

# ADOLESCENT BRAIN DEVELOPMENT

## KEY TAKEAWAYS

### The Brain Continues to Develop into Adulthood

Research shows that there are important emotional and social differences between adolescent and adults. These differences arise because psychosocial maturation is a relatively slow process.<sup>1</sup> Specifically, the pre-frontal cortex, the region responsible for the characteristics of adult behavior, such as impulse control (i.e., regulation of emotions and moral reasoning) is the last part of the brain to mature.<sup>2</sup> This implies that adolescents will continue to display psychosocial immaturity as their brains continue to develop and their cognitive abilities mature. The behavioral and neuroimaging data from a recent study looking at individuals ages 10-30 years old, found that impulse control was weakened for certain teens wherein brain activation patterns in teens who had weaker impulse control resembled those observed in younger children.<sup>3</sup>

### Brain Immaturity and Peer Influence on Poor Decision Making

Adolescents make choices shaped by their levels of cognitive and psychosocial development and research shows the delineation between youth and adults is not simply one of age.<sup>4</sup> Brain immaturity means that many youth are not as capable as adults in assessing level of risk involved or weighing long-term consequences in decision making.<sup>5</sup> Hence, brain immaturity can often lead to poor decisions and even at times, result in delinquent behaviors.

Further, researchers have discovered evidence that the impact of peer influence should be taken into consideration for juvenile delinquency cases. In one study, brain activity of adolescents, young adults, and adults were measured as they made decisions in a simulated driving task. The findings found that with adolescents, the presence of peers sensitized areas of the brain related to the anticipation of potential rewards and increased the likelihood of risky driving decisions.<sup>6</sup>

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<sup>1</sup>Steinberg, L. (2011). Age of Opportunity: Lessons From the New Science of Adolescence

<sup>2</sup>Steinberg, L., et al. (2017). Around the world, adolescence is a time of heightened sensation seeking and immature self-regulation, Developmental Science

<sup>3</sup>Rudolph et al. (2017). At risk of being risky: The relationship between “brain age” under emotional states and risk preference, Developmental Cognitive Neuroscience

<sup>4</sup>Ramowski, S.K., and Nystrom, R.J. (2007). The Changing Adolescents Brain, Northwest Public Health

<sup>5</sup>Steinberg, L., et al. (2017). Around the world, adolescence is a time of heightened sensation seeking and immature self-regulation, Developmental Science

<sup>6</sup>Chein et al. (2011). Peers increase adolescent risk taking by enhancing activity in the brain's reward circuitry, Developmental Science

# Why do Youth-Based Policies and Understanding Brain Science Matters

Research suggests involvement in delinquent behavior increases through adolescence, peaking at about age 16 and 17 and declining thereafter.<sup>7</sup> Although a small number of youth persist in delinquent behavior across this developmental span, the overall majority of antisocial youth desist from delinquent behavior as they enter adulthood.<sup>8</sup> Thus, literature on brain science does not assert that youth should not be held accountable for their actions or that they cannot delineate right from wrong. Instead, evidence from brain research supports the notion that the developmental, particularly the psychosocial and emotional stage of youth should be considered when designing juvenile justice systems and policies.<sup>9</sup>

Youth-Based policies grounded on brain science is also supported by research that looks at the maladaptive effects the juvenile justice systems could have on youths' reoffending. For example, early results from a study of more than 1,200 first-time low-level male juveniles who entered the justice system for minor offenses, indicate that being formally processed into the justice system instead of being diverted to informal processing increases the likelihood that they will continue committing delinquent acts.<sup>10</sup>

## Brain Science Recognized by the Supreme Court

**Roper v. Simmons 543 U.S. 551 (2005)**, a case in which Christopher Simmons, age 17, was accused of committing first-degree murder at age. Citing APA's amicus brief<sup>11</sup> on developmental psychology and neuroscience and the work of Temple University psychologist Laurence Steinberg, PhD, the court ruled that Simmons could not receive the death penalty. Since then, capital punishment has been deemed unconstitutional for individuals under age 18.

**Graham v. Florida 130 S. Ct. 2011 (2010)**, a case in which Terrence Graham, age 17, was sentenced to life in prison by a Florida judge for violating his probation (served jail time for armed robbery and committed another robbery while on probation). The court referenced brain science and ruled that life without parole was unconstitutional for individuals under age 18 who were convicted of crimes other than homicide.

**Miller v. Alabama 132 S. Ct. 2455 (2012)**, a case in which a 14-year-old boy was convicted of murder after he and another boy robbed and beat a neighbor before setting his trailer on fire. In this case, APA revised the original amicus brief used in Roper v. Simmons, and the court referenced this brief to rule that, even in cases of homicide, states could not automatically sentence juveniles to life without parole.

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<sup>7</sup>Farrington, D.P. (1986). Age and crime. *Crime and Justice: A Review of Research*; Piquero, A.R. (2007). Taking stock of developmental trajectories of criminal activity over the life course, *Long View of Crime: A Synthesis of Longitudinal Research*; Piquero et al. (2001). Assessing the impact of exposure time and incapacitation on longitudinal trajectories of criminal offending. *Journal of Adolescent Research*

<sup>8</sup>Laub, J.H., and Sampson, R.J. (2001). Understanding desistance from crime, *Crime and Justice: A Review of Research*

<sup>9</sup>Steinberg, L., Cauffman, E., & Monahan, K.C. (2015). Psychosocial Maturity and Desistance From Crime in a Sample of Serious Juvenile Offenders, *OJJDP Juvenile Justice Bulletin*

<sup>10</sup>Cauffman et al. (2018). How Developmental Science Influences Juvenile Justice Reform, Cauffman et al., UC Irvine Law Review

<sup>11</sup><https://www.apa.org/about/offices/ogc/amicus/miller-hobbs.pdf>