

THE ADOLESCENT BRAIN IS LITERALLY AWESOME!

Adapted from "The Adolescent Brain is Literally Awesome" by Kathryn L. Miller & Jeya Anandakumar

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BRAIN STRUCTURE CHANGES DURING ADOLESCENCE

Researchers use a technique called *magnetic resonance imaging (MRI)* to study the brain. MRIs use magnets and radio waves to take photos of the brain while a person is lying inside the machine. MRI studies can show us how the human brain changes in its structure and organization.



The brain is made of many parts, one of which is the cerebrum. The cerebrum has two kinds of tissue called gray matter and white matter. Gray matter is made up of brain cells, called *neurons*, and their connections. Gray matter contains the cells for the senses, decision making, and self-control. Gray matter decreases during adolescence due to the fine-tuning of connections between brain cells. It also decreases because the other tissue in the cerebrum, the white matter, increases.

The white matter is made of long fibers of neurons called *axons*. Axons send signals that connect different parts of the brain. White matter increases in early adolescence but stabilizes during the mid-teens. The increase in white matter is related to an increase in the speed of signals sent between brain cells.

HOW DOES BRAIN ORGANIZATION CHANGE DURING ADOLESCENCE?

Researchers can also use MRI to see how the brain is organized. Different parts of the brain communicate with each other as a person performs different tasks. These brain patterns can be studied using a slightly different technique called *functional MRI (fMRI)*. This technique examines the amount of oxygen in the blood flowing throughout the brain as a measure of brain activity. When different regions of the brain show similar patterns of brain activity, they are said to be *functionally connected*.

Not every adolescent has the same brain organization. Not every adolescent engages in typical adolescent behaviors. The way individuals differ in their patterns of brain activity can relate to differences in behavior.

A behavior that changes during adolescence is called *temporal discounting preference*. This behavior has to do with how long a person is willing to wait for rewards. Temporal discounting preference determines if someone will choose a smaller reward that is available or a larger reward that they must wait for. Researchers studied how this preference changes during adolescence.

CONTINUED ON THE NEXT PAGE 

They found that there were patterns that linked behavior control to temporal discounting preference. They determined that individuals differ in their temporal discounting preference. This difference is related to an individual's brain organization.

Brain imaging studies have shown that the brain reorganizes in adolescence. Experiences during adolescence can shape the brain's organization. By engaging in certain patterns of behavior, we are making certain patterns of brain activity stronger. This makes leaps in intellectual and emotional development possible during adolescence.

WHY THE ADOLESCENT BRAIN PRESENTS A UNIQUE OPPORTUNITY

The brain changes more in adolescence than it does in adulthood, but less than it does in childhood. During adolescence, we learn more about ourselves and the world. We have the ability to make choices that can impact the changing brain. This is what makes the adolescent brain awesome.

Some of the brain's abilities increase during adolescence, like changing points of view and being able to think about the process of thinking. Research suggests that adolescents even have a greater ability to solve problems in new and creative ways. Promoting healthy brain growth means giving adolescents freedom to make their own choices. Adolescents are often quite concerned about how they are perceived by their peers. While this is often talked about as a negative behavior, it can actually be positive when the social environment is healthy. During adolescence, concern about larger social structures and world events increases, too.

WHAT DOES THIS MEAN FOR YOU?

Adolescence is a period of rapid growth, development, and learning. This period presents a unique opportunity for adolescents to shape their brains' development. Humans make patterns of brain activity stronger by engaging in certain types of behaviors. One of the ways you can engage in your own development is by learning and understanding what is happening in your own brain. Awesome, right?



SOCIAL MEDIA AND THE BRAIN

Adapted from

“Mind Games: Technology and the Developing Teenage Brain”

by Lucía Magis-Weinberg & Estelle L. Berger

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The Impact of Technology on the Quality of Online Activities

Researchers are finding that using technology a reasonable amount is key for good brain health. Positive emotions are related to high-quality activities on digital devices. High-quality activities are those that require you to be actively engaged. This can be chatting with friends and family or learning through videos. Low-quality activities are related to feelings of depression, envy, and loneliness. These activities could include comparing yourself to others on social media or using your devices when you need to finish other tasks.

Social Media and the Social Brain

The teenage years are about exploring your interests and figuring out who you are. Between the ages of 10 and 24, there are big changes in the body and the brain. During these years, people become particularly sensitive to what is happening around them. During this time, brain networks that control relationships are developing faster than cognitive networks.

The cognitive control network is in charge of attention and memory. It also controls decision-making that guides thoughts and behaviors to achieve your goals. The ability to make decisions and learn is affected by how exciting or social the situation is.

Teenagers have very important relationship goals which can be influenced by social media. Teenagers tend to pay a lot of attention to the number of likes or follows on social media. It feels especially important to be liked by peers. This need to get positive feedback from friends might be the reason why they use social media. Social media can be a great tool to connect with friends when used in a positive way. Social media also creates opportunities to explore and develop different identities. It can affect who you are as a student, friend, sibling, or fan of your favorite band. Exploring different identities through social media can help you understand who you are, what you like, and who you like.

The desire to be popular may also drive the need to make mean comments or send pictures to get attention. Cyberbullying and exposure to inappropriate material can also make adolescents stressed or upset. It can also harm a person's reputation. When you are upset, it is particularly challenging to make good decisions. This is because your cognitive control abilities are still developing. Before you make a decision, think about whether you will regret or benefit from a record of your opinions and behavior. Conflict can also distract from your well-being and your school experience. Consider which social media strategies work best for you.

Spending a lot of time scrolling through the feeds of others can affect a person's self-esteem. Some adolescents on social media reported more depression and anxiety. Researchers are trying to answer whether online activities cause problems or whether they make problems worse. How can you use technology to make your friendships stronger and avoid the social pitfalls of devices?

How can you use technology to make your friendships stronger and avoid the social pitfalls of devices?



Getting “Hooked” on Devices

When you are having fun online, it can be difficult to monitor your time. You may find yourself “hooked” on your devices and spending more time online. It can even feel like you cannot control how much time or attention you want to give your device. The cognitive control network allows you to pay attention longer and avoid distractions, but that network is still developing. There are limits to your ability to self-regulate, especially in exciting or emotional moments. Parts of the brain respond to rewards, including social rewards. Some rewarding activities can be positive, like making friends or getting good grades. Some activities activate your reward response but have a negative impact, like eating lots of sugary treats or playing video games all night. Being more sensitive to rewards makes teens more likely to try out new things, explore, and act in ways that will make them feel good immediately. When you are online, the current rewards might cancel out your ability to think about the long-term future. Activities like gaming or streaming late at night can make you feel good in the moment, but then make you tired and cranky during school the next morning.

TECHNOLOGY AND TEENS

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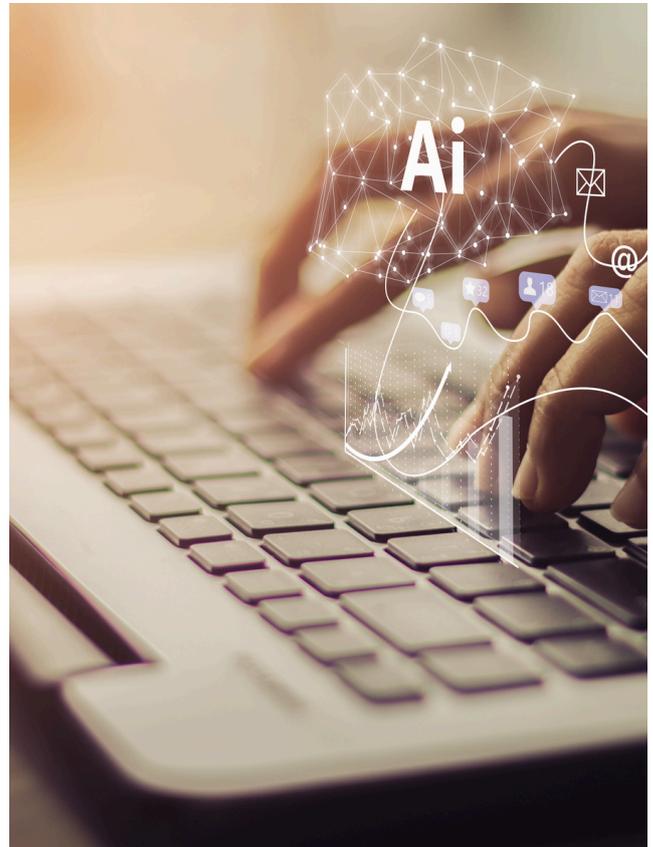
Teenagers Grow Up Online and Offline

When it comes to technology, children and teens are the experts. 95% of teenagers between the ages of 13 and 17 in the United States have a smartphone. Of those teens, 94% report that they are online at least once a day.

While technology offers opportunities for teens to connect, it also carries the risk of distractions and overuse of screen time. Technology has impacted the teenage brain in both positive and negative ways.

Effects of Technology on Sleep

What is the last thing you did before you closed your eyes last night? You probably replied to a text message or fell asleep while watching a show. Technology use affects sleep, which then impacts your brain, body, and health. This lack of sleep can negatively affect your ability to pay attention, learn, and remember. It can also make you feel anxious or sad. Using your devices in bed at night makes it harder for you to go to sleep and might make you stay up later than you should. Notifications can also wake you up in the middle of the night!



It is very important that your technology use does not get in the way of healthy sleep habits. Sleep is important for the development of your brain and body. It is a good idea to keep your devices outside your room when you go to bed.

Take Back Control

Luckily, there are useful skills that can help you disengage from social media, games, and videos, and take back control of your valuable time. If you enjoy watching videos online, turn off the autoplay feature, which is often the default setting on many platforms. This will make it easier for you to choose when to stop watching.

Before activating a new account, ensure that your profile is protected and deactivate push notifications. Companies are constantly competing for your attention, which means default settings are often designed to keep you hooked on their content. Take control of your media habits by choosing settings that allow you to use technology in the way you want.

To limit your screen time and improve your sleep, leave your device outside of your room at night. Set reminders on your phone throughout the day to take breaks and do different activities, like playing sports or spending time with friends and family.

Tech Tips for Teens

1. Pay attention to the quality and content of what you do online instead of total screen time.
2. Use technology actively (learning new skills or writing stories) instead of passively (like scrolling through a celebrity's account).
3. Avoid multitasking. When you are doing homework, turn off your phone.
4. Make sure that using your devices is not taking time away from your health and relationships.
5. When you go to sleep, keep your device outside of your bedroom. Use an alarm clock instead of your phone.
6. Turn off all the defaults in apps that might make it hard to control their use, like video autoplay and notifications.
7. Take responsibility for your own technology use, and create a technology use contract that makes sense for you and your family.

Improve your habits by developing an after-school and weekend schedule that allows you to control how you spend your time. Create a schedule so you know which afternoons you have after-school commitments and how much time it takes you to finish your homework each night.

It is likely important to you to stay connected to your friends via social media, post on social media, and play your favorite online games. If you create your own guidelines for using technology to do these things, you can gain a sense of pride in accomplishing something meaningful to you. Having a system that you design yourself, with the help of an adult, will help you stay committed to the schedule, instead of being told what to do. Consider even creating a technology use contract with your entire family. Even parents can struggle with managing their devices, so you can share with them what you know about maintaining a healthy digital media balance.

Making the Most of Technology

Your teenage years are an exciting time during which you can figure out who you are and develop the tools to pursue your passions. Using your devices with purpose can help you succeed. There are many benefits to being online, and you can improve your overall health by monitoring the quality and content of what you do, instead of focusing on the number of hours you spend online. When using technology, be active rather than passive, and avoid multitasking in order to make the most of your time. Take responsibility for your technology use. Be in charge of your device, instead of letting your devices be in charge of you.