

Title: What's going on in your brain? Your control center is in version 2.0
Author(s): [Linda Bernstein](#)
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Full Text:

Here's a good comeback the next time an adult complains that you're taking too many risks. Just say, "My brain made me do it."

Of course, in the real world, you can't use that excuse to cover reckless behavior. However, it's true that "the brain's inclination for sensation seeking becomes more intense during adolescence," Laurence Steinberg, a professor of psychology at Temple University and an expert on the teenage brain, told *Current Health 2*. At the same time, the brain mechanisms that regulate these desires are not yet fully developed. That's why teens want to do things like bungee jump or drive fast but often don't experience the fear or anxiety adults often associate with such risky activities.

Picture This

Your brain is a mass of cells contained inside your skull. It is, in fact, the boss of you. As the diagram at right shows, there are many parts to the brain, and each has a different function--bossy functions. In fact, the brain is the only organ that has localization, explains Dr. Nancy L. Kuntz, a consultant in child and adolescent neurology at the Mayo Clinic in Rochester, Minn; one specific part controls movement, another helps decode vision, and so on.

Especially important to the teen brain are synaptic pruning and myelin. In childhood, the brain produces many synapses--gaps between nerve cells connected by electrical impulses called neurotransmitters. As you grow, the brain starts to shed some of those synapses because you don't need them. As Steinberg explains, "the brain starts out like a road map with dirt roads. Those synapses that you need turn into highways, and those not used disappear." That process is synaptic pruning.

Pruning is a good thing because the synapses you use get stronger and work better. For instance, during adolescence, as some synapses drop away and others take hold, your thinking becomes clearer and more mature. You get better at planning and controlling impulses.

Everyone has about 99 percent of the same synapses, but that still leaves billions that can differ from one person to another, Steinberg says. For instance, if you play guitar every day, your brain will have more fine-motor synapses than if you spend a lot of time listening to Fall Out Boy on your MP3 player: (In that case, audio synapses would rule.) The cool thing, says Steinberg, is that brain cells can actually regenerate, so synapses that have been pruned can be re-formed if your life direction or interests change. Synaptic pruning peaks at about age 12 or 13 but continues until you're about 24. So right now your brain chemistry is pretty active, preparing you to become an adult.

The production of myelin--the white matter that insulates the neurons--is as important as synaptic pruning. The amount of myelin in your brain increases during adolescence, according to Steinberg. The more myelin, the faster information is transmitted and the more adept, efficient, and mature your brain becomes.

Get Touchy-Feely

Amid this molecular stuff, the teenage brain is witnessing other changes. Deep inside the brain, the limbic system controls smell perceptions and emotions, and processes social information, Steinberg says, and is one of the first to fully develop. Thus a teen experiences feelings more intensely than he or she did as a child and learns how to control emotions. Notice that you no longer have tantrums when your morn won't buy you candy, but if a friend snubs you, you feel hurt, which when you were 6, you might not have noticed.

Strangely, says Steinberg, a teen's prefrontal cortex--the brain's smart part--is out of sync with limbic growth. That's why you may do things that you know aren't really good for you (such as coming home past curfew or eating a whole bag of potato chips all at once) while feeling that you just couldn't help doing it.

Maintain Your Brain

Because there's so much going on right now in your brain, it's important to give it whatever help you can.

* Stay away from harmful substances, such as illegal drugs, alcohol, and nicotine. They can harm sensitive cells and undermine natural growth. Steinberg warns that teens who start smoking are more likely to develop a life habit than those who start later, probably because of the synaptic pruning taking place.

* Wear a helmet when you bike, skateboard, or ski, and wear seat belts in cars. A blow to the head, says Kuntz, may be a blow to the brain. So don't take chances.

* Exercise your mind. Do puzzles, read, think about the world or your life--such activities develop synapses you need and prune away those you don't, Steinberg says.

* Get a lot of sleep. Rest is important to the brain. While you snooze, your brain solidifies all the information it took in during the day, Steinberg says.

By now, having read this article, you might feel a little pumped because absorbing all this information has revved up your mind! Brain work is good for you, and it goes on every minute of every day, whether you think about it or not.

Brainteasers

* The average adult brain weighs about 3 pounds.

* The brain can contain up to 100 billion neurons.

* Some neuron connections stretch several feet.

* If all the brain's neurons were laid end to end, they'd go on for 600 miles.

Discuss

* At about what age does synaptic pruning peak? (age 12 or 13)

* How does the anatomy of the brain relate to risk-taking behavior in teens? (Answers will vary but may involve sensitivity to emotions due to the developing limbic system, and lack of inhibition by the still-growing prefrontal cortex.)

* How do messages travel through the brain? (Thoughts converted into neurotransmitters jump the synapse gaps between myelin-coated neurons.)

* Do you agree that teenagers can blame many of their bad choices on their changing brains? (Answers will vary.)

Do

Synaptic paths can be compared to branches on a tree. Ask students to draw a conceptual "tree of their minds," putting in the synapses they think they are developing (for example, if they love watching movies, they can label a branch "film plots"). The labeled branches should reflect what they think are their major interests and strengths. They can also sketch in the synapses they feel might be pruned, such as capacity for fluency in another language if all they ever speak or hear is English.

Resources

The PBS program Frontline has a site for its "Inside the Teenage Brain" episode, including a section on teens and sleep, at www.pbs.org/wgbh/pages/frontline/shows/teenbrain.

The Teen Brain Book: Who & What Are You? by Dale Carlson (Bick Publishing, 2004) explains the science of the brain and how teens can make the most of theirs.

Bernstein, Linda

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