Drugs and the Teen Brain

Adolescence is a critical time in brain development. The harmful effects of drugs and alcohol may affect teens more than adults.

BY THE TIME YOU ARE A TEENAGER, many parts of your brain have developed. You may be able to perform complicated calculations. You may even have a sharper memory than some adults!

But one critical part of your brain—the prefrontal cortex—won’t be developed until your mid-twenties. This puts teens at a higher risk than adults for experiencing the harmful effects of drugs and alcohol.

Under Construction

The prefrontal cortex is used in critical thinking. It helps people weigh pros and cons before making a decision.

Because the prefrontal cortex is not fully developed in teens, they rely more on the limbic system to make decisions. This system is linked to emotions and experiencing rewards.

This means that teens may make decisions based on what provides immediate happiness. This can lead them to take more risks than adults. Rather than thinking through consequences, teens focus on the reward of social acceptance.

Taking chances is part of growing up. But it can be dangerous when it comes to drugs and alcohol.

One example is binge drinking, which means having four to five alcoholic drinks within a few hours. Because teens don’t always think through consequences, they may have a hard time knowing when to stop. This makes them more likely than adults to binge drink. A few sessions of binge drinking can harm a developing brain.

Addiction Risk

Teens are also at a higher risk of developing addiction. Scientists believe that addiction is closely linked to dopamine. This chemical helps transmit signals in the brain.

Any rewarding activity causes a dopamine release. But the surge is much higher and more intense with drugs. Repeated drug use can “teach” the brain to seek drugs over healthier rewards. That is addiction.

The limbic systems of teens are very sensitive to dopamine. Because of this, teens may crave drugs more strongly than adults. The earlier that someone starts drug use, the higher his or her addiction risk.
The brain’s prefrontal cortex (the part in charge of critical thinking) is not yet fully developed in teens. So they rely more on the limbic system (which is tied to rewards and emotions) to make decisions.

**Brain Changes**

As you grow, your body strengthens pathways between neurons (nerve cells) in the brain and gets rid of ones that aren’t used. These synapses determine how your brain processes information. The network of synapses supports everything from your memory to your ability to learn.

Exposing the teen brain to drugs can change how synapses are organized and how the brain functions. Drug use can cause problems with attention, memory, and problem solving that can last through adulthood.

But thinking through your actions can help your brain. Learn a new sport or a foreign language. These skills help build new connections that make your brain stronger. Be good to your brain and it will be good to you.
Drugs and the Teen Brain

As a teacher, you know that teens are at a critical time of development. The brain doesn’t become fully developed until the mid-20s. This fact makes teens especially susceptible to the harmful effects of drugs and alcohol, putting them at a greater risk for addiction as well as damage to the brain. By sharing the article “Drugs and the Teen Brain” and teaching this lesson, you will help students learn how their brain develops and why using drugs and alcohol is especially risky.

Critical-Thinking Questions

1. Explain how your brain changes as you grow. What types of actions can have a positive effect on your brain? Answers may include that as you grow older, you develop synapses (connections between neurons) that allow you to learn. Learning new skills can build new connections that strengthen the brain.

2. Explain the purpose of the prefrontal cortex and the limbic system in the brain. Explain why an underdeveloped prefrontal cortex might affect a teen’s ability to make decisions. The prefrontal cortex is the area of the brain that is involved in critical thinking and decision making. The limbic system is involved in emotions and rewards. Teens rely on their limbic system since their prefrontal cortex is not fully developed. Therefore, they often make decisions based on instant gratification and do not fully weigh consequences.

3. Why are teens more at risk for becoming addicted to drugs than adults? Support your answer with text evidence. Addiction is linked to dopamine, which is released during pleasurable experiences. Drugs cause a surge of dopamine to be released. With repeated drug use, the brain seeks drugs over healthier rewards. Teens are more at risk because the limbic system is very sensitive to the effects of dopamine.

Writing Prompts

Grades 6–8 Explain why teens are more likely to binge drink than adults.

Grades 9–10 The legal drinking age is 21. Do you think teens should be allowed to drink legally? Explain why or why not.

Grades 11–12 Parts of the teen brain are not yet fully developed. Explain why this can be harmful.

Paired Reading

“Addiction Is a Disease” (https://teens.drugabuse.gov/blog/post/addiction-disease) This article describes how drugs can cause brain changes that lead to addiction.

Writing Prompt Cite text evidence from the article “Addiction Is a Disease” to describe how drug addiction harms the brain.

Activity Sheet Answers

Multiple choice 1. c; 2. b; 3. d; 4. True; 5. d; 6. True; 7. a; 8. True.

“Now Try This” 1. Answers may include that the limbic system (involved in rewards and emotions) may cause teens to make risky decisions that give immediate rewards. Teens’ limbic systems are also sensitive to dopamine, which may cause them to crave drugs more than adults. Thinking through consequences allows you to see the positives and negatives of a situation, which might help you to make good decisions. 2. Answers may include that the teen brain is still in development, so exposure to drugs can negatively affect the way the brain functions. Teen drug use can cause memory and learning problems that last through adulthood.

Subject Areas

• Science Literacy
• English Language Arts
• Health/Life Skills

Standards

CCSS
RST.6-8.1 / RST.9-10.1
• Cite specific textual evidence to support analysis of science and technical texts

W.6-8.1 / W.9-10.1
• Write arguments to support claims using valid reasoning and relevant and sufficient evidence

NGSS
MS-LS1.A / HS-LS1.A
• Structure and function
MS-LS1.D / HS-LS1.D
• Information processing

NGSS Practices

• Obtaining, evaluating, and communicating information/engaging in argument from evidence

NSES
• Personal health
• Science and technology in society/science and technology in local, national, and global challenges

NCSS
• 8. Science, technology, and society

Additional Lesson Resources

• Vocabulary List: scholastic.com/headsup/drugsandtheteenbrain
• headsup.scholastic.com/teachers
• teens.drugabuse.gov

NIH National Institute on Drug Abuse
What Do You Know About the Teen Brain and Drugs?

Answer these questions to test your knowledge.

1. The brains of teenagers are:
   a. larger than those of adults
   b. the same as adult brains
   c. not yet fully developed
   d. made up of different parts than those of adults

2. The limbic system of the brain is involved mainly with:
   a. decision making
   b. emotions
   c. problem solving
   d. balance

3. The last part of the brain to fully develop is:
   a. the emotion center
   b. the part that controls breathing
   c. the reward center
   d. the part involved in critical thinking

4. Teen brains are more sensitive to drug use than adult brains.
   ○ True
   ○ False

5. Which of the following statements is true about the brain’s prefrontal cortex?
   a. It helps people think through their actions.
   b. It can be damaged by drug use.
   c. It is used in decision making.
   d. All of the above.

6. Drug use can harm the brain.
   ○ True
   ○ False

7. Dopamine is:
   a. a natural chemical in the brain linked to positive feelings
   b. a harmful chemical found only in drugs
   c. an area of the brain involved in emotions
   d. a natural chemical in the brain that forces you to take risks

8. The connections between neurons in your brain can be affected by drug use.
   ○ True
   ○ False

NOW TRY THIS

Answer the following questions on a separate piece of paper after reading “Drugs and the Teen Brain.”

1. How might the limbic system make teens more vulnerable to drugs? Tell how thinking through consequences might keep you safe.

2. Explain how teen drug use could impact a person’s entire life. Use evidence from the text to support your answer.

For more information, visit scholastic.com/headsup
From Scholastic and the scientists of the National Institute on Drug Abuse, National Institutes of Health, U.S. Department of Health and Human Services