

Nicotine and the Developing Brain

Adolescent Brain Development

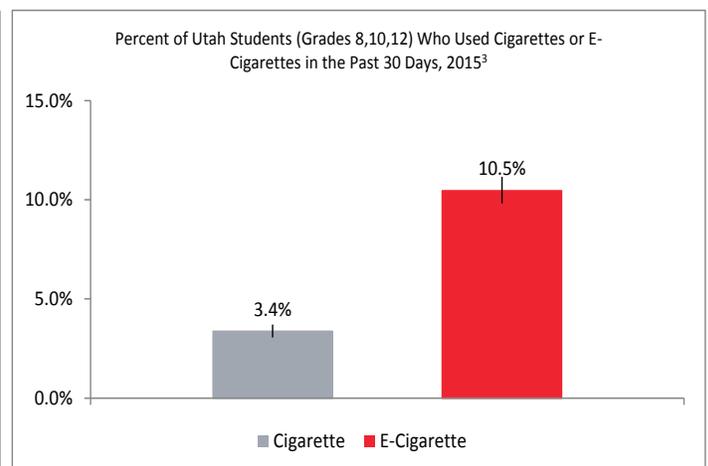
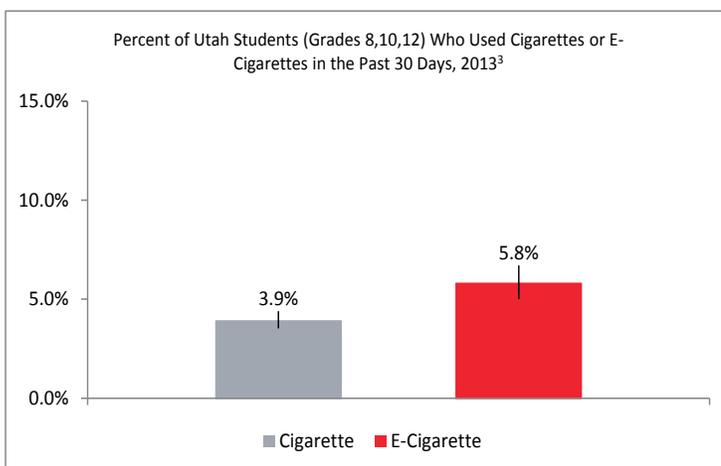
Adolescence is a critical period of brain development during which the maturation of areas involved in cognitive functioning is still ongoing.¹ The prefrontal cortex is one of the last brain areas to mature. Evidence suggests that exposure to nicotine during adolescence interferes with the normal course of brain maturation and has lasting effects on cognitive abilities, mental health, and personality.² The adolescent brain is in a vulnerable state of imbalance and particularly susceptible to the influence of brain-altering substances such as nicotine.

Nicotine and the Brain

Nicotine is a psychoactive and addictive substance that directly interferes with all brain areas involved in emotional and cognitive processing. Nicotine use during adolescence results in cell damage and cell loss throughout the brain - particularly in the hippocampus, the mind's memory bank. The effects of nicotine on critical components of reward pathways and circuits involved in learning, memory, and mood are likely to contribute to increased addiction and long-term behavioral problems in adolescents. Furthermore, research indicates that nicotine exposure during adolescence increases the risk of developing psychiatric disorders later in life.¹ Compared to adults, adolescent nicotine users experience more episodes of depression and cardiac irregularities, and are more likely to become quickly and persistently nicotine-dependent. As a result, adolescents are more vulnerable to nicotine addiction than those who begin smoking as adults. Furthermore, studies indicate that even a brief period of intermittent or continuous nicotine exposure during adolescence can lead to lasting neurobehavioral damage.¹

Adolescent Smoking Rates

In 2015, 10.5% of Utah students (grades 8, 10, 12) reported that they had used an e-cigarette in the past 30 days, nearly double the rate from 2013.³ Whereas cigarette smoking among Utah students has decreased by nearly 35% since 2011, e-cigarette use has increased fivefold.³ The increase in e-cigarette use among Utah youth is particularly concerning due to the perception that e-cigarette use is safe compared to use of other tobacco products. The nicotine in e-cigarettes has negative effects on brain development processes, establishes patterns that leave adolescents vulnerable to other forms of substance addiction later in life, and elevates the potential for nicotine addiction and dependence in adulthood.



References

¹Goriounova, N., Mansvelder, H. Nicotine Exposure During Adolescence Alters the Rules for Prefrontal Cortical Synaptic Plasticity During Adulthood. 2012. Frontiers in Synaptic Neuroscience.

²Centers for Disease Control and Prevention (CDC). The Health Consequences of Smoking - 50 Years of Progress: A Report of the Surgeon General. 2014. Atlanta, GA: U.S Department of Health and Human Services (HHS).

³Tobacco Prevention and Control Program. Prevention Needs Assessment (PNA). 2011-2015. Salt Lake City: Utah Department of Health.