

Research from neuroscience highlights that adolescence represents a critical period for brain development—second in importance only to early childhood. This research shows that adolescence is a period when the human brain develops the capacity to engage in key elements of learning, such as critical thinking and problem solving. In fact, the degree to which adults can engage in analytic thinking depends largely upon the degree to which this capacity develops during adolescence. While it is well known that adolescence is a period of heightened risk for behaviors such as truancy and substance use, the "risk" of adolescence is not solely about problem behaviors. It also is about potentially limiting the ability to thrive as an adult.

Trauma¹ can impede this development by interfering with critical processes that comprise the neurological foundation for learning. The adolescent brain is malleable, which makes adolescents particularly vulnerable to the impact of trauma. Yet this malleability also presents an opportunity. Since the brain undergoes dramatic changes during adolescence, this period of development offers the chance to heal from trauma experienced early in life when young people receive targeted support and intervention.

Trauma and Victimization Are Prevalent Among the Nation's Children and Youth

- 1. The gun homicide rate for fifteen- to twenty-four-yearolds is forty-nine times higher in the United States than in other high-income countries.²
- Among children aged one month to seventeen years,
 60 percent have been exposed to violence, while more than one in ten children report five or more exposures to violence.³

3. Students aged twelve to eighteen years experienced 827,000 total victimizations, such as theft and nonfatal violent victimization, at school and 503,800 total victimizations away from school in 2017. Also in 2017, 20 percent of students aged twelve to eighteen years reported being bullied, which undermines their confidence and emotional well-being.⁴

Students of Color and Those from Low-Income Families Disproportionately Experience Trauma and Victimization

- 4. African American children aged two to seventeen years are nearly twice as likely as white children (12.8 percent versus 7.7 percent) to experience multiple types of victimization, such as sexual or physical abuse, bullying, or exposure to family violence. Children from lowincome families are nearly twice as likely as more affluent children (7.3 percent versus 4.7 percent) to experience multiple types of victimization.⁵ Just to be clear—no matter the group, such trauma is never acceptable.
- 5. Latino children between the ages of twelve and fourteen years are twice as likely as white children of the same ages to be victims of robbery (6.1 per 1,000 versus 2.9 per 1,000) or aggravated assault (7.3 per 1,000 versus 3.8 per 1,000).⁶ Once again, these types of experiences must be addressed for all children as the impacts of trauma are too significant to ignore.

The Adolescent Brain Is Vulnerable to Trauma

6. Adolescence is a significant period for brain plasticity, or adaptability, during which a burst of neural connections develop that lay the foundation for students to engage in learning and complex mental tasks for the rest of their lives.⁷



7. During this period of brain growth, adolescents have a heightened vulnerability to stress because several parts of the brain are still developing, including the prefrontal cortex, which is responsible for attention, working memory, and the expression of emotions and appropriate social behavior.⁸

Trauma Impedes Learning

- 8. Brain scans show that trauma and stress impact regions of the adolescent brain engaged in learning. These effects include changing gray matter volume—which can inhibit working memory—and reducing the size of the anterior cingulate cortex—the portion of the brain that engages in memory formation and responds to anxiety and fear.⁹
- 9. Chronic stress can increase the size and sensitivity of the amygdala—the portion of the brain that stimulates the body's "fight-or-flight" response—and triggers the production of cortisol. Elevated levels of cortisol may impede learning because the parts of the brain engaged in learning (as described previously in bullets 7 and 8) are still developing and can be damaged by excessive cortisol.¹⁰
- 10. Neurological changes to the brain caused by stress affect students' abilities to learn by limiting their capacity to pay attention to things other than what is causing them stress. These changes also make it more difficult for students to remember concepts and impede students' abilities to respond appropriately to interactions in their surrounding environments and in key relationships.¹¹



For additional information about the science behind adolescent learning and development, visit all4ed.org/SAL.

Endnotes

- 1 Trauma is any disturbing experience that results in significant fear, helplessness, dissociation, confusion, or other disruptive feelings intense enough to have a longlasting negative effect on a person's attitudes, behavior, and other aspects of functioning. See R. Harper, et al., Science of Adolescent Learning: Valuing Culture, Experiences, and Environments (Washington, DC: Alliance for Excellent Education, 2018), https://all4ed.org/wp-content/uploads/2018/12/Science-of-Adolescent-Learning-Valuing-Culture-Experiences-and-Environments.pdf.
- 2 E. Grinshteyn and D. Hemenway, "Violent Death Rates: The U.S. Compared with Other High-Income OECD Countries, 2010," *The American Journal of Medicine* 129, no. 3 (2016), https://www.amjmed.com/article/S0002-9343(15)01030-X/pdf.
- 3 D. Finkelhor et al., "Children's Exposure to Violence, Crime, and Abuse: An Update" (Laurel, MD: U.S. Department of Justice, Office of Juvenile Justice and Delinquency Prevention, 2015), https://www.ojjdp.gov/pubs/248547.pdf.
- 4 L. Musu et al., Indicators of School Crime and Safety: 2018 (NCES 2019-047/NCJ 252571) (Washington, DC: U.S. Department of Education, National Center for Education Statistics and U.S. Department of Justice, Bureau of Justice Statistics, 2019), https://www.bjs.gov/content/pub/pdf/iscs18.pdf.
- 5 D. Finkelhor et al., "Polyvictimization: Children's Exposure to Multiple Types of Violence, Crime, and Abuse" (Laurel, MD: U.S. Department of Justice, Office of Juvenile Justice and Delinquency Prevention, 2011), https://www.ncjrs.gov/pdffiles1/ojjdp/235504.pdf.
- 6 Child Trends, "Violent Crime Victimization," https://www.childtrends.org/indicators/violent-crime-victimization (accessed August 28, 2019).
- 7 R. Harper et al., Science of Adolescent Learning: How Body and Brain Development Affect Student Learning (Washington, DC: Alliance for Excellent Education, 2018), https://all4ed.org/wp-content/uploads/2018/08/Science-of-Adolescent-Learning-How-Body-and-Brain-Development-Affect-Student-Learning.pdf.
- 8 Harper, et al., Science of Adolescent Learning: Valuing Culture.
- 9 Ibid
- 10 Ibid.
- 11 Ibid.



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