

The Power of the Adolescent Brain: A TAG Talk

Transcript — Segment 3: The Adolescent Brain and Addiction

Frances Jensen:

We've learned a lot about brain development in recent years. We know the brain is very different during teen and young adult years compared to later adulthood. We know that enriching, positive experiences have lasting impact at this age because of their ability to mold their brain to experiences.

However, we also know that negative inputs can mold the brain also. Addiction is an example of this. Addiction is essentially a form of learning, but in the reward circuits in your brain. Just as adolescents can learn faster and build stronger connections when they're learning, unfortunately, they can get addicted faster, because really, they're just using the same process of learning but in the addiction circuit, if you will. Hence, adolescents can get addicted harder, stronger, longer, faster than an adult for a given exposure to a substance of abuse.

This is paired, of course, with the fact that their frontal lobes, which is impulse control center, haven't been fully connected for fast access at this point in life. The risk-reward parts of the adolescent brain are very active at a time where the frontal lobe, which normally suppresses and inhibits impulses, is not yet fully online, if you want will.

A big problem with the adolescent brain, because it's growing so rapidly, is chronic substance abuse. If a drug is being present across periods of time in the adolescent brain, damage can be done that may be irreversible. Both animal and human studies are showing an effect of chronic daily exposure to cannabis on later brain IQ and cognitive function. Cannabis can affect synapses and how they function. It can also impair learning. Research has shown that cannabis can affect the way the brain wires itself during development if there is chronic exposure.

Some studies have shown that, actually, the connections to the frontal lobe which are involved in decision-making seem to be less strong in people that have smoked marijuana during the teen years. This, of course, will affect their later ability to make decisions correctly, to control impulses and risk-taking as adults.

Another area of concern is that many adolescents may actually be using marijuana as self-medication for anxiety. This will increase their chances of long-term brain effects with chronic daily usage.

We mentioned that adolescent brains can become more addicted than adults. A perfect example of this is nicotine addiction. We all know of adults that got hooked on cigarettes as teenagers, and how difficult it is for them to kick the habit, if you will, as adults, compared to people that get addicted as adults.

The adolescent brain, because its reward systems are so much more active than the adult, and the fact that the synapses can be made stronger during the process of addiction, explains why nicotine exposure in adolescents causes much greater addiction than in the adult.

An area of concern is the increasing use of e-cigarettes. While cigarette smoking may be declining in teenagers, the use of vape cigarettes and e-cigarettes is increasing. In fact, e-cigarettes contain four to six times more nicotine than regular cigarettes. This means that e-cigarettes may pose a greater threat for nicotine addiction in teen years than in the past with regular, conventional cigarettes.

The part of the brain that controls addiction is more active in the teenager compared to the adult. It's interesting that all kinds of addiction, not just addiction to drugs, but even video game addiction, actually are using the same circuits. It starts to explain why teenagers can become so addicted to so many things, including electronic stimuli.

With addiction, peer pressure is another factor that's pushing the adolescent brain to a greater level of vulnerability compared to the adult. The emotional parts of our brain are connected up before, several years before, our frontal lobes are fully connected. This explains many aspects of teen behavior, their vulnerability to peer pressure because they don't have their frontal lobe to say, "This is a bad idea." They're really going on risk and reward system.

It also explains why they take more risks, with or without peer pressure. It also explains why their decision-making may not be at the level of an adult. We need our frontal lobes for organizational prioritization of lists and planning. The teenage brain does not have full access to that part of the brain.

The fact that the emotional parts of our brain connect up before our frontal lobes also explains why teenagers can be so emotional at times and respond to things that we as adults may feel are inconsequential as if they are international incidents. They really are experiencing emotion to a greater and higher, larger, extent than the adults. Functional imaging has shown that when we confront the adolescent with an alarming image, their brain areas that control emotion actually turn on higher and to a greater extent than children or adults. They really are experiencing emotion in Technicolor, as opposed to adults experiencing emotion in relative black and white.

Here are some additional resources on brain development and adolescent for teenagers. The other segments in this series address brain development, mental health, risk taking, and behavior during this developmental period, and what adults can do to support teens' healthy development. Thank you.