The Awesomely

THE BRAIN’S REWARD SYSTEM
Your brain has evolved to make you feel good when you do things that help you survive. The pleasure you feel is caused by the chemical dopamine, which is released in your brain’s reward system. When you enjoy certain activities, dopamine is released, and you are more likely to repeat those activities. This brain system has evolved to help you learn and grow, and to become healthy, happy, and successful.

THAT LOOKS GOOD… The brain has evolved to crave the fattiest meats, the sweetest fruits—natural, unprocessed foods that contain the highest energy. Why? Because our evolutionary survival instinct tells us that famine may be just around the corner.

WHAT A RUSH! You live to skateboard. Your friends love it when you complete 360° turns. No doubt you are taking some risk, but it’s healthy! Evolution has designed us to learn from new experiences so that we become independent—and find our own place in this world.

CRUSH ALERT When you first met, you couldn’t stop flirting with each other. Why? Members of every species are designed to find a partner, and humans are no different.

Have you ever thought about how many different things your brain can do? This amazing organ, which scientists are only beginning to understand, has been refined through millions of years of evolution. It helps you process information—often before you are aware of it. And it figures out things fast, even when information is incomplete. Did you know that your brain even controls what you enjoy? The brain does this to help you survive and to keep your body’s internal environment stable and balanced, a state known as homeostasis. The brain is awesomely complex and crucial to who we are and how we live.

BRAIN EVOLUTION TIMELINE

THE EARLY BRAIN
Focus on Survival—MILLIONS OF YEARS

BEGINNING OF TIME

WALKING UPRIGHT

FIRST TOOLS

MILESTONES
6,000,000 Years Ago
2,600,000 Years Ago

2 From Scholastic and the scientists of the National Institute on Drug Abuse, National Institutes of Health, U.S. Department of Health and Human Services
WHEN TOO MUCH OF A GOOD THING CAN BE BAD
The brain’s reward system can go haywire. This is especially true in today’s world, where many of the foods we eat are highly processed, and technology invades almost every aspect of our lives, overloading us with information. Because evolution takes millions of years, our brains have not yet caught up with the demands of today. This overload can throw us out of balance and lead to compulsivity—or the inability to stop a behavior, even when it’s harmful.

Dopamine Overload
Ever feel like you just can’t stop? Maybe it’s eating potato chips, or maybe it’s playing a video game over and over—it can be different things for different people. These experiences overstimulate the brain’s natural reward system, causing some people to compulsively repeat certain behaviors, like overeating, which can cause obesity.

It also happens with drugs, which overload the brain with dopamine. This is why for some people, experimentation can lead to addiction.

MORE INFO: For additional facts about the brain and drugs, visit scholastic.com/headsup and teens.drugabuse.gov.
“Wiring” Your Brain

Your actions as a teen directly influence your brain’s efficiency.

Our brains develop from birth through adulthood in a process that starts with our genes but is then shaped by our experiences. So although you don’t have control over the building blocks (genes) of who you are, you do have a say in who you will become. In fact, it is during your teen years—yes, right now!—that you have the most say in how efficiently your brain applies new information. In other words, the habits and skills you practice now will take less time and effort in the future.

HOW? Brain cells, called neurons, communicate with each other through connections called synapses. During childhood, your brain produces more of these synaptic connections than you actually need. This abundance allows you to develop skills as you grow, such as coordinated movements for sports and academic skills for school.

As a person ages, synapses that are used a lot become strong and efficient, while unused synapses die off in a process known as synaptic pruning. So the more you do a certain activity—for example, solving a math problem or throwing a ball—the better you become at it.

WHERE’D YOU GET THOSE FANCY SYNAPSES?
The brain is composed of a network of neurons (brain cells) connected by synapses (“living circuits” through which information flows). The complexity of this network is what allows humans to create art, feel emotion, solve problems, and be unique individuals, among many other things.

NEWBORN
A newborn’s brain starts out with at least 100 billion neurons. The brain is focused on basic body functions, such as heart rate, breathing, eating, and sleeping.

0 to 3 YEARS
At its peak, the brain of a toddler may create as many as 2 million synapses a second. The brain is focused on fundamental skills like talking, playing with others, and following directions.
LEARN IT

Practicing certain skills strengthens the related synaptic connections. At the same time, the brain will get rid of connections that are not used. This ability of the brain to modify its circuitry is strongest in the teen years. This means that it is easier for you—as a teen—to learn something new and remember it, such as a foreign language, than it is for an adult. It also means that teens can shape who they will become as adults through their experiences and actions.

DRUGS AND BRAIN DEVELOPMENT

As a teen, you have a lot of say about how your brain develops. But using drugs can undo all of your hard work. Think of your brain like a computer and yourself as a programmer. Imagine you sit at the keyboard to write code for a program. But what if the keys were scrambled? If you typed your name using the keyboard to the right, with your fingers positioned for standard touch typing, your name would come out unrecognizable. If you were typing code, your program wouldn’t work correctly.

Similarly, drug abuse during your teen years scrambles how information flows between your synapses. Using drugs can negatively affect your attention, memory, and problem solving—not just as a teen, but well into your future. Drug use during your teen years can even “wire” your brain for addiction—a devastating disease that affects millions of lives.

3 YEARS
By age 3, brains have approximately a quadrillion* synapses, many more than needed. Some synapses are strengthened, but many are gradually discarded (synaptic pruning).

TEEN YEARS
Though the brain reaches its full physical size by age 12, the process of synaptic pruning continues in response to new experiences throughout the teen years.

20s to 30s
Synaptic pruning is in the final stages. The brain has become more efficient based on experience, requiring less effort to accomplish familiar activities.

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Pushing Pause

Science shows that by pausing, you can help shape your destiny through self-control.

“OMG! Did I really just send that text?”

Most people have said something that they wish they could take back. And if they had paused to think about it first, they probably would have acted differently.

Pausing doesn’t pay off just when you speak. Scientific studies have shown that making a habit of pausing before you do something can actually have a big impact on how your life turns out.

THINKING IT THROUGH: THE TEEN BRAIN CHALLENGE

In making decisions we rely on two areas of the brain: 1) the limbic system, which creates and processes emotions, and 2) the prefrontal cortex, which governs logical thought. The type of decision, how we feel about it, and how prepared we are to handle it helps determine which brain area has the most influence.

But our age also plays an important role. Thinking through the consequences of one’s actions is actually harder for teens because the prefrontal cortex is not fully developed until around age 25. This is why teens often feel an intense emotional drive to act impulsively—it’s how their brains are structured!

Though this tendency to act without considering the outcomes can lead to problematic situations, impulsivity during the
High Self-Control = Bankroll

Pausing, paying attention, and not giving up are all key parts of self-control. Long-term scientific studies have linked a person’s self-control when they were younger to how successful they became as adults. One study followed the behavior of nearly 1,000 children born in the same year in Dunedin, New Zealand, for 32 years!

Through this research, scientists have shown that individuals with high self-control have better grades, stronger relationships, and greater income levels. Those with low self-control over time are more likely to be in trouble with the law, as well as have health problems, including drug addiction.

More Info: For additional facts about drugs and drug abuse, visit scholastic.com/headsup and teens.drugabuse.gov.
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