



Science Behind the Story (SBS)
Your Sleeping Brain is Hard at Work (🌈 A Physical Health Story)
(1st Grade – 6-7 year olds)

Sleep is important for the survival of all animals. This story will describe what sleep is, why animals do it and what your brain is doing while you are sleeping.

🌈 All animals sleep in different ways.

Sleep is a behavior that is controlled by our internal biological clocks, or circadian rhythms (Dibner, 2010). All animals, from the single celled bacteria to humans, have internal biological clocks (Gerstner, 2010). This means that some kind of sleeping behaviors are ubiquitous to all animals.

Just as animals eat differently, depending on their body structures and bodily needs, animals also sleep differently.

🌈 Your body needs sleep to rest and recover from all the things you do while you are awake. Your brain's job, however, is never done. While your body rests, your brain has time to do other things. (fix things – repairer or repair technician, memory consolidation – storage facilitator, and waste removal – janitor)

Basically, there are 3 principal reasons why animals sleep, although this question has been the topic of much research and debate.

First, sleep serves to conserve energy (Berger, 1995). Sleep may prevent an animal from wasting energy during a time of day when food is not available. Sleep also tends to vary with environmental factors and it may help animals avoid predators.

Second, sleep serves as a period of restoration, during which certain anabolic physiological processes occur (Krueger, 2016). The wear and tear caused by activity during the waking period is repaired during sleep (Krueger, 1995). Sleep also restores the brain by allowing the brain to get rid of wastes through activation of the glymphatic system (Reddy, 2020). This makes sleep a physiologically necessary function, such as eating and drinking.

Third, sleep appears to aid memory consolidation (Diekelmann 2010). It may also help us to forget less important or incorrectly formed memories. Little or no new learning occurs during sleep, but evidence suggests that memory for new material is improved if learning is followed by sleep (Walker, 2004; Diekelmann, 2009).

🌈 There are many reasons why we need to sleep and people of different ages need different amounts of sleep.

Given the importance of sleep, it makes sense that the amount of sleep that we need changes as we age. Our sleep patterns change dramatically over time. The amount of sleep goes from 12-14 hours as infants, to 8-10 hours as children, to 6-8 hours as adults, to 4-5 hours as older adults (Roffwarg, 1966).

National Standards:

Next Generation Science Standards

- Crosscutting Concepts:
 - **Structures & Functions:** The way an object is shaped or structured determines many of its properties and functions.
 - The shape and stability of structures of natural and designed objects are related to their function(s).
 - **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.
 - Events have causes that generate observable patterns.
 - **Patterns:** Observed patterns in nature guide organization and classification and prompt questions about relationships and causes underlying them.
 - Patterns in the natural and human designed world can be observed, used to describe phenomena, and used as evidence.

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.
 - 1.2.1: Identify that healthy behaviors impact personal health. **(CDC)**
- **Standard 7:** Students will demonstrate the ability to practice health-enhancing behaviors and avoid or reduce health risks.
 - 7.2.1: Demonstrate healthy practices and behaviors to maintain or improve personal health. **(CDC)**

References:

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