



ERIK'S CAUSE

*Kids like Erik are dying every week –
YOU CAN HELP!
“Help Stop the Choking Game”*

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UNDERSTANDING THE TEENAGE BRAIN

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Everyone knows the importance of guiding and nurturing toddlers, whose brains are developing at warp speed. But what about the development of the teen brain? We used to attribute the gap between intelligence and behavior to the assault of a hormonal hurricane. But we now know that much of this is the result of teen brain development as opposed to hormones because adolescents go thru a similar wave of major brain development. **From ages 13 to about 25, a pruning and strengthening process happens in the teen brain.** During that time, brain cells and neural connections that get used the least get pruned away and those that get used the most become stronger.

This new knowledge about adolescent brain development explains why it is so important for parents to encourage teens to have healthy activities. Because some risk-taking is necessary to be able to eventually the nest, encourage your teen to take healthy risks. Not only will participation in constructive activities (such as athletics or the arts) help him or her form positive lifestyle habits, it will help your teen's forebrain develop. The more time your teen spends on these activities, the stronger those brain connections become.

Ironically, this period – when the brain is rapidly changing and is most vulnerable to outside influences – is when teens are most likely to experiment with drugs, alcohol and risky behaviors such as the choking game. Why? One reason is because the part of the brain responsible for making complex judgments (the Prefrontal Cortex) is not fully mature and therefore is prone to being overpowered by the emotional or motivational regions of the brain (the Nucleus Accumbens) that are more fully developed.

The brain develops from the back to the front. The parts of the adolescent brain to develop first are those which control physical coordination, emotion and motivation. However, **the Prefrontal Cortex that controls impulses and reasoning is located in the front of the brain and develops last. It may not fully mature until the age of 25.**

Imagine the other parts of the teen brain shouting while the Prefrontal Cortex is not quite ready to play “referee.” You may have already noticed the effects of this:

- Difficulty holding back or controlling emotions;
- A preference for physical activity;
- A preference for high excitement or low effort activities (video games, sex, drug, etc.);
- Poor planning and judgment (rarely thinking of negative consequences);
- More risky or impulsive behaviors.

As a simple visual, think of the teen brain as an entertainment center that has not been fully hooked up yet. There are loose wires ... the speakers are not working with the DVD player which in turn has not been connected to the TV yet. And, to top it off, the remote control has not yet arrived! In contrast, the fully developed adult brain has all the entertainment center components hooked up and the remote control is working ... the adult brain has a remote control that can evaluate choices, make decisions and act accordingly.

The Prefrontal Cortex is the brain's remote control. It weighs outcomes, forms judgments and controls impulses and emotions. The prefrontal cortex communicates with other sections of the brain through connections called synapses, which are like the wires of the entertainment system.

The teen brain experiences a wealth of growth in synapses. But as with connecting an entertainment center, more wires mean potentially more problems. You tend to keep the components you use the most and discard the ones rarely used. Brain development is similar ... it starts pruning away the unnecessary synapses to make the remaining ones more efficient. And it starts in the back of the brain, with the result that the Prefrontal Cortex (the

remote control) being the last to be trimmed and completed. Without a remote control, using other structures in the teen brain can become more difficult and inefficient. Since the adult brain has refined this process, adult decisions are quicker and more efficient. Adult brains are also better wired to notice errors while the teen brain might not notice any mistakes.

The pleasure/reward center (the Nucleus Accumbens) is where the teen brain is fairly well developed. **Thus the teen brain has a strong desire for reward without a developed mechanism for decision-making, which explains a lot of stereotypical teenage behavior.**

The combination of an underdeveloped decision-maker combined with the heightened need for reward drives some of the most frustrating teenage behavior. For most adults, skateboarding off a rooftop sounds immediately ridiculous because their Prefrontal Cortex curbs the impulse to do so by weighing the strong negative outcome against the immediate reward of a thrill. But the teen brain cannot register all the risks such an action might entail.

On a smaller scale we see the challenge teens have with delayed gratification. For example, a teen goes to the mall to see a movie and returns with an expensive iPod because the impulse to buy it was not curbed. Or spending an hour on the internet instead of doing homework because the potential parental punishment is overshadowed by the strong appeal for immediate fun.

HELP YOUR TEEN AVOID RISKY BEHAVIORS:

The teen years do not need to be all gloom and doom. There are many things you can do to help your teen from engaging in risky behaviors and help them make healthy decisions:

- **Keep the lines of communication open;**
- **Setting clear limits; and**
- **Being directly involved in his or her everyday world.**

Talk often, listen regularly, and communicate clearly that you do not want your teen to participate in risky activities. Encourage your teen to spend time with positive role models including peers, family members or other influential adults.

Understanding the Developmental Changes that Occur in the Teen Brain

- **The Teenage Brain:** Adolescence is now starting at younger ages than in previous generations. The average age for girls is between 10 – 11, when they reach 17% body fat. Boys start between 12 – 13.
- **Preparing for the Future:** Teens are going thru a transitional time when the brain rewires itself for emotional attachment, reproduction, and ultimately the creation of a stable family structure.
- **The Brain is Becoming More Efficient:** Myelin sheathing (which insulates nerves) is responsible for conducting nerve impulses to the brain. The myelin sheathing increases by 100% in teenagers. As the nerves become twice as efficient, this feeds the intensity and speed of a person's reactions, contributing to the experience of mood swings.
- **Lower Serotonin Levels:** Serotonin is the primary transmitter in the limbic system, having to do with morale and moods. The teen years are also the time of the lowest levels of Serotonin in the human brain. Low Serotonin levels create a state in which teens are more susceptible to feeling stressed and overwhelmed.
- **The Brain Grows in Stages:** The brain does not grow in an orderly fashion. It first over-produces connections that go to new parts of the brain. Then, from around age 16 thru the mid-20s, it starts eliminating connections based on how frequently they are used.
- **The Adolescent "Brain" Years Continue into the Mid-20s:** The brain does not complete development until the age of 25. The Prefrontal Cortex – responsible for impulse control – does not complete development until the mid-20s, leaving teens vulnerable to impulsive behavior.

SOURCES:

Nagel, Schweinsburg, Phan & Tabert, "Imaging Psychologic Dysfunction of Individual Hippocampal Subregions in Humans and Genetically Modified Mice," 2005

Are teenage brains really different from adult brains?

by Molly Edmonds <http://health.howstuffworks.com/human-body/systems/nervous-system/teenage-brain1.htm>