



Science Behind the Story (SBS)
Be Nice to Your Brain (🌈 A Brain Facts Story)
(4th Grade – 9-10 yrs)

Because your brain does so much for you, this story describes things that you can do to protect your brain and make sure it is healthy.

- 🌈 Your brain is very squishy and needs your protection.

The brain is made up of mostly fat (60%) and the rest (40%) is water, proteins, carbohydrates and salts (hopkinsmedicine.org). This means that your brain is actually very squishy to the touch; think about the texture of jello before it hardens. The brain has no bones and encased in a hard, bony skull. In order to protect the “squishy” brain and help to hold it together, the brain actually floats in a pool of cerebrospinal fluid (CSF) (Tumani, 2018). This protects the brain from getting damaged from hitting the skull. Your hard skull and cerebrospinal fluid are adequate to protect your brain (ncbi.nlm.nih.gov), as long as your body is moving only as fast as your legs will move. If you are moving faster than that, then helmets and other additional devices are needed to help your body protect your brain (Sone, 2017). This is one easy way that we can be nice to our brain.

- 🌈 Your brain needs sleep – to take out the trash.

More and more we are learning of all the benefits that our brain (and our body) get from our sleep. While we have always known that while we sleep, both our body and our brain repair itself from all of the wear and tear that we put ourselves through during the day (Breedlove, 2020). We have also known about the positive effects that sleep has on our cognitive abilities, allowing us to consolidate information that we have learned during the day and helping us to get rid of information that we no longer need (Diekelmann 2010; Lokhandwala, 2020). What we have not known about for very long is how our brain actually acts to remove “waste” that we have generated during the day; this takes place because of the action of our glymphatic system (Xie, 2013). This is vital for our day to day functioning and a lot of research is pointing to how decreases in our amount or quality of sleep can allow result in the built of waste products (like misfolded proteins and other metabolites) which may account for neurological diseases (Coulson, 2022). Making sure that we get adequate sleep, is another way that we can be nice to our brain.

- 🌈 Your brain needs energy because there is no such thing as a fat head.

Ironically, while your brain is made up of 60% fat, your brain does not store energy in fat cells like the rest of your body (Nortley, 2017). Your brain is also one of the most metabolically active parts of your body (Karbowski, 2007) and because it cannot store energy in fat, it needs to receive energy on a regular basis from the glucose in the blood (Nortley, 2017). Making sure that you eat a diet that is full of nutrient rich foods (proteins, vitamins and minerals) will ensure that your brain gets not only the energy it needs to help you do all the behaviors that you need to do, but that it also get nutrients that your brain needs to take care of itself.

National Standards:

Next Generation Science Standards

- Crosscutting Concepts
 - **Cause & Effect:** Events have causes, sometimes simple, sometimes multifaceted. Deciphering causal relationships, and the mechanisms by which they are mediated, is a major activity of science and engineering.
 - Cause and effect relationships are routinely identified, tested, and used to explain change.
 - **Structures & Functions:** The way an object is shaped or structured determines many of its properties and functions.
 - Substructures have shapes and parts that serve functions.
 - **Energy & Matter:** Tracking energy and matter flows, into, out of, and within systems helps one understand their system's behavior.
 - Energy can be transferred in various ways and between objects.
 - Matter is made of particles.
 - Matter flows and cycles can be tracked in terms of the weight of the substances before and after a process occurs. The total weight of the substances does not change. This is what is meant by conservation of matter. Matter is transported into, out of, and within systems.
- Related Grade Level Content
 - **Structure, Function, and Information Processing**
 - 4-LS1-1: Construct an argument that plants and animals have internal and external structures that function to support survival, growth, behavior, and reproduction.
 - 4-LS1-2: Use a model to describe that animals receive different types of information through their senses, process the information in their brain, and respond to the information in different ways.

ASCA (American School Counselors Association):

Personal/Social Development

- **Standard B:** Students will make decisions, set goals and take necessary action to achieve goals.
 - PS:B1 Self-knowledge Application
 - PS:B1.1 Use a decision-making and problem-solving model
 - PS:B1.2 Understand consequences of decisions and choices
 - PS:B1.3 Identify alternative solutions to a problem

National Health Education Standards (Shape America) & CDC (Centers for Disease Control and Prevention)

- **Standard 1:** Students will comprehend concepts related to health promotion and disease prevention to enhance health.
 - 1.5.1: Describe the relationship between healthy behaviors and personal health. **(CDC)**
 - 1.5.2: Identify examples of emotional, intellectual, physical, and social health. **(CDC)**
 - 1.5.4: Describe ways to prevent common childhood injuries and health problems. **(CDC)**
- **Standard 5:** Students will demonstrate the ability to use decision-making skills to enhance health.
 - 5.5.1: Identify health-related situations that might require a thoughtful decision. **(CDC)**
 - 5.5.3: List healthy options to health-related issues or problems. **(CDC)**
 - 5.5.4: Predict the potential outcomes of each option when making a health-related decision. **(CDC)**
 - 5.5: Choose a healthy option when making a decision. **(CDC)**
 - 5.5.6: Describe the outcomes of a health-related decision. **(CDC)**
- **Standard 7:** Students will demonstrate the ability to practice health-enhancing behaviors and avoid or reduce health risks.

- 7.5.1: Identify responsible personal health behaviors. **(CDC)**
- 7.5.2: Demonstrate a variety of healthy practices and behaviors to maintain or improve personal health. **(CDC)**
- 7.5.3: Demonstrate a variety of behaviors to avoid or reduce health risks. **(CDC)**

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<https://www.hopkinsmedicine.org/health/conditions-and-diseases/anatomy-of-the-brain#:~:text=Weighing%20about%203%20pounds%20in,inclu%20neurons%20and%20glial%20cells>

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