

# Alcohol and the Developing Brain



Discovery  
EDUCATION



GRADE  
RANGE  
5-7

## BRAIN ACTIVITY

# THE SCIENCE BEHIND THE EFFECTS OF ALCOHOL ON YOUR BRAIN

### Learning Objectives

Students will:

- Describe their own memories and consider the importance of such memories
- Understand the role that the hippocampus plays in memories' formation, as well as the effects of alcohol on the development and retrieval of memory
- Analyze the risks associated with not being able to form memories

### Overview

The *Ask, Listen, Learn* underage drinking prevention program teaches kids what the brain does, what alcohol does to it, and what underage drinking does to them! In this activity, students explore the differences between short-term memory and long-term memory and learn the role that the brain's hippocampus plays in processing both types of memories. They also explore how alcohol affects the storage and retrieval of these memories as they learn about the effects of underage drinking on the developing brain. Students then discuss various scenarios in which memories play an important role and consider the risks associated with not being able to form memories.

### Timing

45–60 minutes

### Materials Needed

- Device with the ability to project, one for the teacher
- Devices with internet access, one for every two or three students
- *Game:* [Memory Flip](#)
- *Handout:* **Memories**, one half-page per student
- *Video:* [Nathan Adrian The Science Behind the Effects of Alcohol on Your Brain](#)
- *Video:* [How Alcohol Affects Your Developing Hippocampus](#)
- *Handout:* **Hippocampus**, one per student
- *Handout:* **Scenario Cards** (cut out), one page per every four students

### Vocabulary

- Short-term memory
- Long-term memory
- Working memory

### Optional Preparation/Extension

- Show students all of the *Ask, Listen, Learn* videos to enhance their understanding of the concepts in the [Memory Flip](#) game.

### Procedure

1. **Warm-Up Activity:** Begin by dividing students into pairs or groups of three. Instruct each group to visit [asklistenlearn.org/play/memory-flip](http://asklistenlearn.org/play/memory-flip) and follow the instructions to take turns testing their memory skills by playing the [Memory Flip](#) game from *Ask, Listen, Learn*.
2. Once students have played for about five minutes, bring the class back together. Ask: To play this game, did you have to rely memories from a long time ago or memories from a short time ago? Students should conclude that the game did not rely on any memories from the past, which means it relied only on short-term memories.
3. Introduce and explain the terms short-term memory, long-term memory, and working memory.
4. Tell the class that this game relied on short-term memory and working memory. Explain that every time they flipped a card, their brain immediately tried to respond to what it saw by storing the card's position and design in its short-term memory. Their working memory then tried to process these short-term memories in order to remember where they could find matching cards. Explain that these short-term memories are normally not stored away permanently. Instead, they are temporary memories that are held in our brains for a very limited period of time.

Ask: In what kinds of situations do we depend on our short-term memory?

5. Distribute a **Memories** handout to each student and explain that students will now be diving into their long-term memories. Read the directions on the top of the page, and give students about five minutes to independently recall and describe one of their favorite memories to the best of their ability.
6. Instruct students to share their memory with a partner, describing not only what happened in this memory, but why it is one of their favorite memories. Show the *Ask, Listen, Learn* video: [The Science Behind the Effects of Alcohol on Your Brain](#). Then bring the class back together and ask students to consider: Why are our long-term memories important? How do our long-term memories help form the person we are today?
7. Next, distribute a **Hippocampus** handout to each student. Explain that one part of the brain that is very involved in our memory-making process is the hippocampus. Direct students' attention to the flow chart

on the top half of the page. Tell students that you are going to play a video a couple of times. The first time they watch the video, they should use the flow-chart to take notes on how the hippocampus helps store and process memories.

8. Play the *Ask, Listen, Learn* video: [How Alcohol Affects Your Developing Hippocampus](#) once. When the video is complete, encourage students to discuss their flow-chart notes with a partner. Then instruct students to read through the comprehension questions on the bottom half of the handout. Explain that you will play the video one more time, and they should watch with these questions in mind.
9. Following the video, give students a few minutes to record their responses to the questions. Discuss the answers as a class before moving on.
10. Tell students that they will now participate in an activity that pushes them to further consider why being able to develop new memories and retrieve old memories is important. Divide students into groups of four, and distribute one set of scenario cards to each group. Instruct the groups to randomly select one scenario at a time. Once they have read the card, they should discuss:
  - a. Does this involve short-term, long-term, and/or working memory?
  - b. Why is memory important in this scenario?
  - c. What might happen if you could not form or retrieve memories?
11. Tell students that they will have about two minutes to discuss each card, and they should only select a new card for discussion when instructed to do so.
12. Every two or three minutes, direct the class to pick a new card. Pop in and out of the students' discussions throughout this activity!
13. **Wrap Up:** Conclude with a quick full-class discussion around the following question:

Underage drinking is dangerous for a variety of reasons. If you were trying to convince a friend not to drink based on what you learned today, what would you say?

## Optional Extensions

- Students may perform additional internet research to further understand how the hippocampus stores memories from a physiological perspective, as well as how alcohol impedes this important process.
- Students may perform additional research to further understand the many ways in which an adolescent's brain is still growing and developing. They can then create a two or three-dimensional model of an adolescent brain that portrays this information.

### Continue the Conversation

The *Ask, Listen, Learn* program provides a variety of resources to help you continue the conversation around alcohol and underage drinking throughout the school year. To learn more about how educators and families can help students make healthy decisions and say no to underage drinking, visit [AskListenLearn.org](http://AskListenLearn.org).

### National Middle School Standards

#### Next Generation Science Standards

- MS-LS1-8: Gather and synthesize information that sensory receptors respond to stimuli by sending messages to the brain for immediate behavior or storage as memories.

#### National Health Standards

- 5.8.1 Identify circumstances that can help or hinder healthy decision making.
- 5.8.2 Determine when health-related situations require the application of a thoughtful decision-making process.
- 5.8.7 Analyze the outcomes of a health-related decision.

#### Common Core English Language Arts Standards

- CCSS.ELA-LITERACY.CCRA.SL.1 Prepare for and participate effectively in a range of conversations and collaborations with diverse partners, building on others' ideas and expressing their own clearly and persuasively.

### Hippocampus

#### Step 1: Memory Flow Chart

How does your hippocampus help you store and remember your memories?

First, you have an experience that your brain would like to keep as a memory.



#### Step 2: Comprehension Questions

1. What system is the hippocampus part of and what responsibilities does this system have?

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2. When the hippocampus stores your long-term memory, it links it to the senses and the emotions that you experienced during that moment. Why may both of these be important?

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3. When the hippocampus is impaired by alcohol, it can have serious consequences. Describe at least one immediate and long-term effect of alcohol on the hippocampus.

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## Scenario Cards

**You have big unit tests in both science and math at the end of the week.**

Discuss:

Does this involve short-term, long-term and/or working memory?

Why is memory important in this scenario?

What might happen if you couldn't form or retrieve memories?

**Your parents work fulltime, so you walk home by yourself after school every day.**

Discuss:

Does this involve short-term, long-term and/or working memory??

Why is memory important in this scenario?

What might happen if you couldn't form or retrieve memories?

**Today is your first day of soccer practice. You've never played soccer on a team before, and you don't know your coach or your teammates!**

Discuss:

Does this involve short-term, long-term and/or working memory?

Why is memory important in this scenario?

What might happen if you couldn't form or retrieve memories?

**You're in a situation where you feel like something isn't quite right, but you can't pinpoint exactly why.**

Discuss:

Does this involve short-term, long-term and/or working memory??

Why is memory important in this scenario?

What might happen if you couldn't form or retrieve memories?

**Flashforward: Your parents just dropped you off at college! You are excited because you got into your dream school, but you're nervous because you know you will have to work really hard in order to do well.**

Discuss:

Does this involve short-term, long-term and/or working memory?

Why is memory important in this scenario?

What might happen if you couldn't form or retrieve memories?

**Flashforward to being an adult! You are now grown up and responsible for your own children. You want to make sure to be the very best parent you can be.**

Discuss:

Does this involve short-term, long-term and/or working memory?

Why is memory important in this scenario?

What might happen if you couldn't form or retrieve memories?

### Memories

**Directions:** In the space below, sketch a picture of one of your favorite memories. Include as many details as you can remember, and use the lines to write about the senses and emotions you associate with this memory.

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