



Science Behind the Story (SBS)

Exercise – Good for Your Body and Your Brain (🌈 A Physical Health Story) (2nd Grade – 7-8 yrs)

This story describes how moving your body helps your muscles and your brain to stay healthy.

- 🌈 Exercise is not just about sweat. There are lots of different types of exercise that you can do to stay healthy.

For people of all ages, there are a number of different ways to increase your physical activities; including walking, dancing, riding a bike, playing games that include catching, throwing, kicking, jumping, sports – including water sports, strength training, etc. (Hoskers, 2019; Klimova, 2020).

- 🌈 When you move your body, your brain releases signals that help to keep it healthy.

There are many biological mechanisms that are affected by physical activity (Kandola. 2019).

These are mechanisms that are related to neuroplasticity which is the ability of the brain to change our movements and behaviors. These mechanisms include changes in the molecular level of neurotrophin release such as brain derived neurotrophic factor (BDNF). Changes on the cellular level which results in neurogenesis (production of more brain cells), angiogenesis (production of blood vessels to supply the brain with nutrients), and synaptogenesis (changes in the connections – or synapses – between brain cells and other cells).

These mechanisms are also related to changes in the neuroendocrine system, which is the system that helps to regulate the bodies internal environment (related to the stress response) and influencing mood and behaviors.

Physical activity also causes decreases in the inflammatory response and oxidative stress which plays a role in improving brain health. Activation of the inflammatory response and oxidative stress, while at low levels protects the brain, at high or maintained levels causes damage to the brain.

- 🌈 Exercise helps with your Physical Health, but it also helps with your Social, Emotional and Cognitive Health. So, exercise is SPECTacular for your brain.

Depending on the frequency, intensity, time, type, and context of the physical activity there are 3 proposed mechanisms for the effects of physical activity on the brain (Lubans, 2016).

1. Neurobiological – where the structure and function of the brain changes with exercise.

2. Psychosocial – physical activity provides for social interactions, self-efficacy and competency, improvements in self-perception and independence.
3. Behavioral – physical activity may improve sleep, self-regulation and coping mechanisms.

With physical activity, you have better cognitive abilities, social health, and you can deal with other physical issues better.

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)**
 - 1.2.2: Recognize that there are multiple dimensions of 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)**
 - 7.2.2: Demonstrate behaviors that avoid or reduce health risks. **(CDC)**

National Physical Health Education Standards- (Shape America)

- **Standard 5:** The physically literate individual recognizes the value of physical activity for health, enjoyment, challenge, self-expression and/or social interaction.
 - S5.E1.2: Recognizes the value of “good health balance.”
 - S5.E3.2: Identifies physical activities that provide self-expression.

References:

Hoskers D.K. et al. Promoting Mental Health and Wellness in Youth Through Physical Activity, Nutrition, and Sleep. *Child Adolesc Psychiatric Clin N Am* 28 (2019) 171–193.
<https://doi.org/10.1016/j.chc.2018.11.010>

Kandola, A., et al. Physical activity and depression: Towards understanding the antidepressant mechanisms of physical activity. *Neuroscience and Biobehavioral Reviews* 107 (2019) 525-539.
<https://doi.org/10.1016/j.neubiorev.2019.09.040>

Klimova, B. & Dostalova, R. The Impact of Physical Activities on Cognitive Performance among Healthy Older Individuals. *Brain Sci.* (2020), 10, 377

Lubans D., et al. Physical Activity for Cognitive and Mental Health in Youth: A Systematic Review of Mechanisms *Pediatrics* (2016). 138(3) 1-13. PMID: 27542849 DOI: 10.1542/peds.2016-1642