The Teenage Brain

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Period 2

October 20, 2015

Countless generations of parents have always wondered why their teenage son or daughter behave the way they do, and why they can’t make rational decisions, or understand their parent’s point of view. Parents may wonder why their child excels in school and behaves pretty well but they make idiotic, risky decisions such as texting while driving. Well the teenage brain is a mystery that has yet to be solved, while scientists have come to discover some information as to what makes the teenage brain so unique and complex, there is still so much that scientists don’t know about it. Today scientists know that a very significant part in our brain, the pre-frontal cortex is not fully developed in a teenager’s brain along with other various areas. Various studies and experiments have been conducted to discover why teenagers differ from adults and why their behavior is so erratic. Studies have given us insight into diseases, addictions, learning abilities, and various other concepts.

From what researches have gathered from studying the teenage brain, they have proven that teenagers don’t yet have the capabilities that adults do. As a result teenagers can’t make correct decisions, plan, or reason, because they don’t have the connections in their brain that give them the ability to function as an adult. David Dobbs has stated that the brain doesn’t grow very much from age 12 to 25 (Dell'Antonia, 2012). Not much really happens until the age of twenty-five, while during adolescence the brain changes and undergoes extensive remodeling and develops new functions. Frances E. Jensen, a professor of neurology said, “The teenage brain is not just an adult brain with fewer miles on it,” “It’s a paradoxical time of development. These are people with very sharp brains, but they’re not quite sure what to do with them.” (Ruder, 2008). By researching and conducting studies on the teenage brain, scientists can learn a wide variety of endless possibilities about the mystery that is our brain. Scientists could potentially gain insight into why or how some young adults are more susceptible to addictions, and why there is such a dependence on drugs and alcohol.

For starters there are various significant differences between an adult brain and a teenager’s brain. For instance the pre-frontal cortex, which deals with your judgement, decision making, and planning are contained here, this area of the brain is only fully developed in an adult brain. The pre-frontal cortex which is housed in the frontal lobe is the last area of the brain to develop and mature, it is done developing in the mid- twenties. Since the pre-frontal cortex is not fully functioning in a teenager’s brain, it makes them even more prone to make stupid decisions and take risks that could endanger their life such as going over the speed limit to impress their friends in the car with them. Initially scientists believed that the cerebellum which is also not fully developed in a teenager’s brain, controlled physical coordination. But as of new research, scientists have come to believe that the cerebellum is involved in the coordination of thinking processes. The Limbic system which is also not yet fully developed in a teenage brain is involved in regulating motivations, emotions, and rewarding feelings. The limbic system is hyper-sensitive to the rewarding feelings when you take a risk as compared to adults.

A study that was conducted at the McLean Hospital in Belmont, Massachusetts, which involved Deborah Yurgelun-Todd and other researcher’s. They studied how teenagers perceive emotions as compared to adults. They studied 18 adolescents and teenagers between the ages of 10-18 and used 16 adults using the functional magnetic resonance imaging (fMRI). The researchers showed images of adult faces and were asked to identify the emotion on their face. The results astounded the researchers because the teenagers and adults answered with completely different answers. The teenagers answered with words such as “shocked, surprised, and angry,” while adults answered with the correct emotion expressed. From this study the researchers concluded that teenagers and adults use different areas of their brain to process and identify emotion. They discovered that teenagers use their amygdala more, which is responsible over gut reactions and emotions, while adults used their frontal cortex, the area in which contains reasoning and planning. As teenagers grow up, their reasoning and planning activity is shifted from the amygdala to the developed frontal cortex. Teenagers are not capable of identifying emotions from other individuals. For example some fights in high school between girls, may occur because one girl thought another was looking at her funny, and a fight or argument may ensue. But in reality the first girl wouldn’t have been able to correctly identify what emotion she was displaying, that reaction that comes from her is through the role of the amygdala which controls gut reactions.

Studying the teenage brain has also given us insight into identifying early signs of diseases in young adults. As of 2013, researchers at Cambridge University in the United Kingdom have discovered new research that studies could potentially provide us insight into understanding behavioral and mental illness that emerge in the young adult period. Studying the structure of the teenage brain could help doctors and scientists possibly prevent or treat mental illnesses such as schizophrenia. Schizophrenia has been known to emerge in young adults as young as the late teens to the early twenties. This disease has been quite difficult to identify or diagnose in young adults because the symptoms of this disease are normal signs in teenagers and young adults. Some signs or symptoms of this disease are drops in grade, change of friends, and irritability. John Williams, head of Neuroscience and Mental Health at the Wellcome Trust, stated that, “We need to understand what happens in the brain as part of normal development before we can start to work out what goes wrong in psychiatric disorders. This research will be key to understanding how these disorders develop and we hope will help to find better treatments,” (Inkstet, 2013). By studying the teenage brain and understanding its structures and their functions we can eventually be able to identify individuals who are at a high risk for developing mental illnesses or drug dependence disorders. By improving our understanding of the complexity of the teenage brain we can then understand how disorders develop and also gain the potential to advance treatments for young people that go through these diseases and disorders.

Other than the areas of our brain, our brain also contains grey and white matter which allows us to mature, process information, and learn easier. The grey matter’s function is to store information and it usually develops in the adolescent years of eleven and twelve. The white matter which function is to make connections in the brain, but this it isn’t developed until the early twenties. Therefore if these two are not connected or activated, it would be extremely difficult for teenagers to function as how an adult would.. Throughout childhood and well into adolescence there is an incline in the amount of grey matter, but as the individual reaches their teenage years this grey matter begins to decline. This grey matter contains cells bodies and connections between cells synapses. In the brain there are various neural connections that when developed, allow various areas of the brain to work together, but in teens these connections are not yet developed so teens don’t process information the same way in which adults do, they are not able to view the whole picture just a portion of it. Neurons then communicate through chemical signals in our brains. Learning takes place at the synapse between neurons when cells excite one another. This is often called cellular excitement or long-term potentiation, which enables teenagers and adolescents to learn easier than adults. While it is extremely important for teenagers to have this plasticity which helps them learn easier, it also makes them extremely vulnerable to addictions such as alcohol or drugs.

This learning plasticity can also have harmful effects especially on teenagers when it comes to drug or alcohol addiction. During this period of a teenager’s life, it is the most critical period because there brain chemistry is designed to learn new things as they are exposed to all kinds of different concepts. But this can also have harmful effects on a teenager’s brain such as alcohol. Frances E. Jensen conducted an experiment that involved rats and alcohol. Rat brain cells were exposed to alcohol which then blocked some synaptic activity. When the alcohol was washed out of their system the adult cells were able to recover, but the adolescent’s cells remained “disabled,” they were not able to regain their normal function. Jensen states that, “We make the point that what you did on the weekend is still with you during that test on Thursday. You’ve been trying to study with a self-induced learning disability.” This study goes to show that alcohol can still have lasting effects on a teenage brain. At the same time period in which teenagers are designed to learn and process new things it is also a critical and vulnerable time as well, especially with teenagers who are experimenting with alcohol or drugs. Alcohol or drug abuse can have severely long-lasting effects on the development of the brain. Alcohol abuse can render the brain to not function or develop as it should properly be. While teenagers consume alcohol their brain is creating and forming new connections with a response to the environment in which they find themselves in. This makes addiction so much easier because the brain doesn’t know that it’s necessarily bad for you because it is designed to create new connections with what they receive from their environment.

There are also gender differences when it comes to the ability of the area of the brain that processes information. Scientist have discovered through research that the function of processing information expands during childhood and then decreases into the teenage years. But although this may sound discouraging or bad, it is actually not; this is a sign that the brain is functioning normally as it should be. The part in our brain which processes information’s peaks at ages around 12 to 14 in girls, and in boys about two years later (Ruder, 2008). These findings have suggested that girls absorb information much quicker than their male counterparts.

Overall the teenage brain is a complex, unique organ that we are still trying to understand and figure out. While undoubtedly studies have given us so much insight as to some of the functions in the teenage brain, we still have an endless amount of knowledge that we have yet to uncover. Furthering our research into this remarkable organ we could discover new and interesting functions that we may not even think of at this moment. By studying the brain we will gain insight into the inner workings of our behavior, thought processes, learning processes and so much more.

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