



Child Law Practice

Vol. 28 No. 2

April 2009

Helping Lawyers Help Kids

EXPERT EXCHANGE

The Amazing Teen Brain: What Every Child Advocate Needs to Know

by Linda Burgess Chamberlain

As a child advocate, you are well aware that your teen clients think and behave differently. Recent scientific discoveries on teen brain development are helping us to better understand and respond to the sometimes unpredictable, frequently frustrating, and totally amazing teen years.

Around puberty, the teen brain begins to undergo major changes, many of which will not be completed until the early to mid-20s. The massive surges of hormones teens experience are associated with gender-specific changes in the brain that may help explain some of the differences between male and female brains. The teen brain is a work-in-progress that is far from complete.

During adolescence the brain becomes more efficient and develops more advanced skills. Brain connections that are stimulated and used repeatedly are strengthened while unused connections wither away. Similar to early childhood, this developmental window of opportunity is a period of “use it or lose it.” Adolescence is also a time of enhanced vulnerability. Rapid changes make the teen brain more sensitive to stress and neurotoxins, such as alcohol, tobacco, and drugs. How teens spend their time influences the organization and capacity of their brains. This raises questions about whether they are engaged in activities that promote active learn-

ing and skill development, such as volunteering with community services, practicing public speaking, learning to play an instrument, engaging in physical activities, and spending quality time with adults.

While you may think teen brain development does not directly affect your advocacy with teens, you may be surprised. Every youth-serving professional should have a basic understanding of teen brain development. The implications for frontline child advocates who work with at-risk youth is even greater. Many of these teens have experienced early trauma such as child abuse or domestic violence. Trauma can impact brain development and consequently behavior.

What is going on in your teen clients’ lives is influenced by their developing brains and life experiences—their behaviors, relationships, decisions, emotions, and just about everything that makes them unique. Developing a basic understanding of teen brain development can guide your interactions, enhance your communication skills, and help shape your advocacy for teens.

“What Were You Thinking?”

Challenging teen behaviors, such as sudden mood-swings, extreme risk-taking behaviors, and failure to follow instructions make sense when we understand what is happening in the teen brain. Teens lack all of the hardware in their brains to think like an adult. The outer covering of the brain, the cortex, goes through extensive remodeling during adolescence. Often referred to as the “intellectual brain,” this upper region of the brain is responsible for reason, logic, and rational thinking.

The prefrontal cortex is located right behind the forehead. It has a leading role in judgment, impulse control, problem-solving, organization and planning, multitasking, goal setting, and other essential skills. Following a growth spurt around age nine or 10 when the prefrontal cortex actually thickens,

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ABA Child Law PRACTICE

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ABA Child Law Practice (CLP) provides lawyers, judges and other professionals current information to enhance their knowledge and skills, and improve the decisions they make on behalf of children and families. Topics include: abuse and neglect, adoption, foster care, termination of parental rights, juvenile justice, and tort actions involving children and families.

CLP is published monthly by the **ABA Center on Children and the Law**, a program of the ABA's Young Lawyers Division, 740 15th St., NW, 9th Fl., Washington, DC 20005-1022.

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this area of the brain then goes through extensive pruning to eliminate unused brain connections. *Nature saves the best for last*—the prefrontal cortex will not mature until the early 20s when brain connections get a final coating of insulation, called myelin, which increases the brain's speed and efficiency.

Teens may not be able to respond rationally when asked "What were you thinking?" because they reacted impulsively without the benefit of a mature prefrontal cortex to think things through first. The teen brain is still developing the thought patterns and skills for rational thinking and decision making. This is new terrain for the teen brain as teens develop more advanced cognitive skills to ask "how" and "why" questions, analyze more complex issues, and evaluate alternatives in decision making.

During adolescence, short-term memory increases by approximately 30 percent. Teens have tremendous capacity for acquiring new knowledge and skills. Even so, prefrontal cortex functions such as prioritizing what is important and developing organizational skills, challenge most teens. Asking a teen to multitask (i.e., "Take these papers to your guardian and have them signed, return the signed papers to your counselor, and schedule a follow-up appointment in two weeks.") can overwhelm a teen brain that is just learning to sort and prioritize information. Add stress to the scenario, and a teen may appear defiant when really they are overwhelmed with too much information.

While part of adolescence is about seeking new experiences and independence, teens still need lots of quality time with healthy adults to help shape their brains and learn the skills to transition into adulthood. They need the guidance of adults' mature prefrontal cortexes, even more so when they have histories of trauma. Traumatized children often

spend more time in the lower "survival" regions of the brain. While this shows the extraordinary ability of the brain to adapt to its environment, it comes at a high cost—spending less time in the cortex. Teens with a significant history of trauma may have deficits in cortical development and skills. Under stress, they may be more reactive and impulsive because it is harder for them to get to their upper brain/cortex. Adult mentoring can help teens model healthy behaviors and provide positive learning experiences to maximize cortical development during adolescence.

Strategies:

- Encourage activities for teens that allow time for active learning and positive social interactions (afterschool activities, sports, etc.). Teens in foster care placements should not miss out on school and extracurricular activities that are available to all students because of their foster care status.
- Educational stability is key to promoting active learning and academic success. When foster placements must change, advocate for the teen to remain in the same school to avoid disrupting the teen's education.
- Recognize trauma can impact brain development. It is important to meet each child at her developmental level rather than base expectations on age or grade in school. When a child has a long trauma history, it is not unusual to see significant developmental delays in reading, speech, social skills, and impulse control. These skills are cortical activities that require lots of energy and an ability to focus, which can be compromised when a child does not feel safe, nurtured, and stimulated in their environment.
- Create opportunities for healthy adults to spend quality time actively engaging with teens.

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Legal advocates, foster parents, caseworkers, relatives, Big Brothers/Big Sisters, mentors, teachers, coaches, pastors and other adults can positively influence a teen's life.

- When interacting with teens, communicate one task at a time and help identify priorities. Don't overwhelm teens with too many decisions at once.
- Create reminders by posting notes, setting up calendars, using erasable message boards and other strategies to help teens identify and process tasks.

Boys vs. Girls

Gender influences brain structure and function. Being aware of these differences can help you understand common behavioral patterns in boys and girls. The cerebral cortex is composed of gray and white matter. The female brain has more gray matter, which is densely packed with cell bodies. Having more gray matter may explain why girls tend to be more efficient in processing information, have stronger verbal skills, and often excel at juggling several activities. Boys have more white matter, which consists of insulated axons that form connections between brain cells. Having more white matter helps the male brain transfer information throughout the brain, which can enhance spatial skills, such as aiming at targets, navigation, and mathematical problem solving.

Several structures in the limbic system, the emotional core of the brain, grow differently in teen boys and girls. The hippocampus, which transfers new information to long-term memory, is sensitive to the female hormone, estrogen, and grows faster in girls. Scientists believe that a larger hippocampus may explain girls' strong social skills—sizing up social situations, being emotionally supportive, and coordinating

complex relationships. The amygdala and the hypothalamus are sensitive to male sex hormones and grow larger in boys. Both structures are involved in the body's response to fear and danger, often called the "fight or flight" response. Enjoying contact sports, having increased sexual desires, and being more assertive are behaviors that make sense due to the male growth spurt in the amygdala and hypothalamus.

Given the differences between male and female brains, it is not surprising that boys and girls learn differently. Understanding some of these differences is relevant to anyone who is trying to reach and influence teens—

- *Boys* often learn better and have fewer impulsive behaviors when they can move around while they are learning. They typically need more variety to engage their attention and keep focused. *Girls* can typically focus on one activity or subject for longer periods and are less likely to get bored.
- *Boys* are more oriented towards spatial thinking and therefore often need more physical space to learn (spreading out their work etc.). *Girls* learn best when things are conceptualized into everyday language with examples and details.
- *Boys* tend to prefer coded language and jargon and learn more from diagrams, charts, and symbols. *Girls* are often better listeners and can absorb more details from conversations.

Strategies:

- Recognize that girls' and boys' brains develop differently, which influences how they process information and solve problems. Girls' brains mature sooner than boys.' Think about gender differences when interacting with a teen. Avoid one-size-fits-all approaches.
- Promote gender-specific enrichment activities tailored to a teen's

interests. Provide additional support and learning opportunities to promote skill development in areas where a teen is particularly challenged.

- Provide opportunities for teens to develop social skills through small groups and one-on-one with adults to promote closer bonding. This especially benefits teen boys.

Managing Emotions

The core of our emotions—the limbic system—lies deep in the center of the brain. The limbic region, which includes the amygdala and the hippocampus, goes through major transformations during adolescence. It is no wonder that youth sometimes feel like they are on an emotional roller coaster as they navigate the daily drama of school, relationships, and life in general, in addition to the many changes occurring in their bodies and brains.

While adults rely on their cortex to interpret and think through their emotions, teens rely more on the primitive limbic system. Changes in the teen brain slow teens' ability to identify emotions—their own and those of others. Teens frequently misinterpret other people's emotions. Often they confuse anger with sadness or concern. Without the advantage of a mature cortex to override the more impulsive limbic response, the teen brain is vulnerable to stress. In emotionally-charged situations, teens tend to overreact and escalate their emotions.

Lack of sleep can affect teens' brain development and their ability to manage their emotions. The brain chemicals that induce sleep also help build brain connections. Due to changes occurring in the sleep center of the teen brain, teens need more sleep than adults—approximately 9½ hours a night. Many teens are sleep deprived not only due to busy schedules but also

because melatonin, a hormone that induces sleep, is secreted two hours later at night during adolescence and stays in their systems two hours later in the morning compared to childhood.

Teens are often wide awake at bedtime and have difficulty waking up at the usual time in the morning. This can lead to chronic sleep deprivation. Sleep deprivation can look like or worsen symptoms of ADHD (attention deficit/hyperactivity disorder) in children. Sleep-deprived teens are more likely to be depressed, lack control of their emotions, and act aggressively. Adequate sleep is particularly challenging for traumatized youth because of sleep problems associated with early trauma, such as night terrors, repeated night wakings, and fear of going to sleep.

Strategies:

- When a teen seems upset or angry, respond calmly. Limit your emotions to prevent prompting or escalating an emotional (and often inaccurate) response.
- Clearly state your feelings or concerns, one at a time. Avoid communicating your emotions through facial expressions, which teens often misinterpret.
- Encourage teens to talk about their feelings by asking open-ended questions in a safe and supportive environment where their feelings can be acknowledged without judgment.
- Help teens find healthy ways to deal with stress, such as physical exercise, journaling, and peer support groups.
- Ask about sleep patterns if teens experience behavioral and/or emotional problems. Find out if they're getting enough sleep and suggest changes if not.
- Encourage teens who are having problems getting enough sleep to avoid stimulating activities, such as playing computer games, exercising, or drinking caffeinated beverages close to

Web Sites:

www.cdc.gov/HealthyYouth/yrbs/ This Web site provides national data on adolescents' health and risk behaviors, including alcohol, drugs, and tobacco use from the Youth Risk Behavior Surveillance System.

www.pbs.org/wgbh/pages/frontline/shows/teenbrain/ "Inside the Teen Brain" describes what science tells us about how the teen brain works.

www.nimh.nih.gov/Publicat/teenbrain.cfm

A brief overview of research into brain development during adolescence.

Books:

Walsh, David. *Why Do They Act That Way?* New York, NY: Free Press, 2005.

Strauch, Barbara. *The Primal Teen: What the New Discoveries About the Teenage Brain Tell Us about Our Kids.* New York, NY: Doubleday, 2003.

Wolfe, David, Peter Jaffe, and Claire Crooks. *Adolescent Risk Behaviors: Why Teens Experiment and Strategies to Keep Them Safe.* New Haven, CT: Yale University Press, 2006.

Journal Articles:

Giedd, J. N. et al. "Brain Development during Childhood and Adolescence: A Longitudinal MRI Study." *Nature Neuroscience* 2(10), October 1999, 861-863.

bedtime. Talk with them about ways to wind down when trying to go to sleep, such as reading, listening to soft music, and relaxation activities.

The Risk-Seeking Teen

What is it about adolescence that causes teens to take risks—often extreme risks—without considering the consequences? While we know what puts teens "at-risk"—poverty, neglect, violence, and substance abuse—we are less clear on why teens are more likely to take risks than adults. There is little question that puberty and the developing teen brain have a major role in teens' quests for new experiences and thrills.

Paus, T. et al. "Maturation of White Matter in the Human Brain: A Review of Magnetic Resonance Studies." *Brain Research Bulletin* 54(3), 2001, 255-266.

Spear, Linda Patia. "Neurobehavioral Changes in Adolescence." *Current Directions in Psychological Science* 9(4), 2000, 111-114.

Tapert, S.F. et al. "Substance Use and Withdrawal: Neuropsychological Functioning over 8 Years in Youth." *Journal of International Psychology and Sociology* 8, 2002, 873-883.

DeBellis, M. et al. "Hippocampal Volume in Adolescent-Onset Alcohol Use Disorders." *American Journal of Psychiatry* 157, 2000, 737-744.

Brown, S. A. et al. "Neurocognitive Functioning of Adolescents: Effects of Protracted Alcohol Use." *Alcoholism Clinical and Experimental Research* 24(2), 2000, 164-171.

Monti, P. M. et al. "Adolescence: Booze, Brains and Behavior." *Alcoholism Clinical and Experimental Research* 29(2), 2005, 207-220.

Abreu-Villaco, Y. et al. "Nicotine is a Neurotoxin in the Adolescent Brain: Critical Periods, Patterns of Exposure, Regional Selectivity and Dose Thresholds for Macromolecular Alterations." *Brain Research* 979, 2003, 114-128.

To start, teens lack a mature frontal cortex to suppress those "just do it" impulses or to fully consider the consequences of their actions. Chemical changes occurring in the teen brain are also likely contributors. Levels of dopamine, the "feel good" neurotransmitter that is part of the brain's pleasure and reward circuit, are declining between childhood and adulthood. One way to get that dopamine "high" is thrill-seeking. In addition, levels of serotonin, a brain chemical that helps control impulsive behavior, fluctuate during adolescence.

Teens perceive risk differently than adults—they are more enticed by the novelty of the experience. They also have a higher sensitivity

to reward which means that when they take a risk and win the reward, they are more driven to keep taking that risk over and over again even when the strategy does not work anymore. Research shows that when other teens are present, teens' willingness to take risks increases dramatically whether it is driving a car or hanging out with a street gang.

Given teens' propensity for risk-taking, we need to create more options for positive risks under structured circumstances. Opportunities for teens to do new things and have novel experiences are essential development tasks. The types of activities depend on each teen and his/her life circumstances. It might be surfing waves in the ocean, learning to use power tools, or organizing a youth rally. There is one thing we can count on—if we do not provide them opportunities to build their confidence and independence through reasonable risk taking, they will find their own ways to take risks without adult supervision.

Drugs and the Teen Brain

The tendency towards risk-seeking and novel experiences during adolescence increases the likelihood that a teen will experiment with alcohol and drugs. Drugs such as Ecstasy and methamphetamine cause imbalances in brain chemicals and can lead to problems with impulse control and depression.

Even the nicotine in tobacco interferes with healthy brain development. Nicotine interacts with at least 20 different chemicals in the brain and can damage the hippocampus (the brain's memory maker). The neurotoxic effects of nicotine on the brain may help explain why teen smokers are more prone to infections and depression.

Alcohol is still the most common substance that teens try. According to national data, more than one out of 10 eighth graders reported heavy drinking (consuming five or more alcoholic beverages in

a row) in the past two weeks. Research on the impact of alcohol on the teen brain has led to some startling discoveries:

1. Teens are more likely to black out (conscious but can't remember) than pass out and are less likely to succumb to the sedative effects of alcohol. As a result, they are less sensitive to the warning signs of inebriation and can continue consuming alcohol and engaging in other risky behaviors, such as driving while intoxicated, without recognizing their level of impairment.
2. The hippocampus is approximately 10 percent smaller in heavy teen drinkers. Young drinkers have more long-term memory impairment.
3. Teens are more prone to addiction than adults. The younger teens are when they start drinking alcohol the more quickly they become addicted.

Strategies:

- When teens engage in bad or risky behavior, for example truancy, violence, and drug use, be mindful of how the teen brain is developing and transitioning. Know how these developmental changes affect teens' thought processes and behaviors so you can talk and relate to your teen client effectively, make better decisions on behalf of your client, and support positive outcomes.
- Ensure teens have opportunities for novel, challenging experiences, such as hiking, rock climbing, outdoor recreational activities, and chaperoned all-night teen events.
- Encourage caregivers to give teens an active role in discussing family rules, curfews, and consequences for their behaviors and to listen to how they evaluate risks and decide what is important.
- Recognize that teens act differently under the influence of alcohol compared to adults and

that there is no known "safe" level of alcohol consumption for teen brain development.

- If a teen drives, encourage caregivers to set boundaries for driving that limit a teen driver's opportunities to take risks, such as limiting the number of friends allowed in the car.

A Peaceful Adolescence

Dr. Lawrence Steinberg, an expert in teen development, compares the teenage brain to "a car with a good accelerator but a weak brake." Teens are acquiring the "hardware" in their brains to function like adults—but they are not there yet. Teens need our guidance and an enriched environment to optimize this extraordinary window of opportunity in brain development.

The importance of a stimulating and supportive learning environment is all the more important when early trauma has interfered with optimal brain development. Under the best circumstances, it is realistic to expect some chaos, conflict, emotional peaks and valleys, risk taking, and rule breaking as teens navigate the tremendous physical and neurodevelopmental changes that begin at puberty and continue into the mid-20s.

By creating opportunities for teens to practice good decision making, develop new skills, seek adventure through structured risk taking, and benefit from the experience of our mature cortexes, we can promote resilience and help teens reach their potential.

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An earlier version of this article was published by the Institute for Safe Families. It has been updated and expanded by the author to address issues unique to traumatized and at-risk youth.