

The Adolescent Brain

Adolescents in the 21st century aren't necessarily different from their predecessors, we just know more about them. In the last 20 or so years the field of adolescent brain development research has gained momentum. It would seem that with this new awareness of what's going inside adolescents' heads, educators and parents would be less perplexed by teen behavior. Alas, that's not the case.

As adolescents move through middle school and high school, some adults expect them to automatically make mature decisions, as if these external events magically grant adolescents adult-like thinking skills. This is a recipe for future conflict; adults become disappointed, and teenagers feel misunderstood. To get a firm understanding of this, let's take a look inside the head of a teenager.

The Prefrontal Cortex

Before most children reach middle school, their brains have reached their size potential. Around 12 years old, another type of growth spurt occurs: strengthening of nerve cell connections. This process continues until the mid-20s, although some new research suggests this process can continue until the 30s. The adolescent brain is fine-tuning its network, which will allow faster and less emotional responses.

Imagine the United States before the interstate highway system. When President Eisenhower was a lieutenant colonel in the Army, it took him and a convoy of other soldiers 62 days to drive from Gettysburg, Pa., to San Francisco, with a few stops and speeches along the way. Today, one can drive from Teaneck, N.J., to San Francisco along I-80 within three-five days.

Similarly, both the adolescent and adult brains are like the land mass of the United States. Adults' brains have all of their connections built, but adolescents' brains don't, although they are expected to arrive at the same destination, at the same time, without any of the roads.

The last part of the brain to develop is the pre-frontal cortex, located behind the forehead. This is the part of the brain responsible for executive skills, such as time management, organization, short-term memory, goal setting, initiation and self-restraint. As mentioned, these skills aren't mastered until the 20s or 30s. Even though parents and teachers will become frustrated with the teens who forgot to take out the garbage or hand in their homework or respond kindly to a question, these teenagers just don't have the brain capacity to do those things yet.

Hormones

If a developing prefrontal cortex isn't enough to send a parent over the edge, teenagers are also going through astronomical hormonal changes. Specifically, adolescent males are producing 20 times the amount of testosterone they had in their bodies when they were in elementary school. Testosterone has been shown to increase aggression and decrease the desire to talk and connect socially.

Males also produce another hormone called vasopressin, which has been shown to affect the way teenage boys read facial expressions. When vasopressin and testosterone are combined, the stress hormone cortisol kicks in. So, if a teacher calls on an eighth-grade boy in class who doesn't have his homework, these three hormones will flood his brain, and with an already underdeveloped

prefrontal cortex, he might respond in a regrettable manner.

In female teenagers, as they experience their menstrual cycles, they will ride the initial surge of estrogen where they might feel confident and energetic. Estrogen also releases oxytocin, a hormone that will increase their desire for intimate connections. Toward the latter part of the menstrual cycle, when progesterone kicks in, the teenage girl will experience a shift from the wonderful world of estrogen to the land of progesterone irritability.

Sleep

Just when teachers and parents have had enough adolescent rebellion and moodiness, nature decides to make teenagers' sleep cycles go through a radical shift. When estrogen (for girls) and testosterone (for boys) reach higher levels, teenagers' "fall asleep" time usually drops back by about two hours. Whereas in elementary school they might have been nodding off by nine or ten p.m., their brains won't let them fall asleep until 11 p.m. or midnight. The National Sleep Foundation recommends adolescents get at least nine hours of sleep to experience optimal performance during their day. With many school start times at 7 a.m., adolescents are in what one researcher refers to as a continuous state of jet lag.

When comparing brain scans of adolescents who are sleep-deprived and those with ADHD, the results are strikingly similar. Over time, as adolescents are chronically sleep-deprived, the connections between the emotional part of their brain and the prefrontal cortex suffer, adding to their already moody dispositions.

Some school systems have heeded the research and initiated later start times. In Minnesota, Kentucky and Rhode Island, the results are noteworthy. After altering the school day to begin around 8:30 a.m., educators witnessed decreased absences, increased grades, fewer school nurse visits and fewer suspensions. The students in those schools reported feeling more alert and happy.

Tying It All Together

As mentioned, the adolescent brain is a work in progress. As such, adolescents haven't mastered their executive functioning: time management, organization, task initiation, etc. Collaborating [in school] on integrated lessons focusing on developing study skills, scheduling, organizing and setting goals is key. Although adolescents often don't know how to execute these skills, many adults expect them to. In several early-college high schools, students are mandated to take classes in study skills, organization and time management – skills that are known to bolster academic success.

[The following] can help to normalize what students are experiencing by:

- Educating students on their developing brains
- Discussing how specific hormones affect emotions and thinking
- Teaching strategies to de-escalate
- Helping them to communicate more effectively

When [parents and school staff] learn about what's really going on in the adolescent brain, it helps to de-personalize some of the ways teens interact with them. Knowing the neural pathways aren't fully constructed can help when [an adult] is correcting inappropriate behavior. Rather than focusing the spotlight on the teen who's acting out in front of 25-30 classmates, a teacher can talk with that

student outside of class, thus experiencing less resistance. Teachers who are educated in the developing executive skills of adolescents have reported they will write homework on the board, say it aloud, ask students to write it in their agendas, and (if available) post the homework on the school's website. These teachers see more positive academic results, and their students indicate that these classes are easier to manage because they are aware of the expectations and feel more confident in their ability to manage the workload.

Just as teenagers are learning to manage the multitude of changes in their bodies and brains, parents are affected by these changes as well. It can be a stressful time for both groups. [Helping parents understand] developmental transformations will help them to:

- De-personalize their teenagers' reactions
- Understand adolescent behavior
- Develop strategies to better communicate with their teens
- Realize the importance of just listening
- Be an involved parent without being overbearing

As the research on adolescent brain development becomes mainstreamed and more schools respond, students will have a different experience.

Source: <https://www.schoolcounselor.org/magazine/blogs/november-december-2011/the-adolescent-brain>