



Science Behind the Story (SBS)
Importance of SPECTacular Brain Health in Adolescence (🌈 A Brain Health Story)
(5th Grade – 10-11 yrs)

This story describes the importance of focusing on all aspects of brain health as hormones enter the picture.

- 🌈 Adolescence marks a major change in the way that your brain works. Hormones cause changes in behavior because they cause changes in both the structure and function of your brain.

The hypothalamus is an area of the brain that receives many signals from both the body and other parts of the brain (Breedlove, 2020). In response to those signal, the hypothalamus signals the pituitary gland to release hormones into the blood which then interacts with other parts of the body to produce behaviors (Green, 2016). These behaviors include reproductive maturation, body rhythms, growth and development of the body, metabolism, emotions, digestion and appetite control (Breedlove, 2020).

In response to the growing body and the brain, signals reach the hypothalamus and trigger the release of a number of different hormones which then change the brain, body and behaviors and triggers adolescence (Chulani, 2014; Sisk, 2004). The onset of adolescence typically begins by 9 to 10 years of age in girls and by 10 to 12 years of age in boys (Peper, 2013). The hormones released during adolescence, known as gonadal hormones, change the areas of your brain involved in reproductive behaviors and risk taking (Green, 2016). However, it is also known that these gonadal hormones act on other parts of your brain involved in many behaviors associated with our social, physical, emotional, and cognitive health (Sisk, 2005).

- 🌈 It is important to learn how hormones affect your SPEC health and to remember all the ways we have to cope with changes in our SPEC health during adolescence.

Adolescence marks the transition from childhood to adulthood as the individual becomes reproductively mature, however there are also changes and maturation of the cognitive, emotional and social parts of the brain (Sisk, 2005).

In terms of social health, the changes in the parts of the brain that underlie social behaviors tend to make the adolescent more interested in sensation seeking and participating in high-intensity, exciting experiences (Forbes, 2010). Adolescents are also more interested in more interactions with peers (Forbes, 2010). These interactions, which mainly take place outside of the home, seem to be helping to ease the transition towards independence from the family (Spear 2000).

The physical changes in the adolescents are occurring during adolescence are mainly seen in the reproductive parts of the body (Chulani, 2014). At this point in time, the individual is visibly changing from having the body of a child to having the body of an adult. It is particularly important at this age for both the individual and those around them to realize that while they may be looking more like an adult, that they still have a developing brain.

Changes occurring in the emotional parts of the brain during adolescence tend to make the individual highly emotional (Guyer, 2016). Due to all of the changes going on in the life of an adolescent, as well as

in their body and brain, it is typical for their emotional behavior to be intense and increasingly unstable (Bailen, 2019). For this reason, it is particularly important for the individual to not only be able to identify their emotional state, but also to control and regulate their affective behaviors (Guyen, 2016).

Due to the changes that are going on in life of the adolescent, it is also safe to assume that the individual is under chronic exposure to stress. It is well known that stress plays a role on the learning and memory, particularly during adolescence (McCormick, 2010). The cognitive health of the individual is further at risk due to the imbalance in the development of the limbic areas of the brain and the prefrontal cortex (Casey, 2008). At the onset of adolescence, the limbic system, which is involved with motivation and reward, is developed, but the prefrontal cortex, involved in decision making, is not (Casey, 2008). As the hormones released during adolescence are changing the brain, there are more sensation seeking behaviors and impulsive actions with limited adaptive decision making (Arnsten, 2012).

- Understanding the importance that SPEC plays in keeping your brain healthy is especially important during this transitional time in life. By helping your brain to stay healthy, it also helps you to stay happy and healthy.

Adolescence is a time when hormones are known to affect the body and the brain, resulting in changes in behaviors. These changes begin early (between 9-12 years old) and last well into young adulthood (early to mid 20's). Understanding that during this time all aspects of our SPEC health are affected is important for individuals to be able to navigate this wonderful and stressful time in one's life. Building up a repertoire of coping mechanisms to deal with the stress affecting our social, physical, emotional and cognitive health will undoubtedly help us maintain our brain health throughout our lives.

National Standards:

- **Next Generation Science Standards**
- Crosscutting Concepts
 - **Structure & Function:** The way an object is shaped or structured determines many of its properties and functions.
 - Substructures have shapes and parts that serve functions.
 - **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.
 - Events that occur together with regularity might or might not be a cause and effect relationship.
 - **Stability & Change:** For both designed and natural systems, conditions that affect stability and factors that control rates of change are critical elements to consider and understand.
 - Change is measured in terms of differences over time and may occur at different rates.
 - Some systems appear stable, but over long periods of time will eventually change.
- Related Grade Level Content
 - Matter & Energy In Organisms & Ecosystems

ASCA (American School Counselors Association):

Personal/Social Development

- **Standard A:** Students will acquire the knowledge, attitudes and interpersonal skills to help them understand and respect self and others.
 - PS:A1 Acquire Self-knowledge
 - PS:A1.1 Develop positive attitudes toward self as a unique and worthy person
 - PS:A1.4 Understand change is a part of growth
 - PS:A1.5 Identify and express feelings
 - PS:A1.6 Distinguish between appropriate and inappropriate behavior
 - PS:A1.8 Understand the need for self-control and how to practice it
 - PS:A1.11 Identify and discuss changing personal and social roles

- PS:A1.12 Identify and recognize changing family roles
 - PS:A2 Acquire Interpersonal Skills
 - PS:A2.6 Use effective communications skills
- **Standard B:** Students will make decisions, set goals and take necessary action to achieve goals.
 - PS:B1 Self-knowledge Application
 - PS:B1.8 Know when peer pressure is influencing a decision
- **Standard C:** Students will understand safety and survival skills.
 - PS:C1 Acquire Personal Safety Skills
 - PS:C1.7 Apply effective problem-solving and decision-making skills to make safe and healthy choices
 - PS:C1.9 Learn how to cope with peer pressure

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)**
- **Standard 2:** Students will analyze the influence of family, peers, culture, media, technology, and other factors on health behaviors.
 - 2.5.3: Identify how peers can influence healthy and unhealthy behaviors. **(CDC)**
- **Standard 4:** Students will demonstrate the ability to use interpersonal communication skills to enhance health and avoid or reduce health risks.
 - 4.5.1: Demonstrate effective verbal and nonverbal communication skills to enhance health. **(CDC)**
 - 4.5.2: Demonstrate refusal skills that avoid or reduce health risks. **(CDC)**
 - 4.5.4: Demonstrate how to ask for assistance to enhance personal health. **(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)**
 - 5.5.2: Analyze when assistance is needed in making a health-related decision. **(CDC)**
 - 5.5.3: List healthy options to health-related issues or problems. **(CDC)**
 - 5.5.5: 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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