



**Science Behind the Story (SBS)**  
**Do Drugs Make You Happy? (🧠 An Emotional Health Story)**  
**(5<sup>th</sup> Grade – 10-11 yrs)**

While we all want to be happy, this story describes how sometimes things that are not good for us – like recreational drugs – can change our ability to feel happy.

- 🧠 Our brain is designed to let you feel happiness whenever you do a behavior that helps you (or your species) get something you need to survive. The reward system is the part of the brain that allows you to feel happy.

The brain is actually designed to make you feel happy when you are doing behaviors that help you to survive. Behaviors like eating when you are hungry, drinking when you are thirsty, and putting on a coat when you are cold are homeostatic behaviors that are necessary for survival (Eagleman, 2016). Behaviors that help with propagation of the species like finding a mate, reproducing, and parenting are necessary for survival of the species (Eagleman, 2016). Other survival behaviors, known as agonistic behaviors, include offensive and defensive behaviors, as well as predatory and anti-predatory behaviors (Eagleman, 2016; Adams, 2006). All of these behaviors are necessary for the survival of the individual and the survival of the species.

To increase the probability that survival behaviors occur, there is a circuit in the brain, known as the dopaminergic mesolimbic system or reward pathway, which is activated that makes the individual feel happy when the survival needs are met (Spanagel, 1999). The things that animals need to survive are known as primary reinforcers (Ferster & Skinner, 1957). Primary reinforcers are things like food, water, sleep, maintaining body temperature (keeping warm and cool - tied to shelter) sex and nurturing behaviors, so our offspring survive to pass on our DNA. More recently, as our society has become more complex, behaviors that relieve stress may also be considered primary reinforcers. The simplistic way of understanding how the brain works to ensure our survival is that there are primary reinforcers that the individual (or species) **needs** to survive. These needs then motivate the individual to perform a behavior which helps to get the primary reinforcer which then **alleviates the need**. The individual feels pleasure or happiness while performing the behavior and this increases the probability that the behavior will be repeated when the need arises. The key to this circuit is that the once the need is met the reward pathway is shut off and reset (Hyman, 2006).

To illustrate this, consider food as the primary reinforcer. When your body and brain need energy, there are a number of signals that are sent to the brain and you feel hungry. Your brain then activates behaviors that will help you get the food (primary reinforcer). Depending on how much your body needs energy (the hungrier you are the greater your need), eating the food will make you feel some degree of pleasure. Once you get the food and the signals from your body reach your brain, then the reward pathway is shut off. You can still eat the food, but you no longer feel the pleasure of eating that was tied to your energy needs (hunger). In fact, eating food when you are completely satiated may lead you to feel disgust at the idea of eating more food.

The reward pathway is considered to be part of a complex neural circuit that assesses our needs and produces the behaviors to help us achieve what we need so that our bodies can stay alive.

- 🌈 Recreational drugs activate the reward system, better, stronger and faster than any natural reinforcer – like food or water.

Most recreational drugs (nicotine, cocaine, opiates, alcohol and marijuana) have been found to interact with the reward pathway (Volkow, 2019; Nestler, 2005). Typically, these drugs contain compounds that directly interact with neurons that make up the reward pathway (Volkow, 2019; Nestler, 2005). This means that the drugs have the ability to activate the reward pathway faster, stronger and longer than a primary reinforcer (such as food or water) (Wise, 2014). So, recreational drugs have the ability to make the user very happy. In most cases, more happy than primary reinforcers. The way the reward pathway is designed to work is that the feeling of pleasure or happiness that occurs with activation is designed to increase the probability that the behavior that occurred to get whatever activated the pathway occurs again (Koob, 1992; Ferster & Skinner, 1957). In this case, getting and taking the drug. An issue that arises, however, is that because there was no physiological need prior to the activation of the reward pathway, the reward pathway is not shut off once the drug is obtained and consumed (Koob, 2001).

- 🌈 Recreational drugs, definitely make you happy, but they change your brain. When your brain changes, normal reinforcers do not make you as happy as the drugs. Your brain becomes addicted.

Everything that you do changes your brain and making the choice to use recreational drugs will change your brain. However, drugs will change the parts of your brain associated with the reward pathway (Kreek, 1998). Recreational drugs act more powerfully to activate the reward pathway and in doing so they become more important to the individual taking the drug than normal primary reinforcers (Koob, 2008). Taking the drug also changes how other primary reinforcers interact with the reward pathway (Koob, 2001). Food, water, taking care of oneself and others are no longer as rewarding to the individual as the drug. Plus, when taking the drug the reward pathway shutoff and reset functions are no longer working properly (Koob, 2001). Changes in the brain caused by the drug are decreasing the amount of pleasure experienced by taking the drug, which means more of the drug is taken to achieve the pleasurable effects (Wise, 2014). All of these factors cause increased stress on the brain, causing further changes and damage (Volkow, 2019). At some point in the cycle, the brain becomes addicted.

Addiction is a brain disease that is characterized by the craving for the drug that remains long after the abstention of taking the drug (Volkow, 2019). As everyone's brain is different, when addiction to a drug takes place will vary (Volkow, 2019). While there are many who are living normal lives with their addiction, until science is able to pinpoint the area of the brain involved in the "craving" the possibility for relapse remains. The good news, is that there are many who are close (Luscher & Janak, 2021; Volkow, 2019).

## 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.
    - Different materials have different substructures; which can sometimes be observed.
    - 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 use to explain change.
    - Events that occur together with regularity might or might not be a cause & effect relationship.

- **Patterns:** Observed patterns in nature guide organization and classification and prompt questions about relationships and causes underlying them.
  - Patterns of change can be use to make predictions.
  - Patterns can be used as evidence to support an explanation.

## **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:A1.6 Distinguish between appropriate and inappropriate behavior
    - PS:A1.7 Recognize personal boundaries, rights and privacy needs
    - PS:A1.8 Understand the need for self-control and how to practice it
- **Standard B:** Students will make decisions, set goals and take necessary action to achieve goals.
  - PS:B1 Self-knowledge Application
    - PS:B1.2 Understand consequences of decisions and choices
    - PS:B1.3 Identify alternative solutions to a problem
    - PS:B1.4 Develop effective coping skills for dealing with problems
- **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:C1.8 Learn about the emotional and physical dangers of substance use and abuse
    - PS:C1.10 Learn techniques for managing stress and conflict
    - PS:C1.11 Learn coping skills for managing life events

## **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 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)**
- **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)**
  - 5.5.4: Predict the potential outcomes of each option when making a health-related decision. **(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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