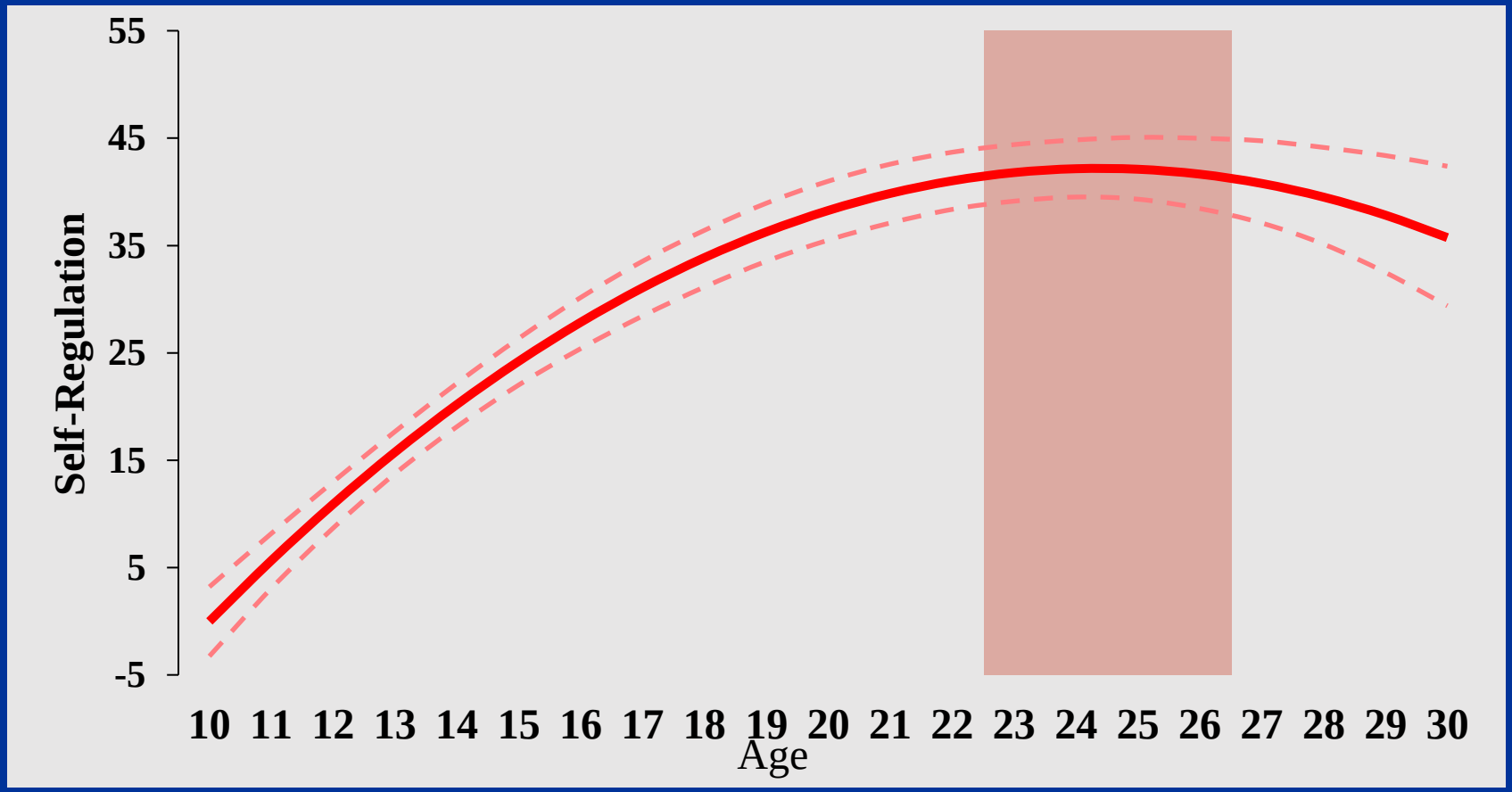
Steinberg, 2013

Age Differences in Sensation Seeking in an International Sample



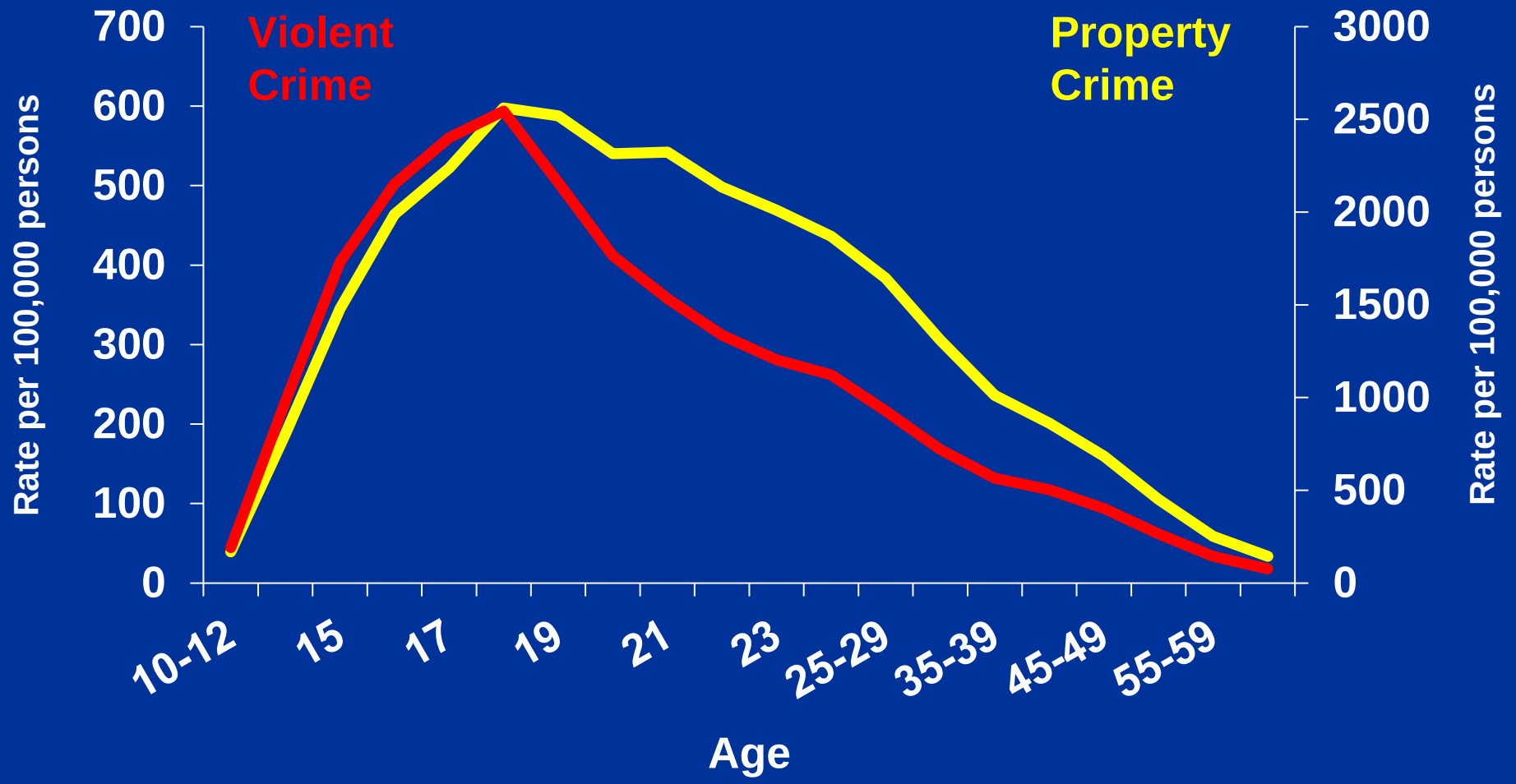
Steinberg et al., 2018

Age Differences in Self-Regulation in an International Sample



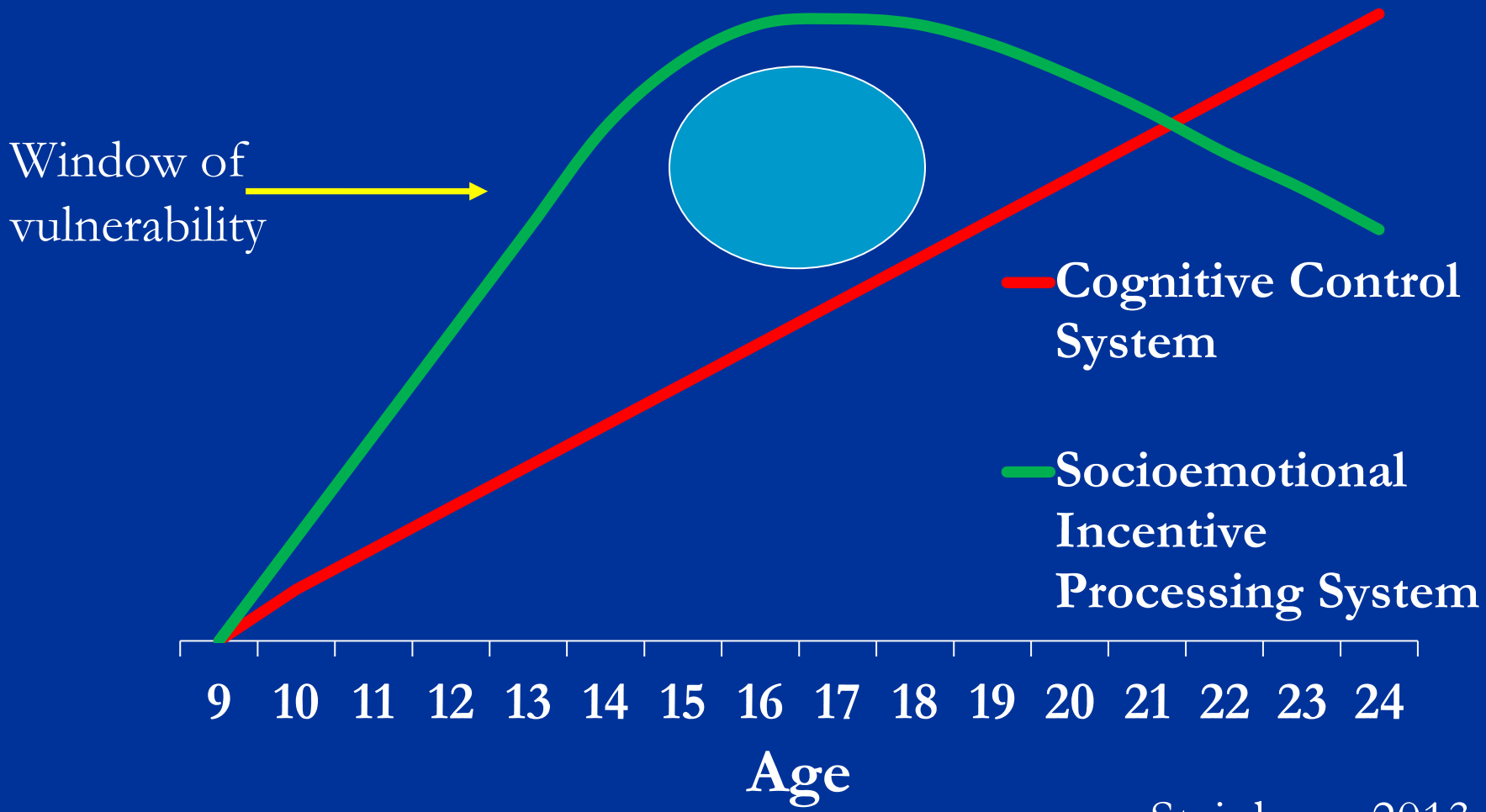
Steinberg et al., 2018

The Age-Crime Curve



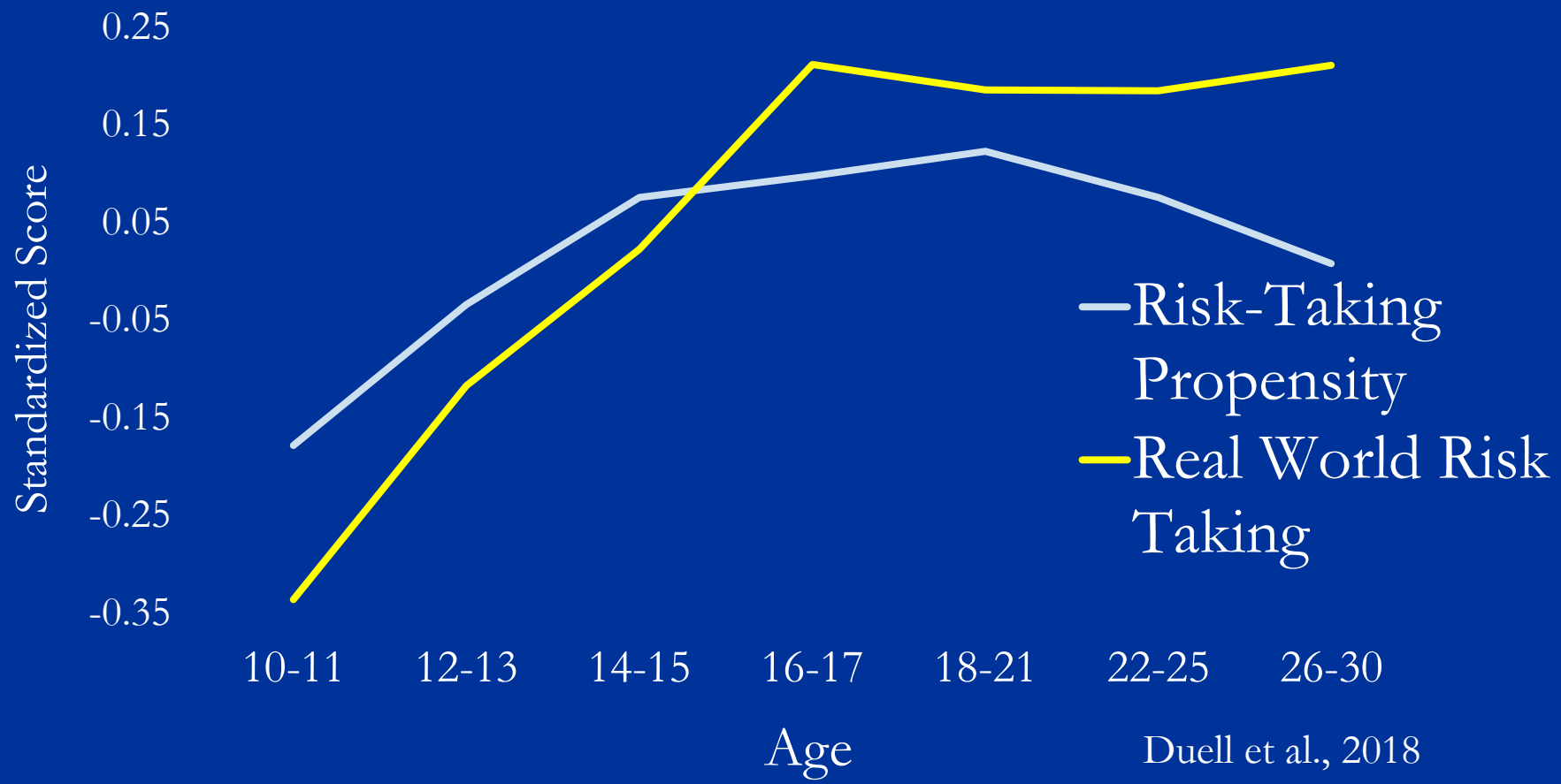
Bureau of Justice Statistics, 2010

The Age-Crime Curve is Really an "Age-Risk Curve"



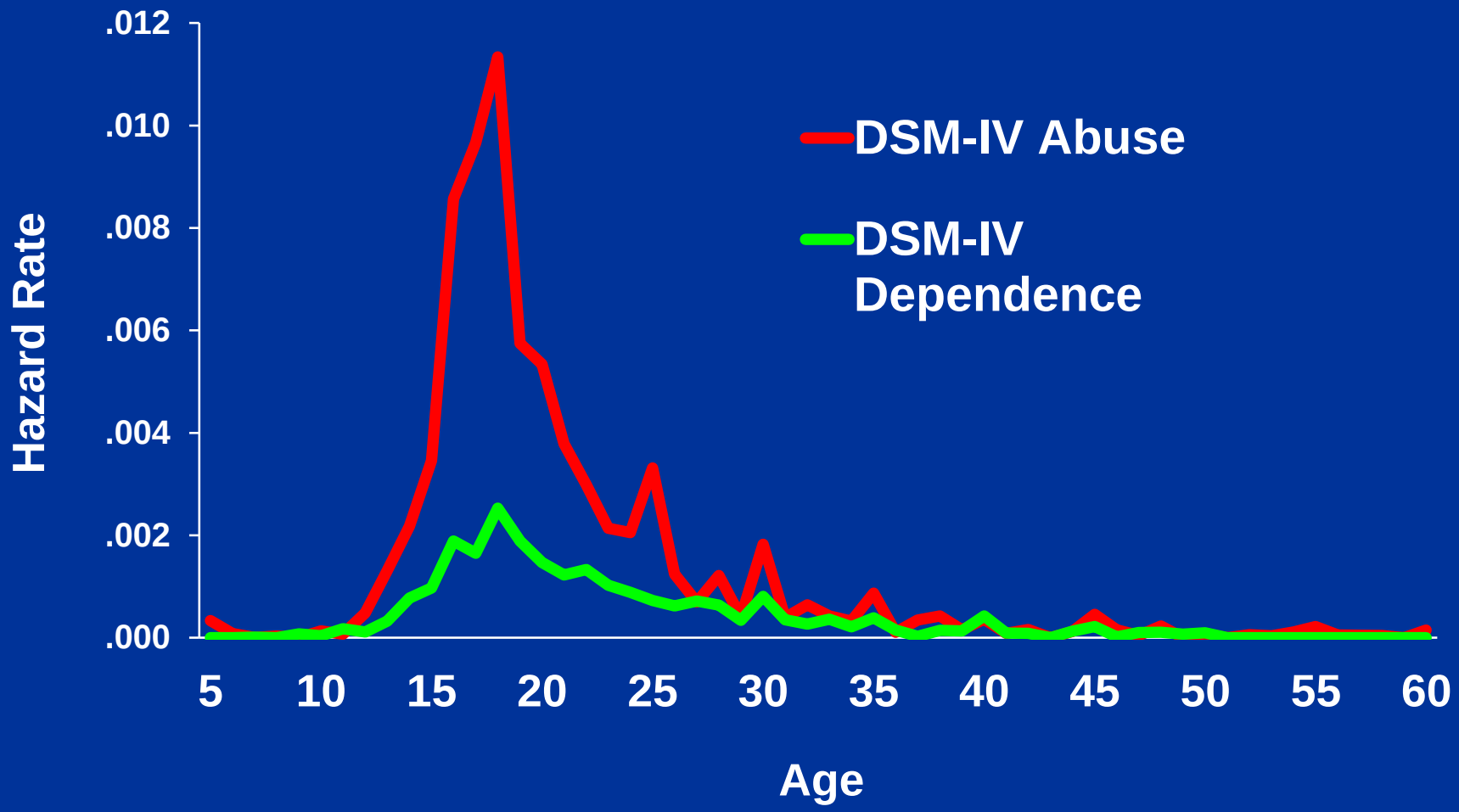
Steinberg, 2013

Risk Taking Versus Risk-Taking Propensity



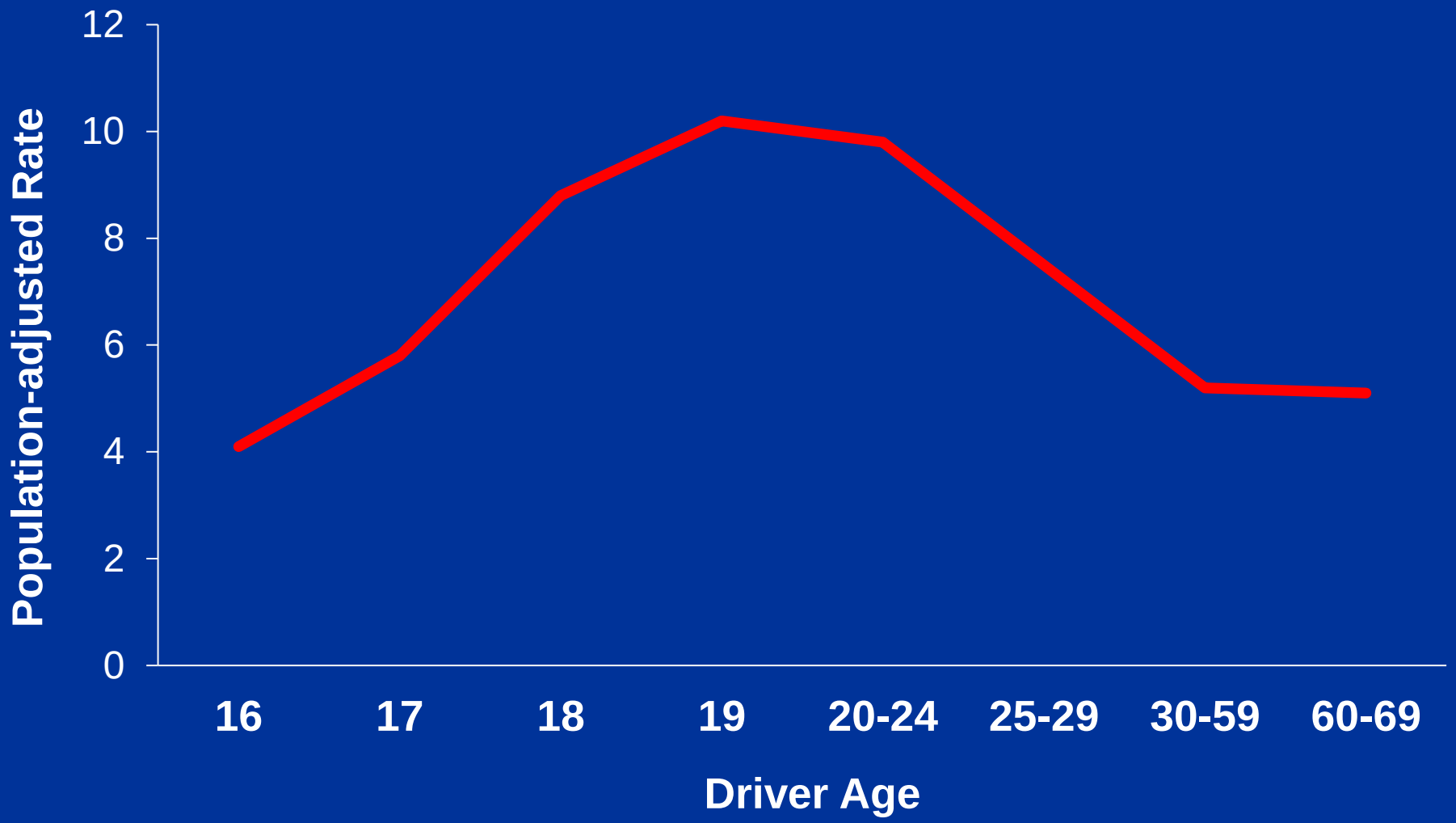
Duell et al., 2018

Age of Onset of Illicit Drug Abuse or Dependence



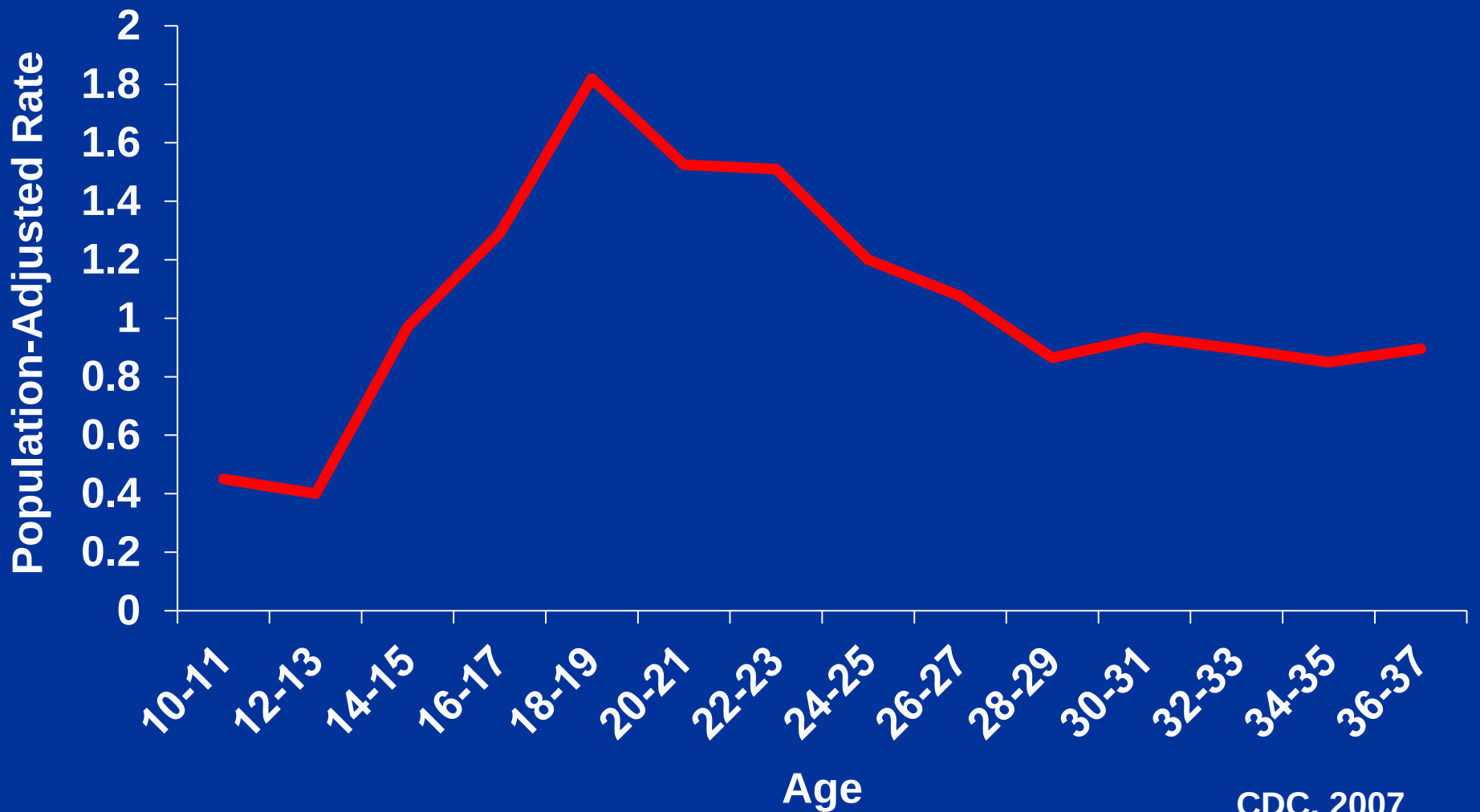
Compton et al., 2007

Driver Deaths



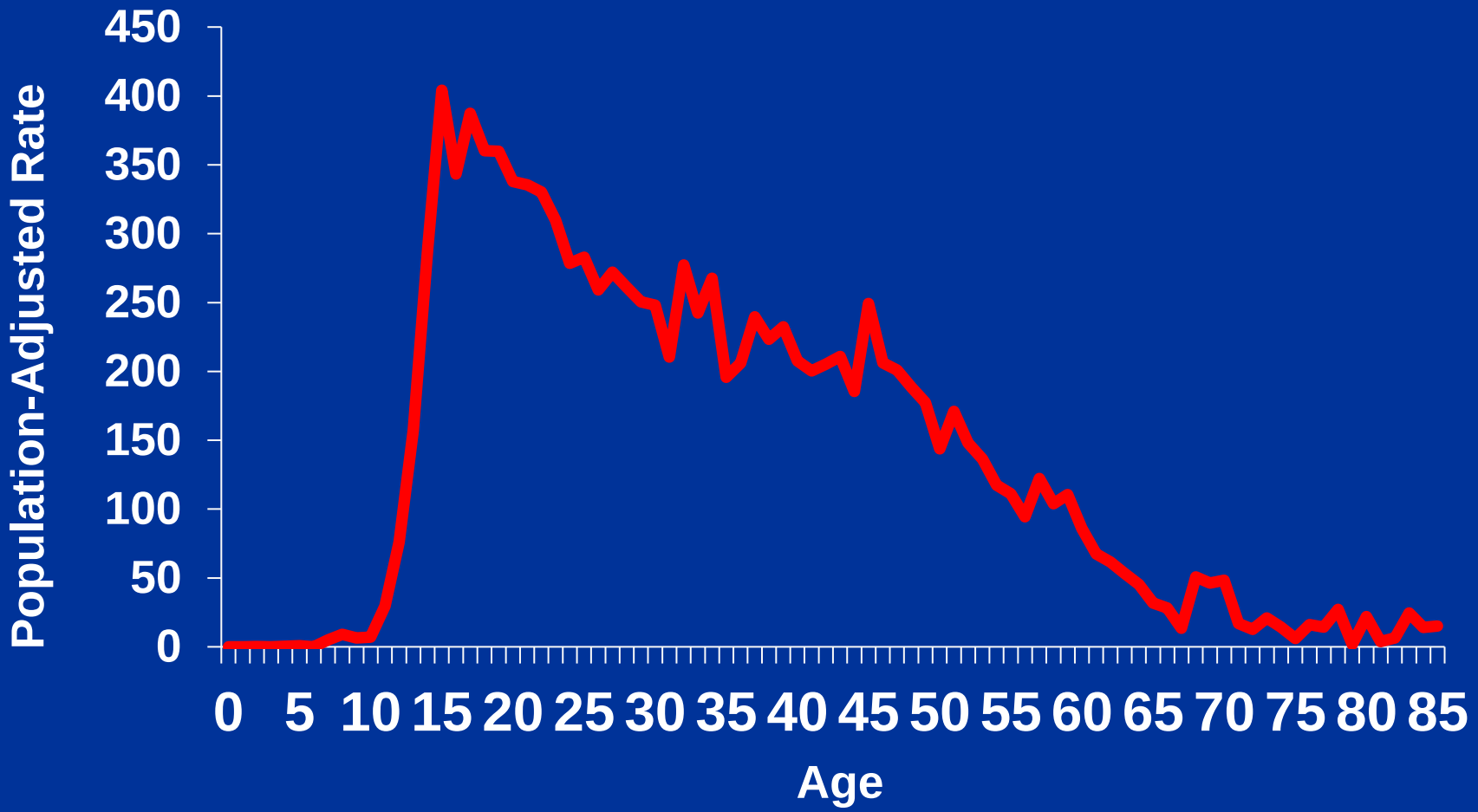
Insurance Institute for Highway Safety (2011)

Unintentional Drownings



CDC, 2007

Non-Fatal Self-Inflicted Injuries



CDC, 2011

Why Are Juveniles Inherently Less Culpable Than Adults?

- Immature judgment leads to "impetuous and ill-considered decisions"
- Susceptibility to external influences, especially peer pressure
- Unformed character makes adolescents better candidates for rehabilitation

Emerging Issues

- The applicability of felony murder charges to juveniles
  - Research on peer influence
- Extending the logic of *Roper* and *Miller* to late adolescence
  - Research on brain development beyond age 18

Two Studies of Offenders

- Pathways To Desistance
  - Serious juvenile offenders convicted of felony between 14-17
- Crossroads
  - First-time male juvenile offenders arrested for moderately serious offense between 14-17

Pathways to Desistance

- Longitudinal study of juvenile felons in Philadelphia and Phoenix followed for seven years, into their 20s
- Dispositions in juvenile system based entirely on prior record and seriousness of current crime.
- Majority of juvenile offenders re-arrested at least once within two years (does not include arrests for probation violation)
- Fewer than 10% are chronic, high frequency offenders
- We can not predict which of the initially high-offending juveniles will fall into this group

Factors Affecting Desistance

- Most juveniles stop offending as a result of normal psychological development
- Incarceration has no impact beyond incapacitation
- Longer institutional stays are no better than shorter ones
- Punitive sanctions increase recidivism
- Substance abuse treatment reduces reoffending short-term, but effect disappears if treatment is stopped

Factors Affecting Desistance

- Effective parenting has deterrent impact on reoffending by diminishing contact with antisocial peers
- Community-based programs involving family are most cost-effective
- Long and intensive probation supervision both increase engagement in school and/or work, which deter offending

Crossroads

Population: 632 Arrested and non-arrested adolescent boys who engaged in similar illegal behaviors

Age at baseline: 13 to 17

Location: California

Interview schedule: Baseline and 6-month follow up

Eligibility criteria: Engaged in certain types of illegal behavior

Retention: High; sample retention at follow up was 97%

How Does Treatment of First Time Offenders Affect Recidivism?

- Recruited first-time male offenders 13-17 y.o.
- All arrested for minor offenses that may have qualified them for diversion
- Matched on background and offense characteristics
- Added a sample of teens who had committed same offense but not arrested

Arrested

Formally Processed

- Adjudicated
- Supervised Probation

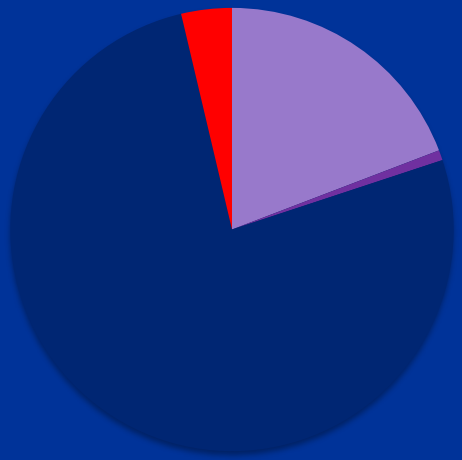
Diverted

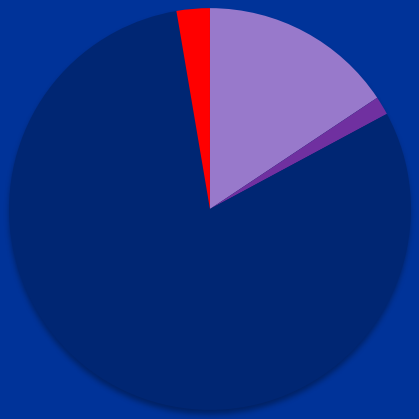
- Traditional Diversion
- Sanction & Dismissed

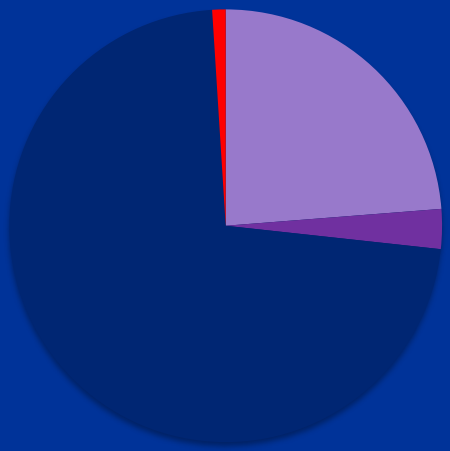
No-justice system contact

Diverted	Formally Processed	No-contact
Age ~ 15.44	*Age* ~ 15.54	*Age* ~ 15.85

White Black Latino Other

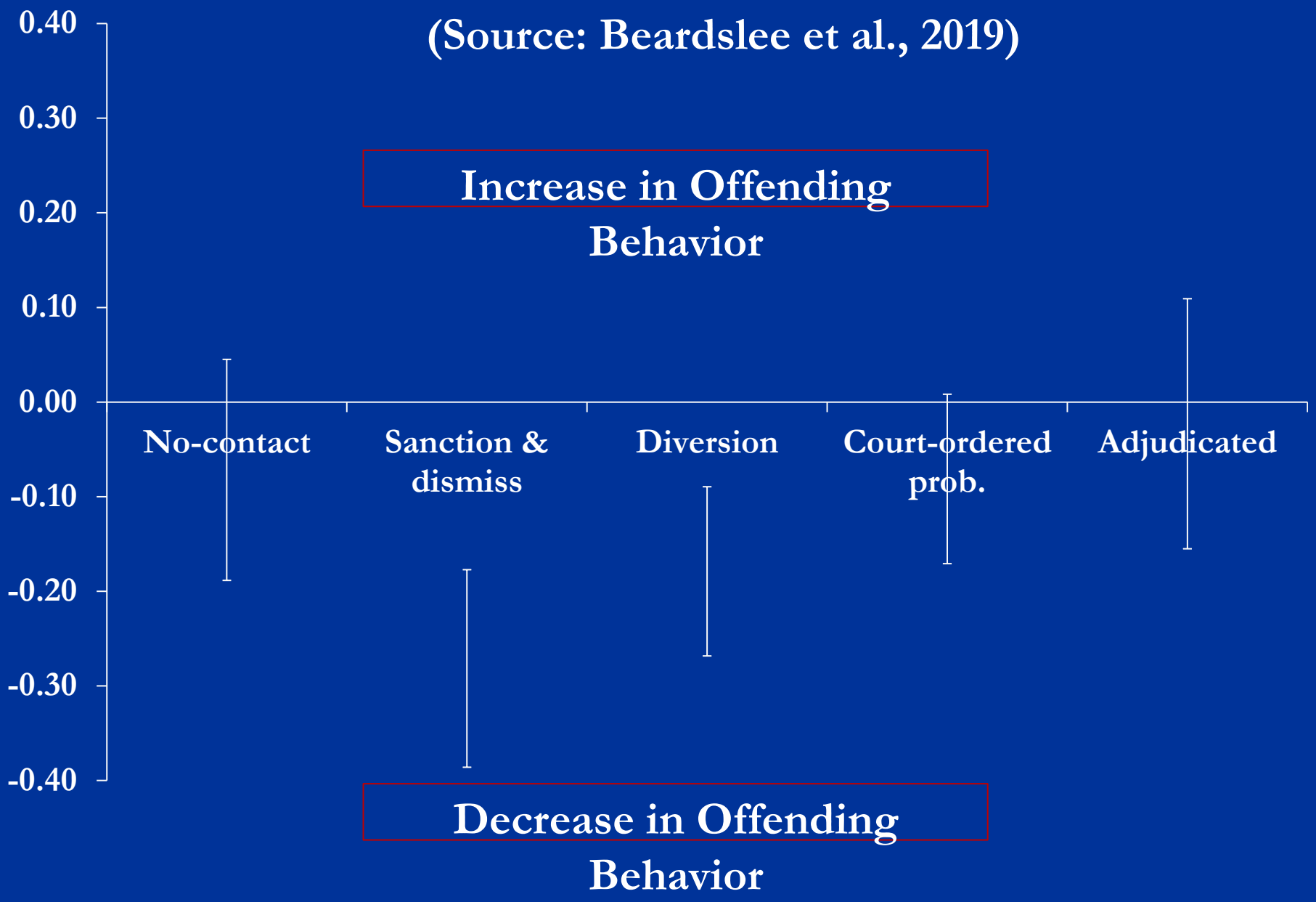






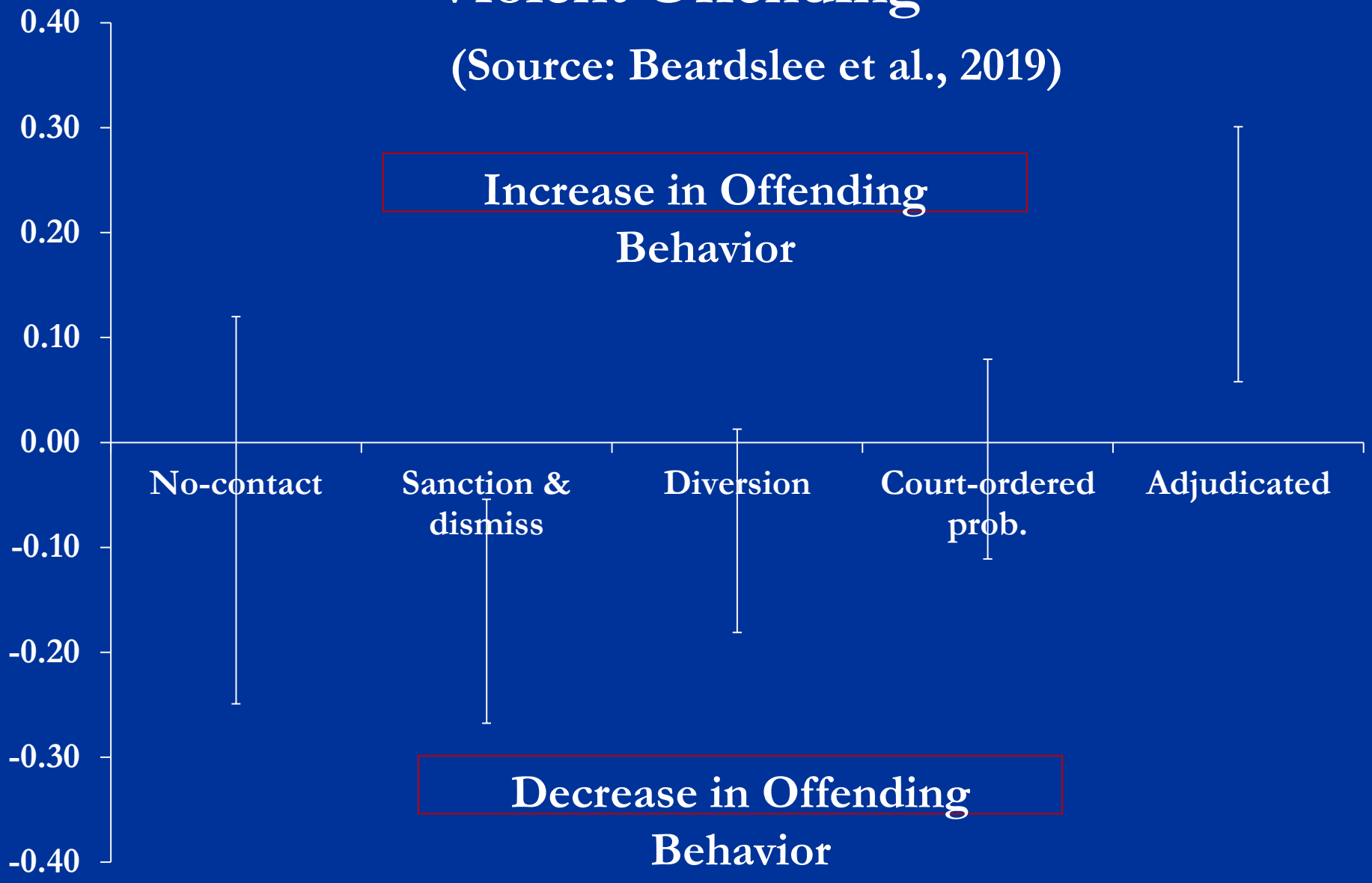
Theft/Property Offending

(Source: Beardslee et al., 2019)



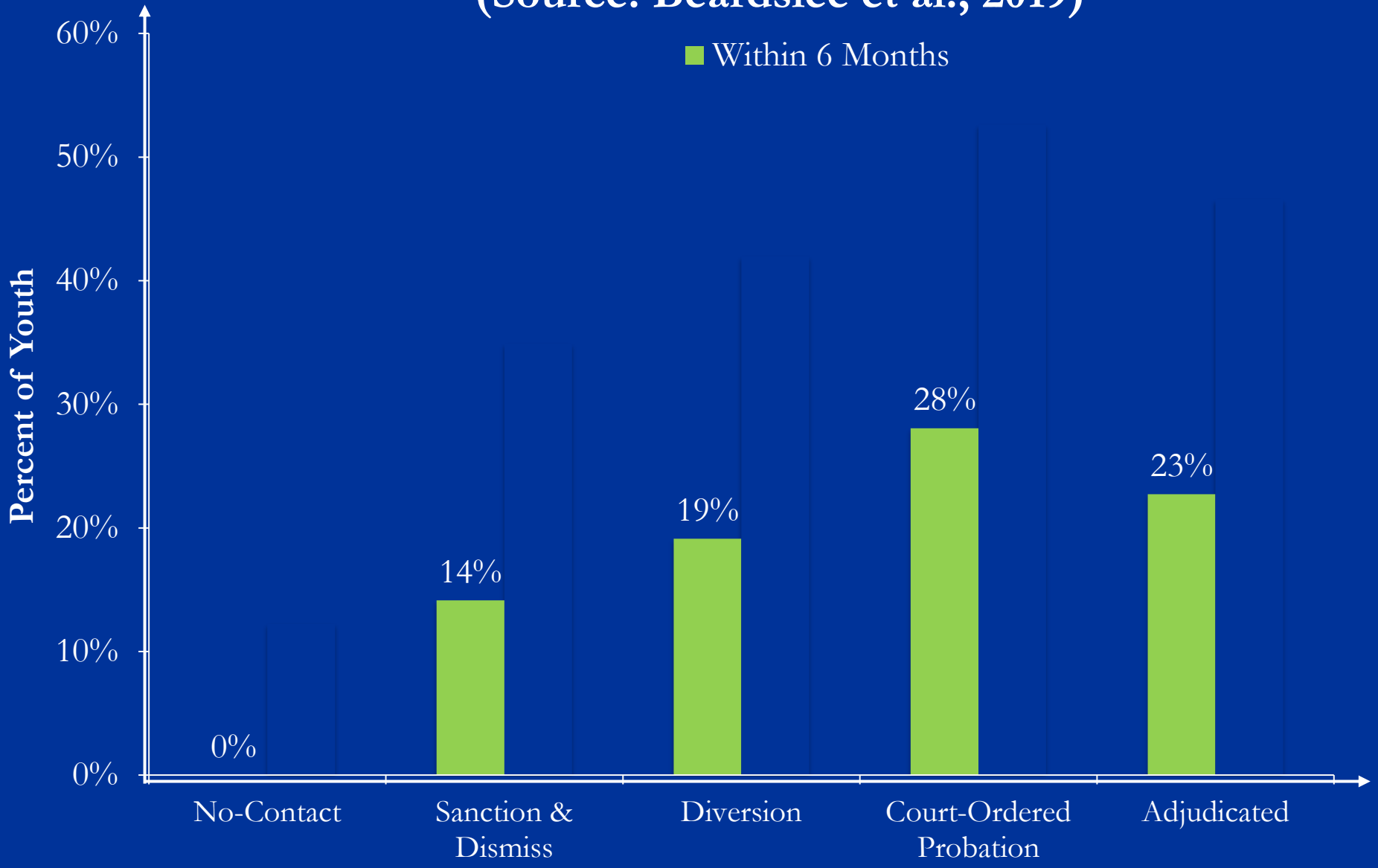
Violent Offending

(Source: Beardslee et al., 2019)



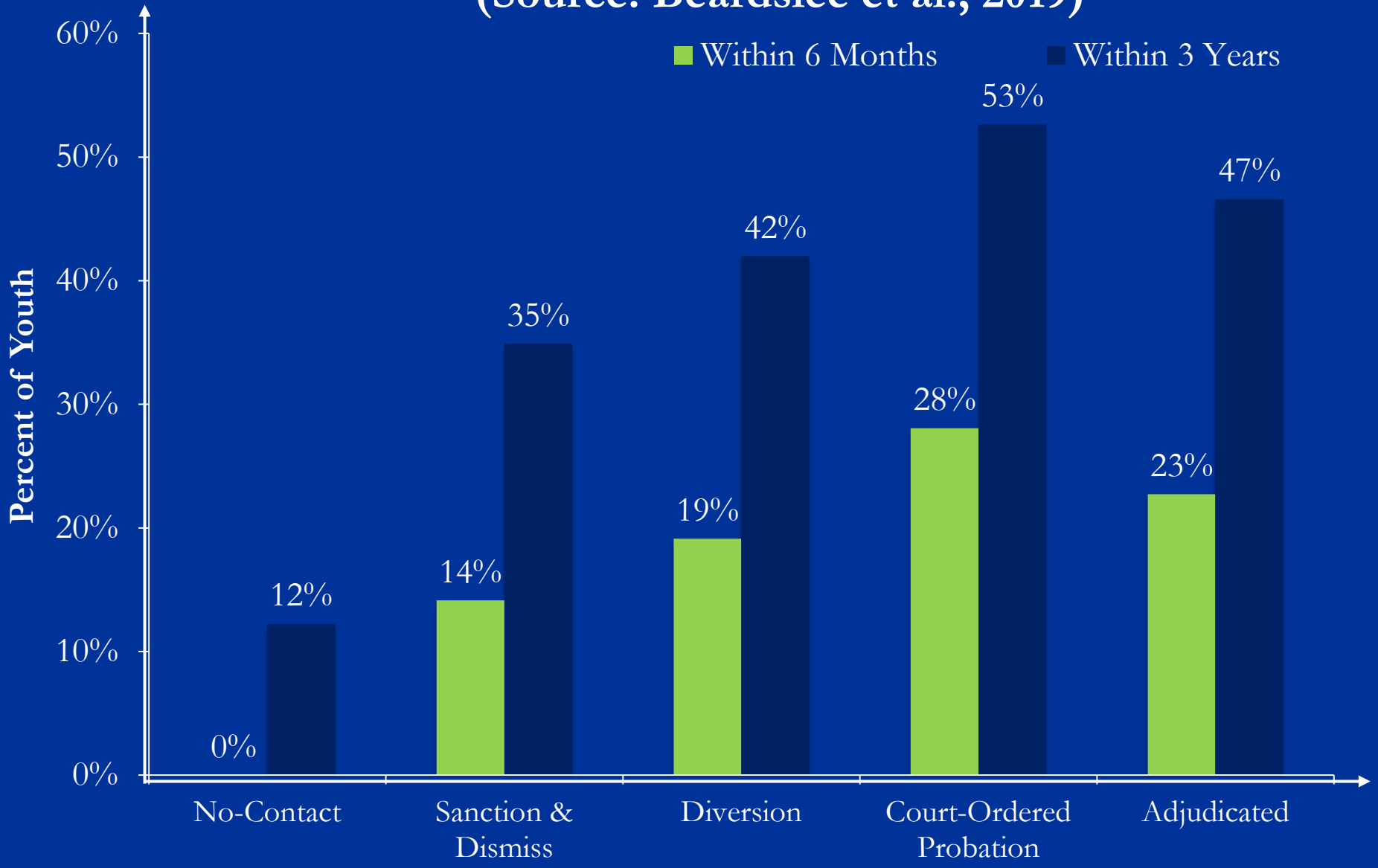
Prevalence of (Re-)Arrest

(Source: Beardslee et al., 2019)

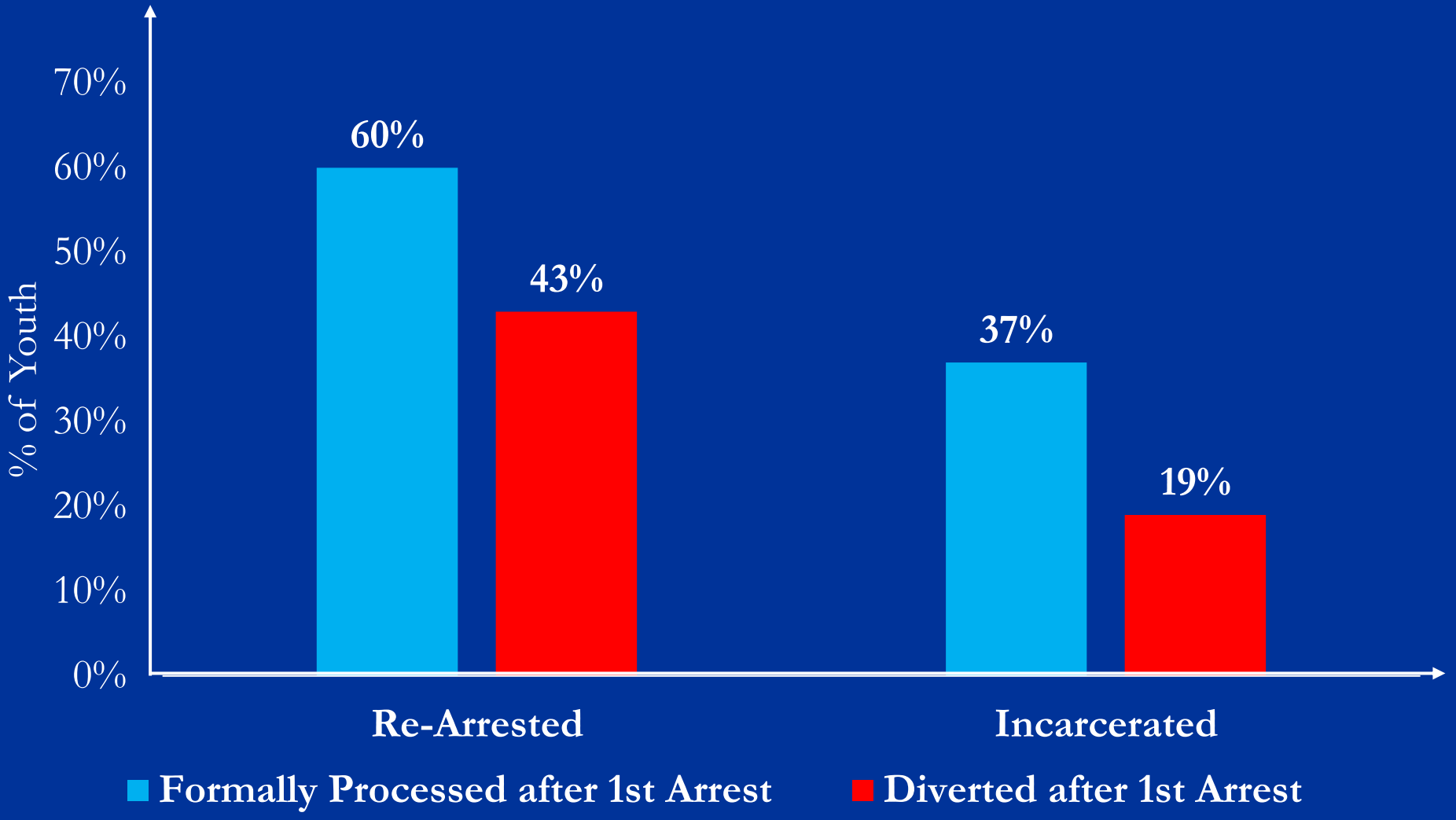


Cumulative Prevalence of (Re-)Arrest

(Source: Beardslee et al., 2019)



Cumulative Prevalence of Re-Arrests and Incarceration Among First Time Offenders after 5 Years



When Do Adolescents Think as Well as Adults?

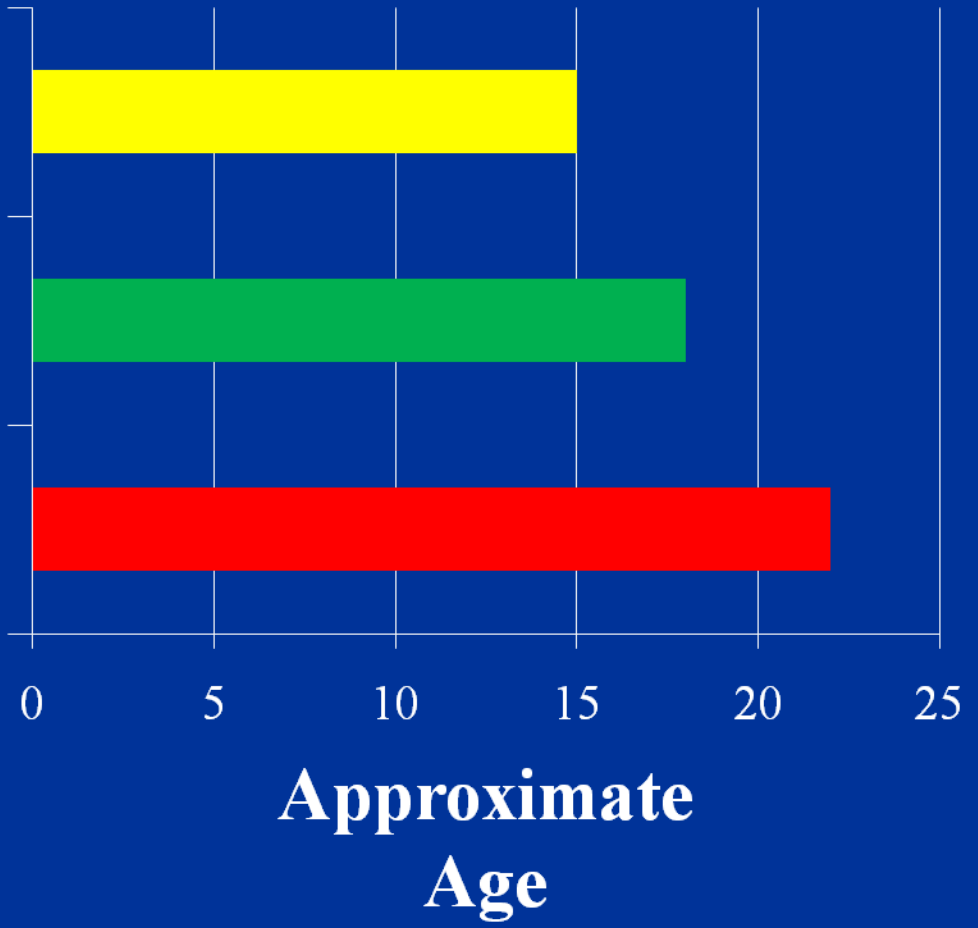
It depends.

Approximate Timetable of Cognitive Control

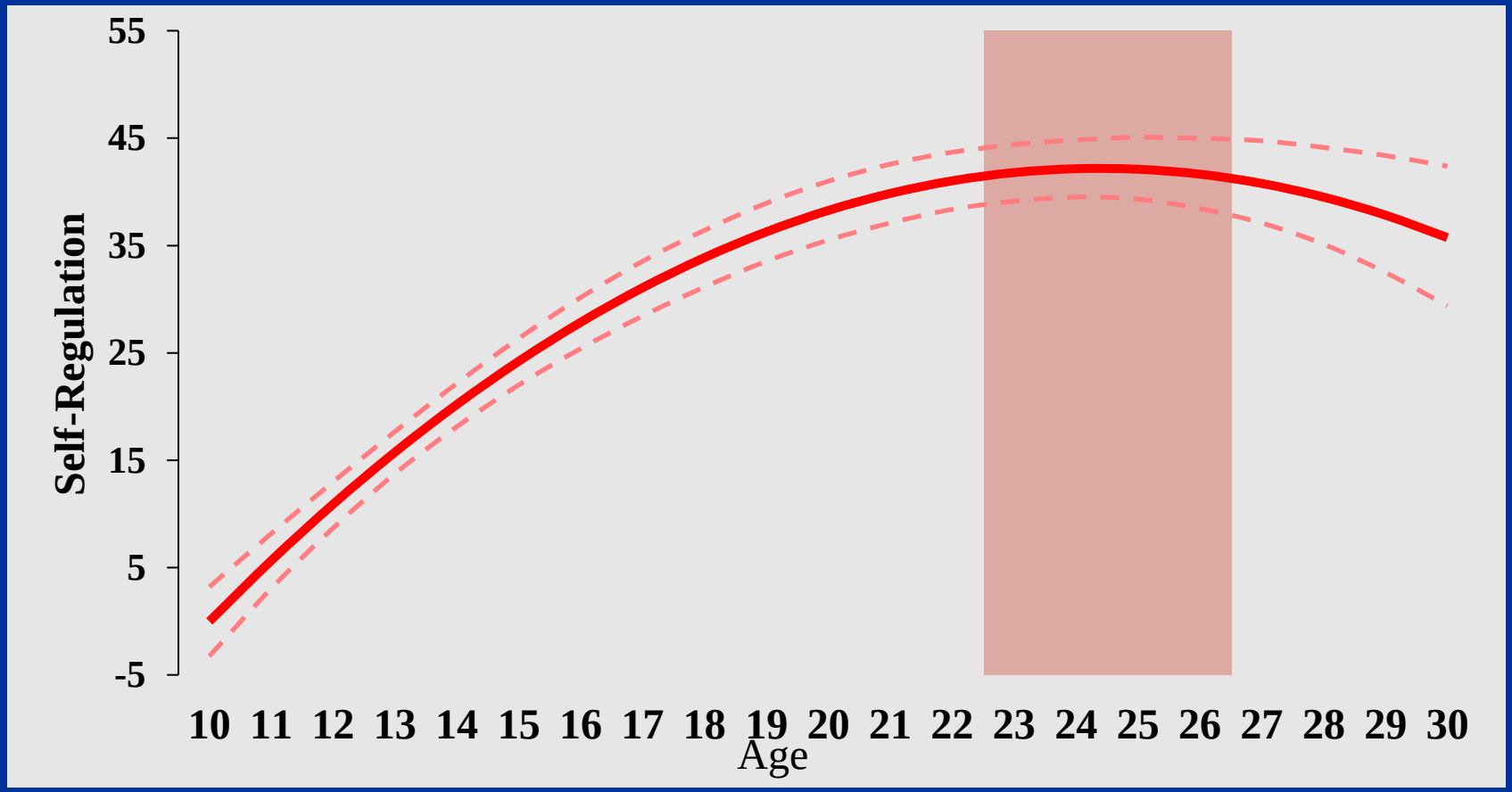
Basic Cognitive Abilities

Advanced Cognitive Abilities

Coordination of Emotion and Thinking

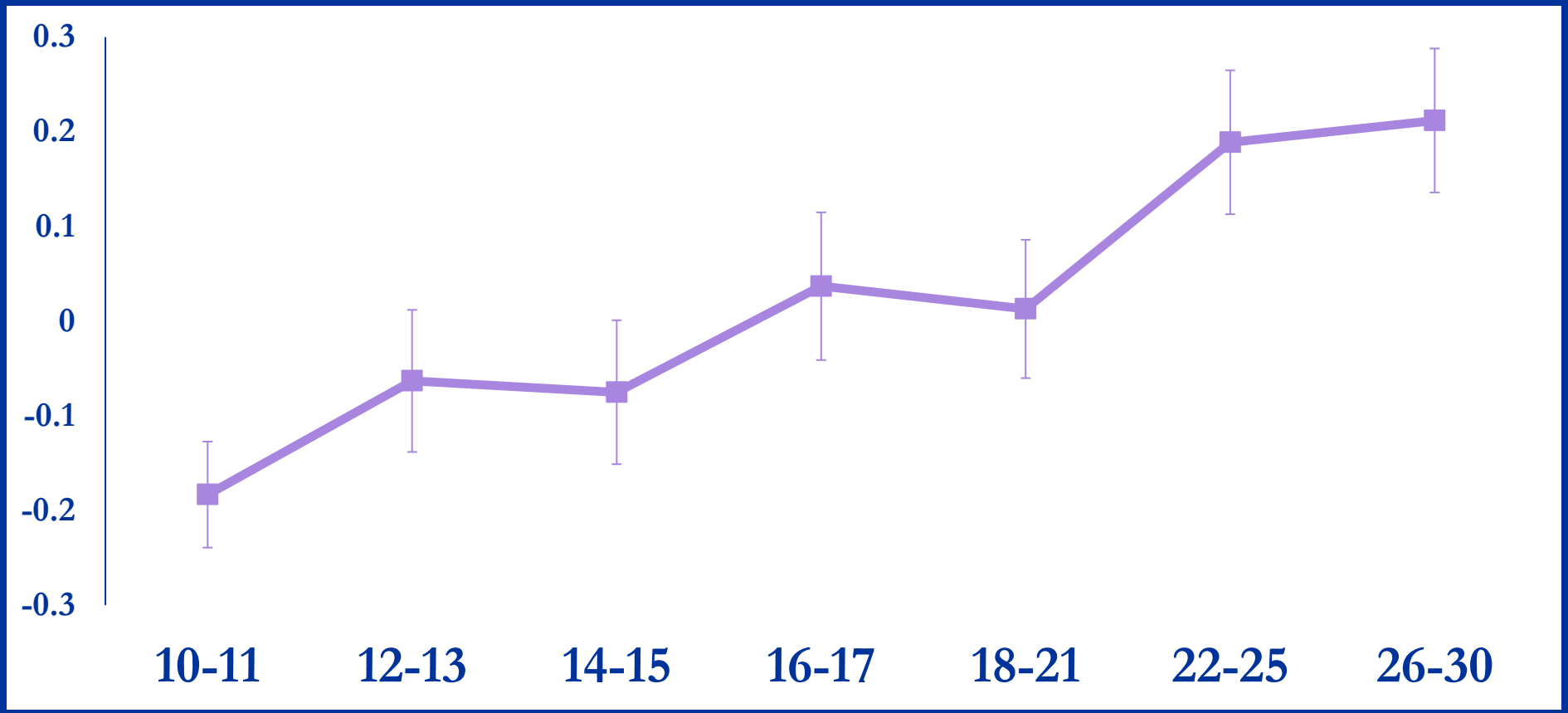


Age Differences in Self-Regulation in an International Sample



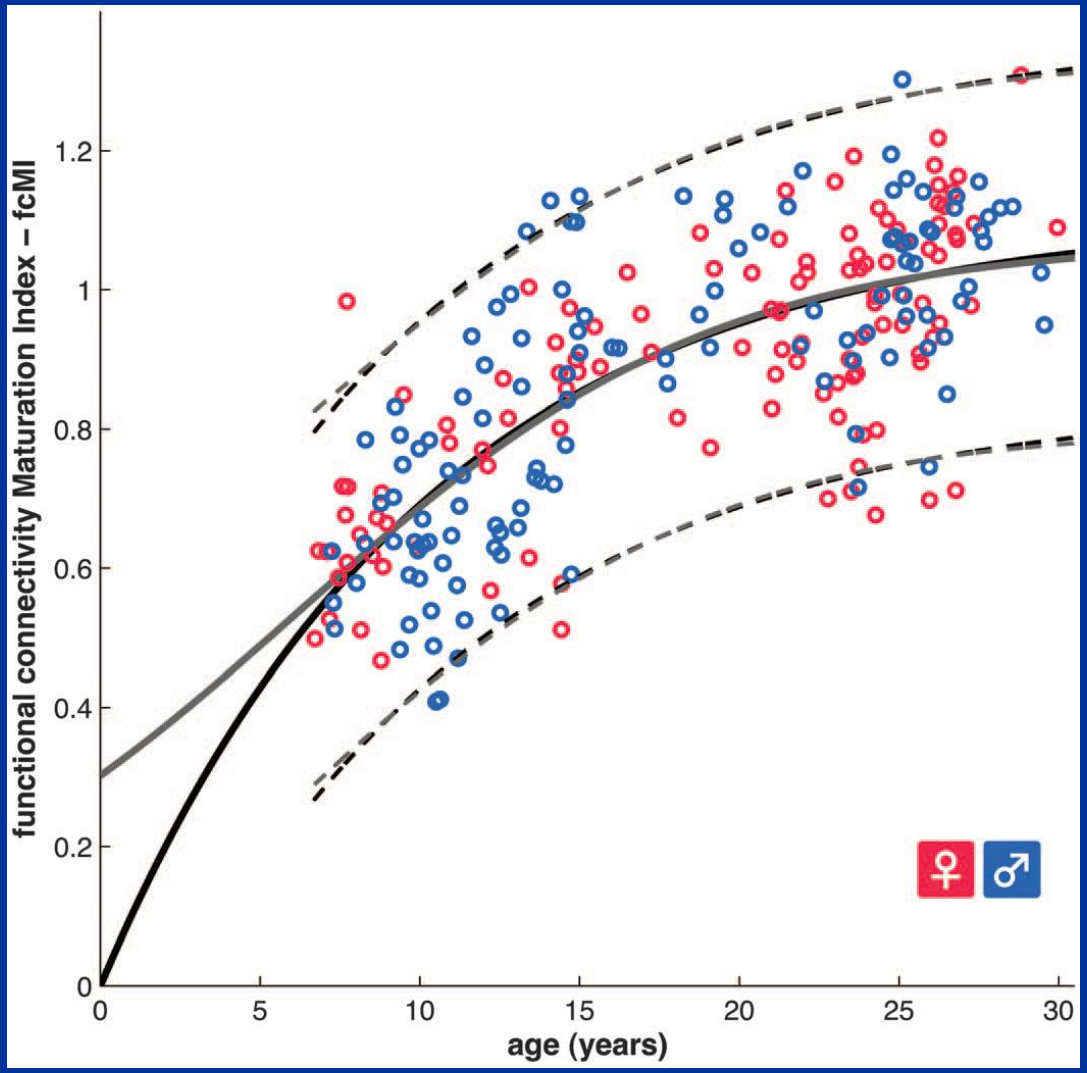
Steinberg et al., 2018

Resistance to Peer Influence in an International Sample



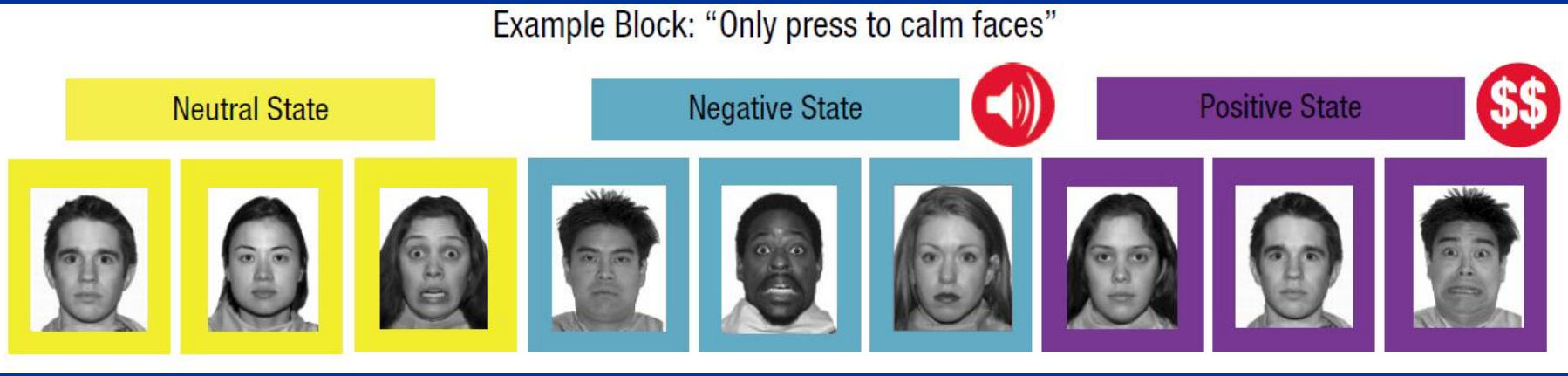
Unpublished data

Functional Connectivity Increases Until Age 22

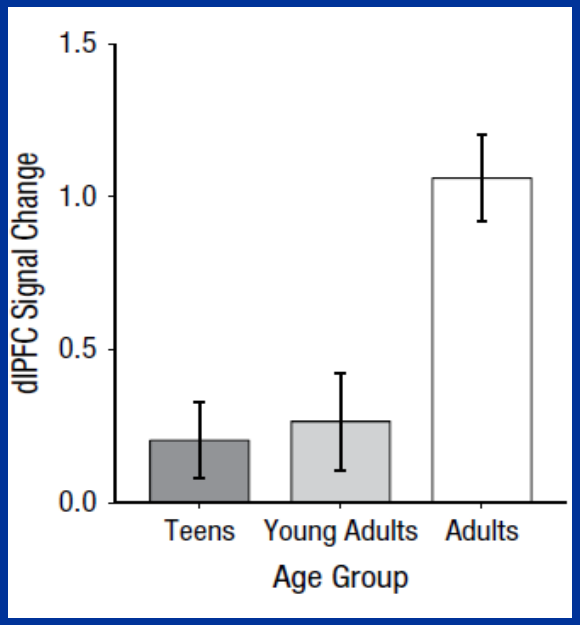


Dosenbach et al., 2010

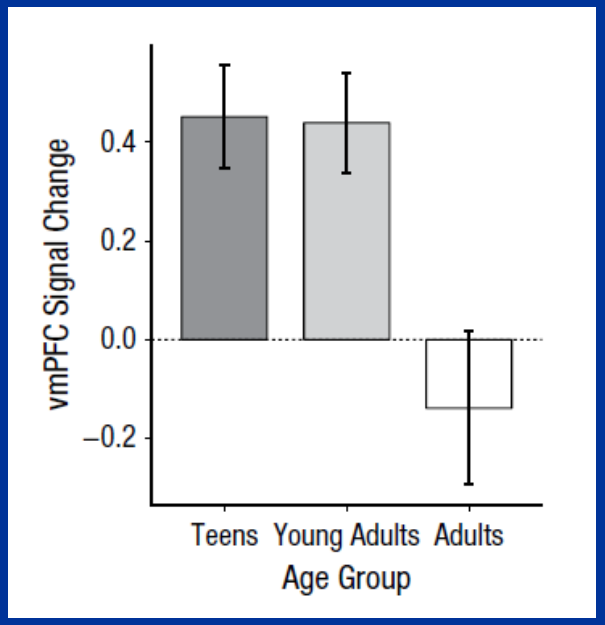
Studied Self-Control Under Neutral, Threatening, or Exciting Conditions in Adolescents, Young Adults, and Adults



Under Conditions of Negative Emotional Arousal, Young Adults Perform Like Teens



dlPFC Activation in Response to Fearful Faces



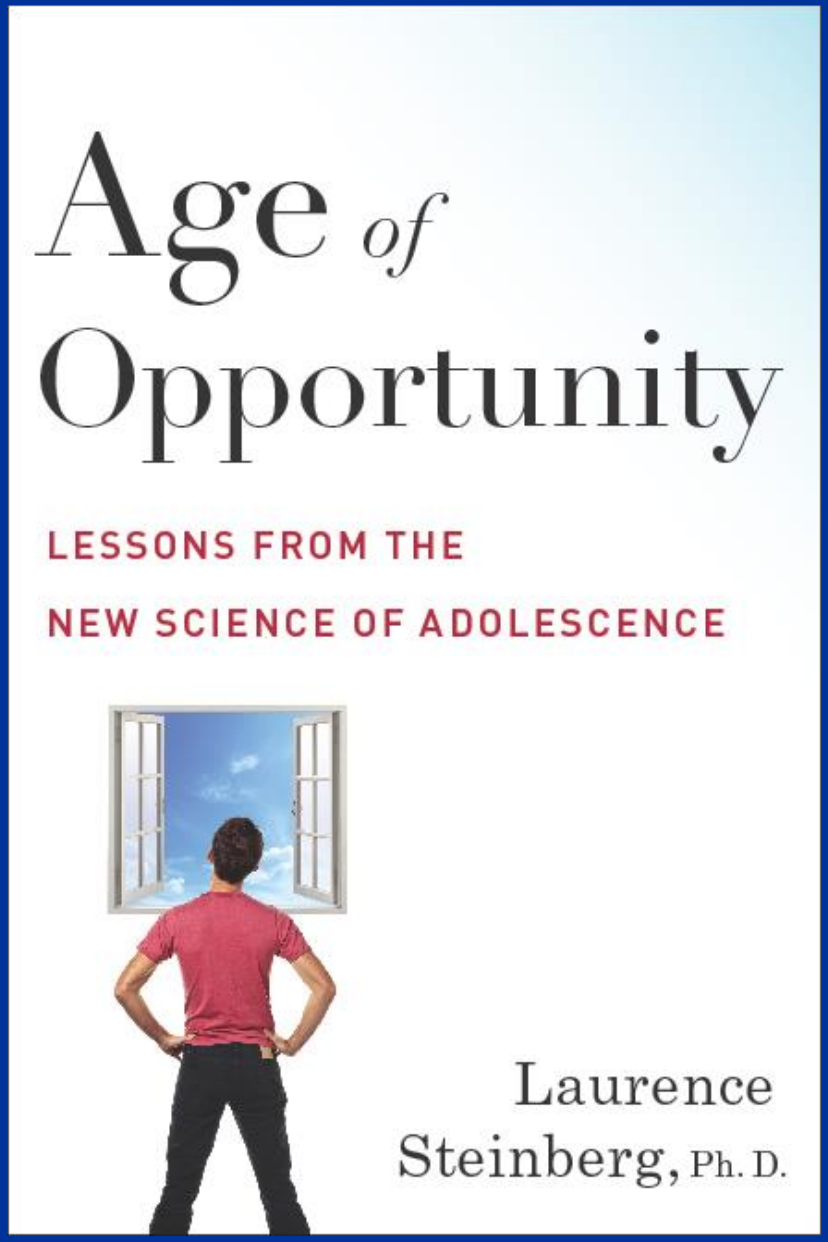
vmPFC Activation Under Threat

Two Types of Plasticity

- **Developmental plasticity**
  - Large-scale changes in structure of neural circuits
  - Growth of neuronal projections, synaptic pruning, neurogenesis
  - Ongoing during late teen years
- **Adult plasticity**
  - Small-scale modification of existing synapses
  - Minor changes in dendritic spines
- **Adolescence is the final period of developmental plasticity**
- **Plasticity creates vulnerability AND opportunity**

Implications of Plasticity Research for the Justice System

- Adolescence as a time of change extends longer than had previously been thought.
- Individuals are still capable of change and maturation during their early 20s.
- Conditions of confinement and post-confinement context matter
- Makes the need for rehabilitative intervention even more important
- Makes the dangers of harsh punishment more hazardous



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