Greater Good in Education
SCIENCE-BASED PRACTICES FOR KINDER, HAPPIER SCHOOLS

UNDERSTANDING THE BRAIN FOR GRADES 4-7

"The brain is like a muscle. When it is in use we feel very good. Understanding is joyous."

—Carl Sagan

OVERVIEW

Students learn about the three parts of the brain--the amygdala, the hippocampus, and the prefrontal cortex--involved with emotion regulation, attention, and learning to engage their interest and enhance their self-awareness.

PLANNING FOR IT

WHEN YOU MIGHT USE THIS PRACTICE

- Before inviting students to participate in any contemplative (mindfulness) practice
- In preparation for the MindUP™ program, to introduce students to the concept that they can use their brain in ways that will help them focus their attention when needed, calm themselves in the face of anxiety, and be less reactive and more proactive in creating a more productive experience.
- To provide students with the science behind the benefits of mindfulness practice
- To give students a sense of control and empowerment through an understanding of the brain structure and functions
- To teach students about the brain and how it works so that they can use it for greater success in school as well as interpersonal relationships

TIME REQUIRED

- 40 minutes

LEVEL

- Upper Elementary
- Middle School

MATERIALS

- Images of famous athlete(s)
- Images of the brain, such as this one
- Optional: Worksheet

LEARNING OBJECTIVE

Students will:

- Identify the amygdala, the hippocampus and prefrontal cortex on a diagram of the brain
- Understand the basic functions of the amygdala, the hippocampus and prefrontal cortex
- Apply their new knowledge of the brain to everyday scenarios

SEL COMPETENCIES

- Self-awareness
- Self-management
- Social awareness
- Responsible decision-making

HOW TO DO IT

REFLECTION BEFORE THE PRACTICE

- Consider a recent stressful experience. What did you notice about your thoughts, feelings, sensations, and ability to problem-solve? What steps did you take to calm yourself?
- Next, consider a time you observed a student who was stressed or upset. What did you notice about how their ability to learn or problem-solve was impacted? What helped to calm the student?

INSTRUCTIONS

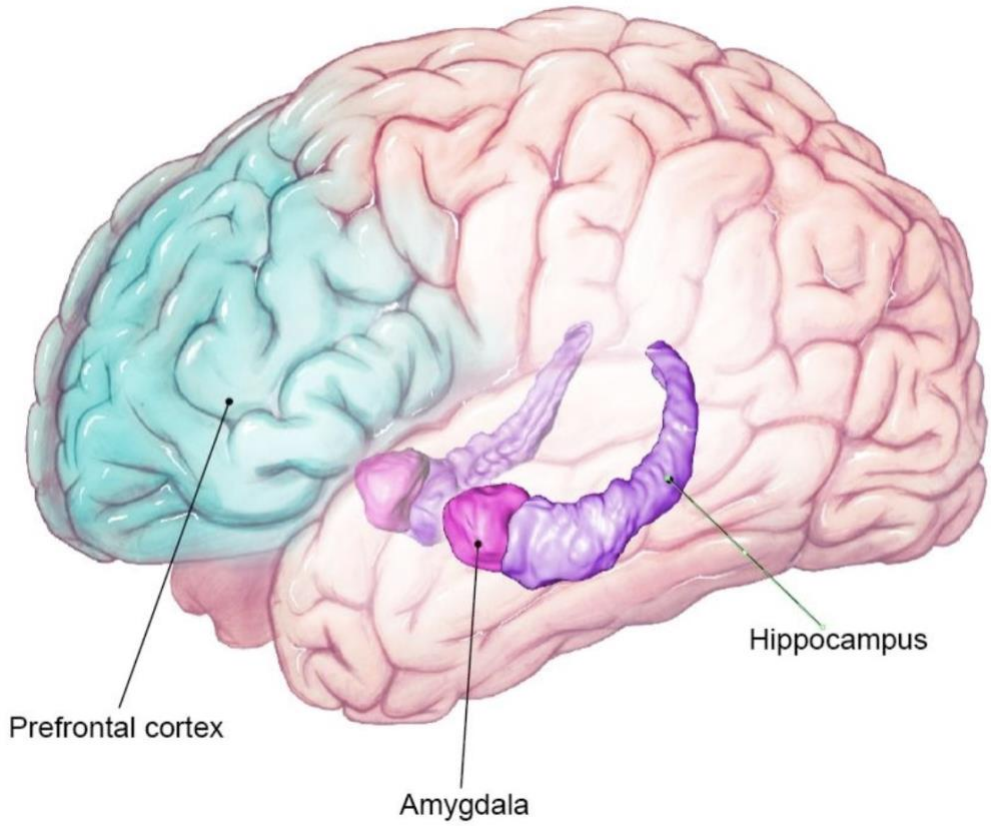
CLASS DISCUSSION (10 MINUTES)

- Read and discuss the following:
    - *We know that if we exercise our muscles, it makes them stronger.*
    - *Did you know you can also exercise your brain?*
    - *What are some ways you can think of to 'exercise' your brain?*
- Next, display photo(s) of one or more famous athletes and ask students to name some others.
- Invite students to share what these athletes have in common. Chart strategies as they are mentioned (e.g. they work out, practice, eat well).
- Let the students know there are other techniques many athletes practice. Tell students that in addition to exercising their bodies, athletes also exercise their minds. This helps athletes to focus their attention, to become more successful in their sport and manage distractions.

MINDFUL ACTIVITY (20 MINUTES)

Your Mindful Brain

- Introduce the following to the students:
    - *Today we are going to learn about our brains.*
    - *We will focus on three parts of the brain that are involved in some of the strategies that athletes and others use to help them be successful.*
    - *The names of these parts of the brain are the **prefrontal cortex**, the **hippocampus**, and the **amygdala**. The name amygdala comes from its almond shape.*
- You may also project the image of the brain below, or create a Powerpoint slide.



- Have students touch the center of their own foreheads and explain the **prefrontal cortex** is just behind.
- Have students touch their ears and explain the **hippocampus** is just behind. There are two **hippocampi,** one on each side of the brain.
- Point out the **amygdala** on the diagram on the worksheet. There are two **amygdalae** located on each side of the brain.
- Read the following and have students label their worksheet. (You may want to give examples of each function verbally - e.g., problem solving: how you resolve a conflict with a friend; complex thoughts: perspective-taking):
    - ***Prefrontal Cortex:***
        - *This is the most evolved part of the brain. It is responsible for:*
            - *Problem solving*

        - *Complex thoughts*
        - *Attention and focus*
    - *The prefrontal cortex is responsible for discipline, delaying gratification, and resisting acting on our first impulse so we do not do something we'll regret.*
        - *For example, not eating all your candy at once! Or stopping yourself from hitting somebody if you are really angry.*
    - *It makes it possible for us to hold ideas in mind at the same time, relating them to one another and playing with them.*
    - *It makes it possible for us to be flexible in our thinking.*
        - *For example, if one approach is not working, what else might I try? How else might I think about how to do what needs to get done?*
    - *An interesting fact about the **human** prefrontal cortex is that it takes up a greater portion of the brain than in any other animal.*
        - *What does this mean?*
        - *It means that we are very smart! It also means that we have a greater capacity to be thoughtful, to control our thoughts and our actions.*
- ***Hippocampus:***
    - *It is part of the Limbic System, which is one of the oldest parts of the brain.*
    - *It helps you to make new memories, and store and retrieve memories.*
    - *It is also involved with our ability to overcome our fear response. We are going to learn more about our fear response later in today's lesson.*
- ***Amygdala:***
    - *It is an almond-shaped part of the brain located deep within the brain.*
    - *It is part of the Limbic System.*
    - *It is one of the first parts of the brain to react.*
    - *It helps to keep us safe when we encounter danger by alerting us and making us more vigilant.*
    - *It is a structure involved in processing and expressing emotions, especially anger and fear. In other words, it is part of the brain's emotional filter through which experiences are linked with certain emotions. For example, a child who was bitten by a dog might express fear whenever a dog walks by.*

- When labeling and explanation are complete, invite students to participate in the following discussion:
    - *Think for a moment: What would happen if you encountered a frightening situation (for example, an angry dog)? How would your body react?*
- After getting feedback from students, discuss the "Fight, Flight, or Freeze" reactions. Explain that one of the amygdala's jobs is to keep us safe. It doesn't think.
    - *Our amygdala doesn't think; it just reacts. It sets off a complex set of reactions that includes all the feelings you might have when an angry dog is barking at you.*
    - *Because the amygdala doesn't think, it can react to certain situations where we perceive danger but we are not actually in danger (for example, when you are taking a test, or have to speak in front of the whole class)*

MAKING CONNECTIONS (10 MINUTES)

Step 1: Share Experiences

- Ask students to think about a "big" performance by an athlete.
- Use the following prompting questions:
    - *How do you think they feel when huge crowds of people are watching them?*
    - *Have there been times when you have had to perform in front of lots of people?*
    - *What did your mind say? What did your body feel like?*
    - *If you're feeling scared or have a lot of fear, this is your **amygdala** setting off a chemical and electrical reaction in your body. It readies the body to flight, fight, or freeze.*
- Ask:
    - *In a situation like a performance or taking a test or being the new kid in class, are you really in danger?*
- Explain again:
    - *The **amygdala** is very primitive and may trigger the same response to a fierce dog as it does to a performance, being the new kid, or a math test. Even though the test is not a dangerous threat like a fierce dog, your body may feel the same way because the amygdala does not know the difference!*
    - *Using strategies, like mindful breathing, to calm down the **amygdala**, the reactive part of the brain, and help to better use your **prefrontal cortex**, or your thinking part of the brain. In other words, you are going to learn to **USE your PFC to calm down your amygdala!***

STEP 2: SUMMARIZE THE KEY POINTS

- Now summarize important points about this lesson:
    - *The **amygdala** is the part of our brain that reacts to situations and/or that it perceives as possibly posing a danger to you.*
    - *The **prefrontal cortex** is the "thinking part" of our brain that is involved in problem solving, complex thoughts, attention, and focus.*
    - *The **hippocampus** is responsible for storing and retrieving memories; it also plays a role in overcoming our fear response.*
    - *Over the next series of lessons you will be learning brain-based strategies to help you notice reactions your **amygdala** signals in your body and respond using your **prefrontal cortex**.*
    - *The **amygdala** and **prefrontal cortex** are two important parts of the brain that are affected by practicing mindful strategies.*

EXTENSIONS

Mindful Living

- As a class, review what they have learned about the three parts of the brain. Ask the students to notice their thoughts throughout their day and think about which parts of the brain they are using in different scenarios.
- Possible discussion topics:
    - **The stressed brain…**

        - The brain's response to stress is connected to the amygdala. When we're calm and peaceful, this filter is wide open and information flows to the prefrontal cortex. When we feel negative or stressed, our ability to think and make good decisions may be stopped by the amygdala. Information stays in the amygdala and doesn't flow to our prefrontal cortex so we can think about how to react. Fear and anxiety actually shut down our ability to think about how to best assess and approach situations. In other words, when we are feeling really stressed out or in danger, it is harder for us to learn and remember and also harder for us to stop and make good decisions. As we have learned, our amygdala helps us to be safe but it isn't always good at assessing when we are in real danger or not….
        - The good news is that we can learn strategies to support us when we are feeling stressed or overwhelmed! This can help us to stop, think about the situation, and choose ways to move forward.
        - Ask:
            - *What are some moments when you feel that learning is more difficult and information is not flowing as freely to the prefrontal cortex and the hippocampus? (Examples may include taking tests, having a fight with a parent or friend before school, a new concept being introduced, feeling like you have failed at something in the past.)*
            - *How can this affect your learning?*
    - **The HAPPY brain…**
        - Research is showing that when we are engaged in activities we find interesting or pleasurable, our brain is flush with dopamine. Dopamine is a chemical that helps us feel happy and focused and can help us:
            - Lubricate our information filter
            - Rev up high-powered thinking in our prefrontal cortex
            - Get our brain ready for peak performance
        - Dopamine is highest when students are:
            - Fully engaged in learning
            - Experiencing positive feelings like optimism, gratitude, hope, and an overall sense of well-being
        - Classroom activities that prompt the release of dopamine include:
            - Participating in acts of kindness
            - Collaborating with peers
            - Making choices and solving problems
            - Engaging in physical activity and enjoying creative efforts such as music, art, drama, reading, and storytelling
        - Ask:
            - *When do you learn best?*
            - *What types of learning activities help you to feel excited and motivated?*
            - *How do you think this affects your amygdala, prefrontal cortex and hippocampus?*
            - *How do these three areas of the brain work together to help learning?*
            - *How can knowing this help you at school? At home? In the community?*

- Following implementation of this lesson, integrate the neuroscience language into your classroom so that students can apply their knowledge of the brain to their own social and emotional understanding of themselves and others.

REFLECTION AFTER THE PRACTICE

- Do you notice if students are making connections between what they have learned about the brain, and their thoughts, feelings, and actions?

THE RESEARCH BEHIND THE PRACTICE

EVIDENCE THAT IT WORKS

Learning about the brain and how it impacts our thoughts, emotions, and actions helps to develop students' self-awareness, or the ability to be aware of their inner lives.

WHY DOES IT MATTER?

As students grow in self-awareness, they cultivate their ability to know how and when to use self-management skills such as navigating emotions in a healthy way (i.e., emotion regulation), persistence, asking for help, setting goals, empathy, and other crucial skills for success.

Indeed, studies have found that teaching students to effectively manage their thinking, attention, and behavior can lead to better grades, higher test scores, and stronger relationships.

SOURCE

MindUP

Since 2003, MindUP has been helping children develop the mental fitness necessary to thrive in school and throughout their lives. MindUP is the signature program of The Goldie Hawn Foundation, a not-for-profit organization created in response to the global epidemic of childhood aggression, anxiety, depression and suicide. Based firmly in neuroscience, MindUP gives children the knowledge and tools they need to manage stress, regulate emotions and face the challenges of the 21st century with optimism, resilience and compassion. www.mindup.org