

The Challenging Adolescent Brain

How the neurobiological changes happening during adolescence impact your teens' thoughts, emotions and behavior



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Speaking
of
Teens

THE CHALLENGING ADOLESCENT BRAIN

When our kids begin puberty and move on through their “teen years”, we make a lot of assumptions about their behavior; namely, that they have as much self-control, ability to make good decisions and act like “rational humans” as we do. Nothing could be further from the truth. So, rather than wonder why your teen can act like such a jerk, can be so mean or do the “dumbest things”, read on and learn what’s *really* going on.

Ann Coleman

Disclaimer: I am not a mental healthcare provider and nothing I say in this Guide should be taken as advice regarding your child’s mental health. I have researched and interpreted the information contained in this Guide from various credible resources including scientific journal articles. Please consult your child’s pediatrician or mental healthcare provider if you suspect they may have an emotional or mental health issue or disorder. If they display signs that they may want to harm themselves, please call 988 for assistance or 911 for an imminent threat.

Speaking
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Teens



contents

| | | |
|----------|--|-----------|
| 1 | A Letter to Readers | 3 |
| 2 | Introduction | 4 |
| 3 | Adolescence <i>A Second Phase of Brain Growth</i> | 5 |
| 4 | Neuroplasticity <i>Adolescent Style</i> | 9 |
| 5 | The Prefrontal Cortex <i>Self-control and Good Decisions</i> | 15 |
| 6 | The Amygdala <i>Emotional Behavior</i> | 18 |
| 7 | The Reward System <i>Risky Behavior</i> | 24 |
| 8 | What Can We Do? <i>Emotional Education</i> | 40 |
| 9 | Final Thoughts <i>On a Personal Note</i> | 42 |

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Overnight my sweet child who used to think I was everything, is now embarrassed by me. He stays up half the night, can't wake up in the morning, gets angry for no reason, won't do anything I ask, doesn't think before he acts, and argues with me constantly.

What the heck happened to our sweet kid?! It's not just "hormones", or laziness. They're not manipulative or entitled. They're not being "mean" or spoiled. It's much more complicated than *any* of that!

The brain goes through enormous structural and functional changes during adolescence that have a major impact on their thoughts, emotions, and behavior. They're just as confused about this as we are. The goal of this e-book is to help you understand what they're going through so you can begin to empathize with them. This empathy will help you temper your own thoughts, emotions and behavior when you interact with them.

”

Mom, I don't want to feel this way. I don't want to act this way. But my thoughts and my feelings are all mixed up right now. I feel like I'm stage and everyone's judging me. All I want to do is to be liked, fit in and have friends. But every day I feel like I'm walking on egg shells and waiting for the next stressful thing to slap me in the face. I just wish you understood what it's like to be me. Things are different than they were when you were my age.





#1 Adolescence

a Second Phase of Brain Growth

Researchers believe the changes the brain goes through from puberty until around the mid to late 20s is a second major phase of brain growth very similar to the first, which takes place from birth to around age three.

So, all that moody and emotional behavior, all those nutty things they do, the trouble they get into, can all be blamed on these neurobiological changes they're going through. Hormones play a role, yes, but they aren't *everything*. Your kid can't help the way these changes impact their thoughts, emotions and behavior.

*Throughout this e-book, the terms **adolescent**, **child**, **kid**, **teen**, or **tween**, are all used to refer to someone in the age range of 10 to 25.*

Additionally, the use of the term **parent**, refers to any adult caring for or raising an adolescent, including relatives or non-relatives.

Because the brain is not fully programmed until around the mid to late 20s, many scientists now include everyone from age 10 all the way through age 25 in the *adolescent* category.

So, remember, just because the law declares your kid an “adult” at age 18, they still have many years to go before their brain reaches that status!

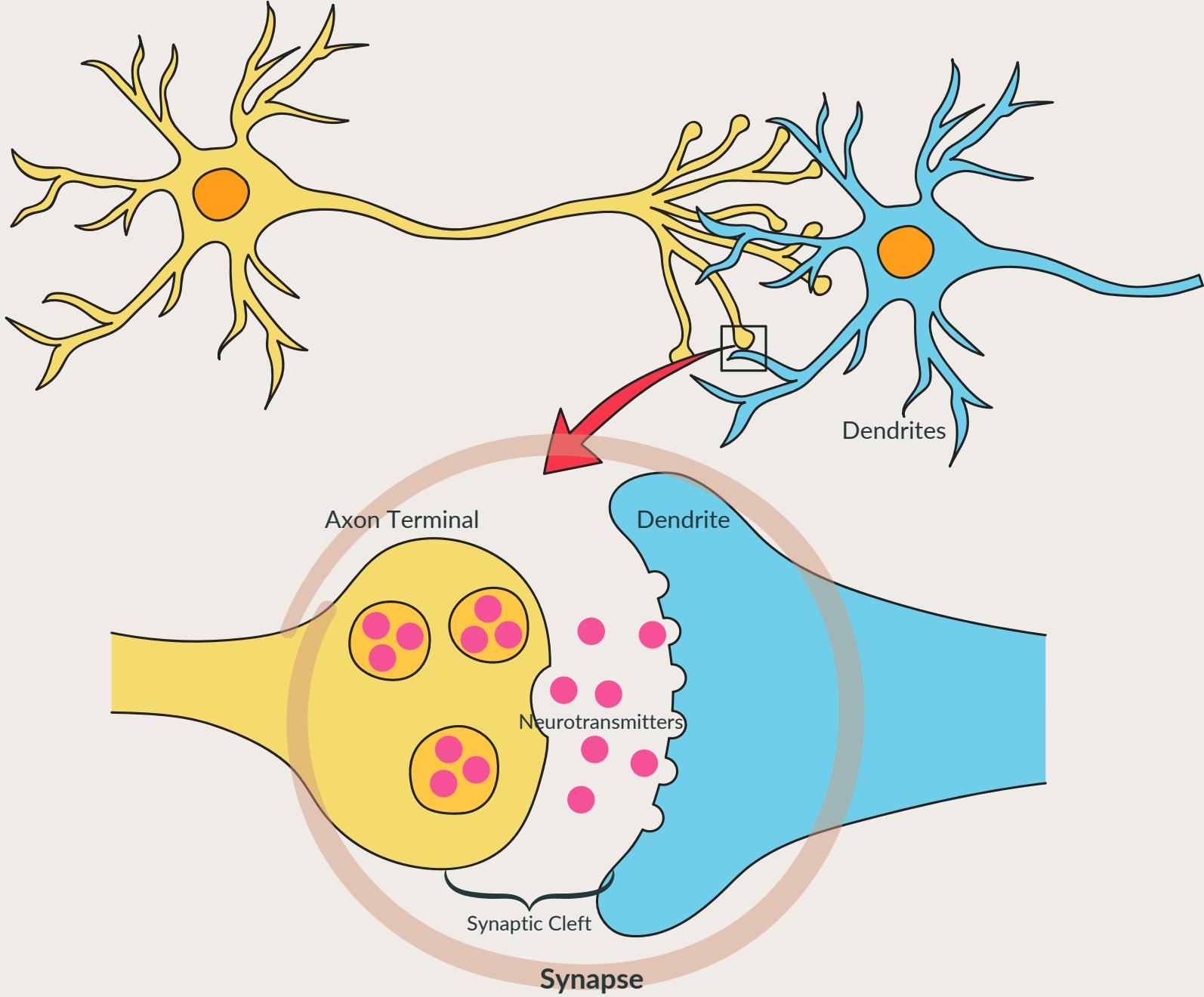
These changes in brain structure start at puberty (around age 9 or 10 for girls and 10 to 12 for boys)...although no one has to tell you this! Their brain is essentially going through the same changes it went through from birth to age 3...BIG changes.

The connections between an adolescent’s brain cells (the synapses) are literally programming themselves based on the individual’s life experiences. The more they learn, experience or do a certain thing, the stronger the brain is “programmed” for that thing. This is known as neuroplasticity.

If you want to dig a little deeper, over these 15 years or so, the brain undergoes changes that start with its “building blocks” or neurons (aka, *brain cells*.)

The brain contains billions of neurons that link together to form complex neural pathways. These pathways allow various areas of the brain to communicate with each other and allow the brain to communicate with the rest of the body. To truly “get it,” look at the next page.





Neurons facilitate this communication by passing chemical messages, called neurotransmitters, along these pathways. The neurotransmitters pass over tiny gaps (they synaptic cleft) between one neuron's dendrites and the next neuron's axon terminals - this meeting point is called a synapse. (See Illustration Above)

During the first 3 years of life, these neural pathways are being constructed, programmed, and expended as we experience the world around us. It was only just over 20 years ago that scientists believed these pathways were completely programmed by the time we reached kindergarten. But we know they are only 95% completed by around age 6 - we still have another 5% to go.



This final 5% of brain programming begins when at around age 9 to 11 right before puberty (younger for females, older for males,) our brain begins another significant phase of programming,

The neurons in the frontal lobe of our brain suddenly sprout billions of additional dendrites, which means there are billions of additional synapses over which neurotransmitters pass.

About a year after reaching puberty, these synapses begin the long and slow process of pruning and strengthening. All those extra synapses we're not using regularly, begin to be pruned (they shrivel up and fall away) and those we're using on a regular basis get stronger and faster and more efficient at passing messages.

As we will discuss in more detail below, this pruning and strengthening is based on our experiences and learning; the more we learn, experience, or do a certain things, the stronger the synaptic connections become.

but if we fail to learn or do a particular things, those synapses are pruned.

This slow and extended period of brain development and programming is not completed until we're somewhere around 25 years old, at which time the brain is considered fully mature.(1)

While we once believed a child's first few years of life were the most critical in terms of learning and protecting against negative influences, we now know adolescence is a second major developmental period; an even more extended opportunity for learning and growth.

#2

Neuroplasticity

Adolescent Style



This lengthy period of neuronal pruning and strengthening begins in the back of the frontal lobe and gradually moves towards the front, ending up in the *prefrontal cortex*.

The brain's ability to reorganize itself by pruning and strengthening and making new connections, based on the immediate environment and learning experiences, is referred to as *neuroplasticity*.

You've no doubt heard this word thrown around in terms of apps the "train your brain" and other gimmicky pseudo-neuroscience programs.

However, neuroplasticity is a crucial part of brain development, our ability to learn things throughout our lives and the brain's ability to heal itself after an injury.

Without getting into the minutia, let's just say scientists have determined that adolescence is a very significant period of plasticity in which the brain is extremely sensitive to environmental stimuli or experiences.

The adolescent brain, as a matter of fact, is more plastic than the immediately previous childhood years and all the years following adolescence.(2) Scientists have even discovered that certain cognitive skills are learned better at certain stages of adolescence than any other time.(3)

The adolescent brain is constantly changing as it eliminates unused synapses and strengthens those routinely used - it literally programs itself to become most efficient. If certain circuits are being used frequently, it makes sense for the brain to strengthen those connections and eliminate unused connections.(4) This strengthening increases the speed and accuracy of communication between neurons.

Tactile and emotional experiences become more vivid as the brain absorbs information faster and easier and continues reinforcing synaptic connections. As one expert put it, "the brain changes characteristic of adolescence are among the most dramatic and important to occur during the human lifespan".(5)

Knowing this can be extremely empowering to parents and adolescents. For one thing, the more time adolescents spend in pursuit of positive relationships, hobbies, and interests, the more likely they will be to continue down that road. It also means that intelligence is not a static concept and that the brain can actually become stronger and more efficient through repeated exposure to information. An adolescent who may not have achieved academic success in the lower grades may find new hope and renewed zest for school if they understand they can harness the brain's neuroplasticity (through practice and repetition) to increase their intelligence.

Although adolescence is a unique opportunity for positive learning and growth it's also a period of extreme vulnerability to negative outcomes. In other words, "plasticity cuts both ways" and negative experiences are just as impactful as positive experiences.(6)

The adolescent's increased capacity to absorb experiences and solidify the brain's synaptic connections is completely dependent on how they choose to spend their time.(7) Regular exposure to environments, activities, experiences, and relationships will strengthen those related synaptic connections.

The problem is, the brain makes no distinction between strengthening *positive* versus *negative* connections. It is, therefore, imperative that adolescents are not only involved in as many positive activities, influences and environments as possible, but they must also avoid the negative.(8)

Routine exposure to environmental and experiential influences during adolescence will have a lasting neurobiological impact on the brain that can affect thought processes, emotions, and behavior for many years to come.

The more an adolescent is involved in negative behaviors or exposed to negative activities – the more likely they will be negatively impacted. And once a synaptic connection is solidified in the adolescent brain, for better or worse, it is very hard to reverse. This is great news if the connections are positive but truly worrisome if they are negative.

Therefore, it's extremely important for adolescents to realize that their personal choices determine which connections are strengthened and which are pruned and can have lifelong effects. This does not necessarily mean that neural patterns can't be changed after adolescence – we know it's very possible. However, according to science, learning new skills and habits (both good and bad) is much easier during adolescence and unlearning them is much more challenging once that window has closed.

The dilemma for parents is how to ensure adolescents are exposed to as many positive experiences and learning opportunities as possible while limiting the negative.

Obviously, we can't put our kid in a bubble at age 10 and keep them there until they turn 25. Some things are simply out of our control. And, as we will learn below, parts of the adolescent brain make it even more difficult for them to stay mentally healthy and physically safe.

This is why parental involvement and supervision is as important during our child's adolescence as it was during their younger years. Once they reach puberty (the official beginning of adolescence), the importance of parental or responsible adult oversight cannot be overstated. The problem is that while we focus on our involvement during our child's early years, many of us become less concerned with supervision as they get older. They do become more independent and often that can lead to a bit of complacency or a false sense of security on our part.

Unfortunately, as much as adolescents want us to believe otherwise, this is not a wise decision. In the pages that follow, you'll learn why the ability to control impulses, make good decisions and regulate emotions decreases significantly during adolescence. For these reasons, our oversight and guidance becomes even more crucial.



An adolescent's world is filled with an overabundance of negative influences that can potentially *hardwire* their brain and change their life's trajectory.

Too much free time, without parental or adult supervision or guidance, can be an open invitation for trouble.

Research substantiates the negative outcomes for kids who are left to their own devices on a regular basis. Those with a parent or responsible adult at home with them after school are less likely to steal, drink, smoke marijuana or inflict harm on others.

Similarly, adolescents in, “adult-supervised after school activities” are much less likely to use drugs than those who are not enrolled in these activities.

On the other hand, kids who have no parents or supervising adults at home after school, are more likely to use substances and engage in other less-than-desirable behaviors.(9)

Simply put; it is far easier for an adolescent to find a way to get into trouble during unscheduled, unsupervised time.

Quality activities with positive peer interaction and learning new and challenging things under adult supervision, is hands-down better than free time if the free time is unsupervised or spent in less positive pursuits.(10)

Obviously, we can't be on top of our kids at all times (nor should we be) but we or another responsible adult should be *present* and vigilant.



On the other hand, we must remember that *overscheduling* our kids can be problematic as well and try to limit activities that interfere with homework, sleep, and family time. It's a real balancing act for sure and one parents have struggled with for years. Just remember that "quality activities with positive peer interaction" doesn't necessarily mean lessons or instruction. Afterschool programs, late-stay, YMCA, and various community organizations offer opportunities for positive growth, supervision and structure. Always remember to investigate such opportunities closely and get recommendations and referrals from parents whose kids have attended.

As we will discuss later, the plasticity experienced during adolescence appears to increase the possibility of addiction issues and common mental illnesses like anxiety and depression. Luckily, for the same reason, these issues are also more easily treatable during adolescence.(11)



#3

The Prefrontal Cortex

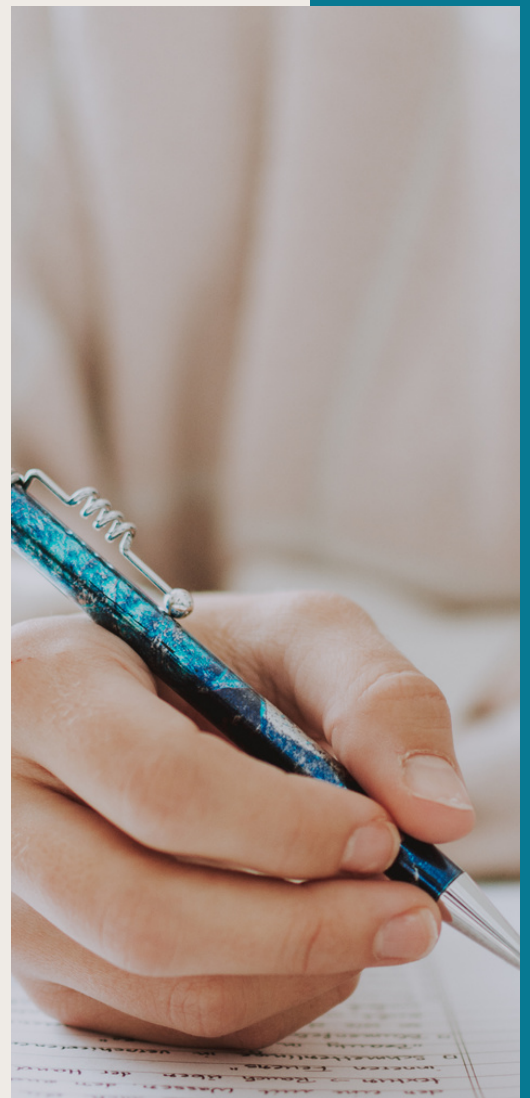
Self-control and Good Decisions

As mentioned earlier, the synaptic pruning and strengthening process begins in the back of the frontal lobe and over time moves towards the front, to a region called the prefrontal cortex.

The prefrontal cortex is the very last area of the brain to be fully “programmed” and where much of the pruning and strengthening is concentrated during adolescence.

This means the prefrontal cortex is in a state of flux throughout adolescence, which as we will see, causes some profoundly difficult issues with their thoughts, emotions, and behavior.

These issues are easy to see once we understand the vast responsibilities of the prefrontal cortex and the critical role it plays in our daily life.





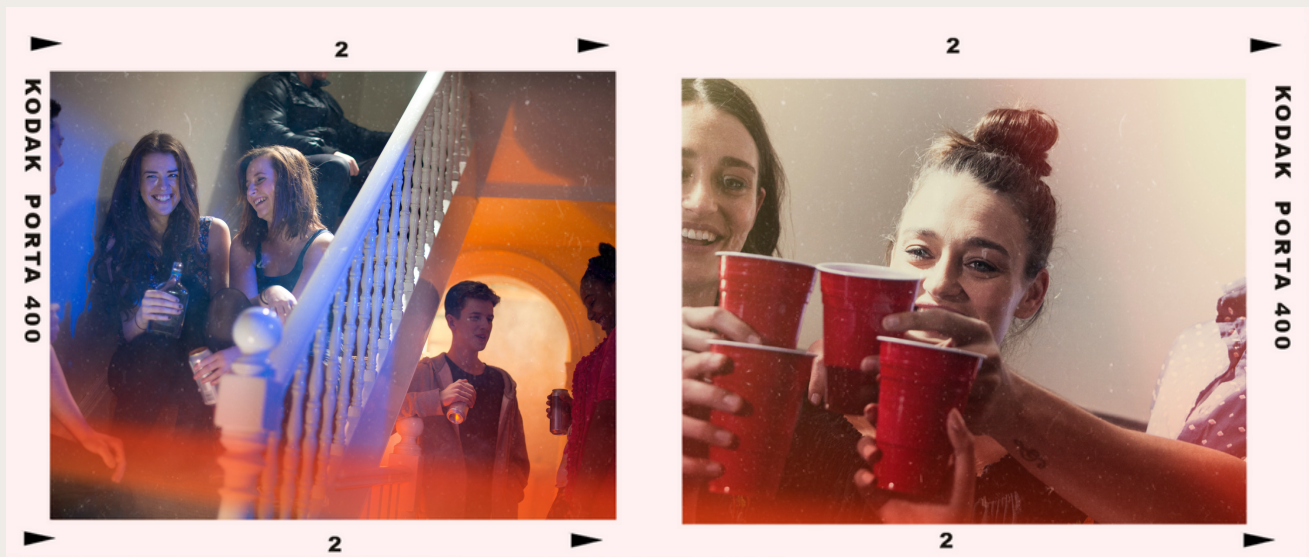
The prefrontal cortex is often appropriately called the CEO of the brain because it handles all *executive functions*. Executive functions (or skills) are those that allow us to organize our thoughts, reason, make rational decisions, solve problems, plan ahead, change plans on the fly, focus attention, ignore distractions, multi-task, watch out for errors, make quick decisions, control impulses, delay gratification, manage intense emotions and behave appropriately under specific circumstances.(12) Yeah, that's a lot for one part of the brain to handle.

These skills are not only necessary for thriving in our everyday life but crucial for academic and job performance and relationships.

We gradually learn and improve our executive functions throughout childhood with help from parents and caregivers at age-appropriate intervals. By adolescence, some basic executive functions are in place, but they are slowly refined as synapses are strengthened in the prefrontal cortex. Over the next 15 years or so, we gradually learn how to utilize these skills at the right time and in the right way.(13)

However, until the prefrontal cortex is completed this process, adolescents vary dramatically in their ability to bring these functions online. Factors such as early environment, genes, birth order and temperament play a role in one's ability to use these skills.

The category of executive function most required during adolescence and unfortunately, the one most lacking, is that of *inhibitory control*. Inhibitory control helps us maintain focus, avoid distractions, plan and follow through to complete tasks, filter our thoughts and control our impulses. In other words, it helps us *think before we act, make good decisions and use self-control.*(14)



Because the synapses in the prefrontal cortex are undergoing the pruning and strengthening process until one's mid-20s, executive functions are just not going to be at 100% capacity until sometime thereafter. This region of the brain is literally still rewiring and programming itself and can't possibly be expected to be fully functional. This is why adolescents are notorious for acting without thinking, for making poor decisions and for using little to no self-control.

Unfortunately, there are at least a couple of other brain regions that make it even more difficult for the adolescent prefrontal cortex to do its job. These other regions are fully functional and even increase in reactivity during adolescence. They are the *amygdala*, which impacts emotions, and the *reward system*, which controls certain motivational mechanisms. We'll discuss both in the sections that follow.

#4

The Amygdala

Emotional Behavior

The amygdala, located deep within the subcortical layer of the brain, is responsible for a lot of the behavior that causes us to label adolescents as irrational, moody and emotional. The still-programming prefrontal cortex is no match for the super active adolescent amygdala, which science proves is even more active than that of a child or an adult.(15)

This revved up amygdala causes some of the most problematic characteristics of adolescence including impulsivity, emotional reactivity, extreme emotional highs and lows and difficulty regulating emotions. The amygdala, involved in many of the brain's neural circuits, has been scientifically linked to everything from stress, aggression, and anxiety to addiction and risk-taking behavior.

To see why it causes such a problem for adolescents and their emotions, let's look at the amygdala's function.



FILM NEGATIVE



FILM NEGATIVE

FILM NEGATIVE

The amygdala plays the role of threat detector for the brain – a security guard of sorts. It sounds an alarm in the brain when through one of our senses it detects a threat in our immediate environment. The alarm then triggers certain hormones and neurotransmitters to be released and travel throughout the brain and body causing a response called *fight, flight, or freeze* (we'll call it the Triple-F response).

This cascade of chemicals, including adrenaline and cortisol, automatically results in physiological changes such as a racing heart, shallow breath, blood rushing to the extremities

The physiological response is meant to help us *flee* the danger, stand our ground and *fight*, or in some cases, it simply causes the body to completely shut down or *freeze*. These physiological and behavioral responses are accompanied by a range of corresponding psychological feelings (emotions) along a continuum of anger and/or fear, or even a complete inability to think (it takes over the prefrontal cortex.)

The Triple-F response can be lifesaving when we're in real physical danger, helping us to instantly avoid the threat of harm by running away or standing our ground to fight it off. This was extremely helpful during the early stages of human evolution when our ancestors were surrounded by real physical dangers. However, our society has evolved, and we are rarely confronted with life threatening situations.

The problem is the amygdala has not evolved as quickly and it still immediately responds to anything it perceives as the least bit threatening (just in case). This means *everyone's* amygdala often overreacts causing the Triple-F response *by mistake*, triggering the same physiological, behavioral, and psychological feelings and responses that happen with a *real* physical threat.



For example, someone throws a wadded-up piece of paper at your head, and you flinch, put your hand up or duck immediately, your heart might race and you might even become a little annoyed and exclaim.

When an adult's amygdala makes such a mistake (no need to duck or get upset - this was no boulder!), the Triple-F response begins but the prefrontal cortex is usually able to jump in right away stopping the response almost immediately. You calm down.

However, this is not so for the adolescent because the prefrontal cortex is too weak to step in and use self-control and rational thinking. So, for an adolescent, the Triple-F response continues, unchecked. In the case of the wadded-up paper, depending on the circumstances, an adolescent might become really angry and throw something back, yell or storm off.



Additionally, because the adolescent amygdala is supercharged and extra jumpy, it *overreacts all the time*, making many more mistakes than that of an adult or a child. This means adolescents mistakenly perceive all sorts of things as threats; a pop quiz, a tone in a friend's voice, a look from a family member, a simple question or comment. It turns out, the adolescent amygdala can interpret almost *anything* as a threat. Specifically, studies have shown the adolescent amygdala to be more reactive to social and emotional stimuli (interactions with and observations of people, facial expression recognition, etc.).(16)

As a matter of fact, research has shown that adolescents misinterpret neutral or ambiguous facial expressions as negative expressions (e.g., angry, fearful, disgusted, etc.) under laboratory conditions.(17) Some of these studies even point to misinterpretation of tone of voice (e.g., thinking a parent is belittling or scolding them when they're not). What this means is adolescents often mistakenly think friends, parents, teachers, or coaches are upset with them or feel negatively about them.

Remember that whether by mistake or not, the amygdala sets off the Triple-F response and the adolescent experiences the same physiological sensations, emotions, and behaviors as they would if a tiger had been chasing them or someone pulled a gun on them!

Physiologically, they may experience a range of sensations such as trembling, racing heart, feeling clammy, nauseous, sweaty, breathing difficulty, lightheadedness, etc. Emotionally, they could feel anything from slight annoyance to rage, or from slight nervousness to all out fear or complete brain shutdown.

Behaviorally, the Triple-F response can manifest in all sorts of ways from screaming and yelling, crying, sulking and silence to punching a fist through a wall or being unable to do anything at all. For a parent or other adult onlooker who sees no reason for the fuss, the adolescent's response is totally irrational, confusing, and completely out of left field. And in many cases the adolescent is just as confused.

Not surprisingly, it appears that acute stress increases reactivity in the adolescent amygdala. Further, research indicates the higher an adolescent's level of stress the lower their ability to engage the prefrontal cortex.

In other words, the more stressed out an adolescent is, the jumpier the amygdala becomes, making even more mistakes than usual, and at the same time, this stress further weakens the prefrontal cortex's ability to step in and stop the Triple-F response. And as we all know, adolescents are under plenty of stress these days.





Compared to both childhood and adulthood, adolescence is a uniquely stressful developmental period. An adolescent's environment is rife with daily stress, varying in degree depending on the individual; academic pressures, romantic relationships, friendships, family, etc., are daily realities.(18)

As if all this actual stress was not enough, adolescents also have higher levels of *perceived* stress. Studies have shown that an adolescent perceived stress has the same emotional and psychological impact as actual stress. In this case, perception *is* reality.(19)

And for adolescents who as younger children experienced abuse and neglect, loss of a parent, natural disaster, familial or community violence, socioeconomic hardship or worse, that developmental stress increases their amygdala's reactivity. The more intense the historic stress experienced, the more reactive the amygdala.(20) The diversity of stress experienced among adolescents is at least one reason emotional responses vary so widely once the amygdala is triggered.

It is also believed that both stress and the adolescent's perception of daily stress is a major factor in the development of mental health disorders such as anxiety and depression because, as we discussed earlier, the developing brain is particularly vulnerable to negative input, like stress.(21)

So, what's the difference between stress and anxiety? Stress is caused by very real and current *external* forces (academic demands, relationship issues, family problems, etc.). Anxiety, on the other hand, is an *internal* state one feels *in response to the stress* and is based on real or imaginary threats that may occur at some unknown point in the future.(22) Anxiety causes us to be hypervigilant in anticipation that something bad will happen any minute, which primes the amygdala to be on guard at all times, which then leads to even more false alarms. Interpreting something as a threat when it is not a real threat is the central component of anxiety disorders.(23)

Each time the amygdala overreacts to a *perceived* threat, that perceived threat becomes more deeply imbedded in the amygdala's memory making it more likely to happen again the next time the same thing is encountered. This is how the brain invents threats from nothing.(24)

Anxiety disorders occur far too often in adolescents. Almost 32% of the adolescent population will suffer from some form of anxiety disorder by the time they turn 18.(25) Additionally, it appears females are twice as likely as males to suffer from an anxiety disorder between puberty and age 50.(26)

As mentioned earlier, the amygdala is not the only part of the brain that is supercharged and causes issues with the adolescent's thoughts, emotions, and behavior. The reward system presents its own unique set of problems.



#5 The Reward System

Risky Behavior



The reward system is a combination of several brain structures connected by a neural pathway. It is responsible for motivating and reinforcing behaviors that we find pleasurable – a *reward* of sorts (sugar, applause, drugs, praise, alcohol, sex, likes on social media, etc.).

Dopamine is the neurotransmitter that flows along this pathway and appears to be the reason we seek out something pleasurable (although it is not responsible for the pleasurable feeling itself).(27)

During adolescence there is a major increase in dopamine floating around in the prefrontal cortex.

This overabundance of dopamine causes adolescents to be hyper sensitive and drawn to any potentially pleasurable (fun, exciting, new, different, etc.) experience and makes these experiences even *more* pleasurable than at any other point in one’s lifetime.(28) This can be both good and bad for the adolescent.

This increase in reward system sensitivity fulfills the evolutionary role of helping the adolescent separate from parents, socialize to meet a partner, experience new things, and move closer and closer toward independence.

The reward system can be the impetus behind joining a youth or community service organization, going on a group ski trip, studying hard for a test, playing on sports team or joining the drama club. All of these things provide *rewards* of one kind or another, whether it's appreciation, applause, peer approval, friendship, or parental praise. Rewards such as these are normally considered *positive*.



Unfortunately, the reward system also motivates and reinforces exciting and pleasurable experiences that range from not so great (e.g., gaming, eating too much sugar, continuous social media scrolling, etc.) to downright risky and dangerous (e.g., reckless driving, drinking alcohol, experimenting with drugs, vaping, or smoking nicotine, having sex, talking to strangers online, jumping in the car with someone who's been drinking, etc.). Of course, all of these *rewards* would be considered *negative* - at least to parents.

So, we can see how a weak prefrontal cortex, lacking in the ability to use self-control and make good decisions, combined with a super hyped up reward system, can cause major issues for adolescents. The weak prefrontal cortex alone would cause enough problems for an average adult but an adolescent must contend with the additional pull of the reward system.

But wait, there's even more to throw in the mix. How adolescents view themselves also has an impact on their risk-taking behavior. Let me explain.

We begin developing a *sense of self* gradually from birth. Research shows that as young infants we can distinguish between ourselves and others – referred to as self-awareness. By age 2 or 3 we begin to understand that others are also self-aware, which prompts us to distinguish ourselves from others when we communicate.(29)

Self-awareness continues to develop throughout childhood at a steady pace and by adolescence, it is a central theme. As peers become an integral part of everyday life, our self-awareness becomes more relative to the views of these other people.(30) This focus on peers and their opinions, is a compelling factor in risky adolescent behavior. Why is this?



There may be several neurobiological reasons for the role peers play in adolescent risk behavior. First, we need to understand just how important peers are to an adolescent and which regions of the brain are involved. Scientists believe that a specific region of the prefrontal cortex (the medial prefrontal cortex) serves a distinctly separate purpose by networking with a handful of other brain regions to focus on social interaction and information – a sort of *social system*.

The neural circuits of the social system happen to overlap with those of the reward system. This overlap appears to help cast our peers in a central role when it comes to participation in rewarding yet risky behavior.

As we said, our whole identity hinges on what we believe our peers think of us. Everything we do and say, what we wear, how we speak, where we go, is all determined based on gaining peer approval. Our entire focus and self-identity is based solely on the opinions of other adolescents, who are totally consumed by the exact same thing.(31)

Not surprisingly, research indicates that adolescents place more emphasis on their peers' opinions than those of their own family members.(32) So, forget trying to convince them those shoes are still in style!

One particularly awful side effect of the brain's social system is that at around age 10 or 12, we become terribly self-conscious and embarrassed about *everything*. This feeling completely rules all our social interaction.

Research shows that adolescents are embarrassed just by the mere *thought* of being observed by others – especially peers.

This phenomenon is very prevalent up to around age 14 and literally causes us to change our behavior as if someone is always watching even when they're not. Unfortunately this often also prevents adolescents from participating in family-type activities even when peers aren't around (watch for telltale signs of the eye-roll and crossed arms!)





So when your 12-year-old suddenly turns you down for a game of catch on the front lawn, a bike ride through the neighborhood or even family game night in the basement of your own house, please understand it's not about you. Simply accept this behavior as another side effect of their changing brain.

Where is all this emphasis on peers going? Studies have continually shown that peer acceptance during adolescence is decisive not only in forming a sense of self, but in influencing the type and level of risk-taking and decision-making in which the adolescent engages.(33)

In fact, scientists theorize that receiving acceptance from peers is approximate to the reward received from using drugs and alcohol. (34) Think about that for a minute.

Peers' opinions are so critical that adolescents will automatically engage in behaviors that will elevate their status among them, without being persuaded or otherwise overtly influenced. In other words, "peer pressure" is something adolescents do to themselves as well.

This means adolescents are more likely to engage in the type of behaviors in which they know or believe their peers engage. For example, if their peers use alcohol, drugs or are sexually active, adolescents are more likely to engage in these types of risky behavior.

All of this is not to say that adolescents blindly jump into something without thinking at all.

As a matter of fact, it's been shown that when with or in front of peers, adolescents may weigh the risk of engaging in the rewarding activity and despite correctly estimating the probability of something going wrong, they decide to do it anyway because, in their mind, the benefit of the reward outweighs the risk.(35) This is truly the opposite of impulsivity - it is a calculated risk - and it shows the power of the reward system and combined with the social system.



The bottom line is that most risky adolescent behavior happens with or in front of other adolescents, *in the heat of the moment*. This has been shown to be even more true for boys.(36)

Trouble just seems to follow most often when adolescents are in groups - they are even more likely than adults to commit crimes when they are in groups.(37) Obviously, this makes guidance and supervision a must when two or more adolescents are present.



One well-known study conducted in 2011 clearly substantiated adolescents are much more willing to take bigger risks when other adolescents looking on. The scientists compared activation of the reward system and risk-taking behavior between adolescents and adults. The experiment was carried out using a simulated driving game which examined the subjects both alone and while their peers were watching.

The game challenged players to get to the finish line as quickly as possible; the faster their time, the more money they received as a reward. Along the simulated racetrack were stop lights which the participant could either ignore or observe.

Ignoring the stop light would of course, decrease their time and therefore increase their potential reward but also increase their risk of crashing and not making it to the finish line. On the other hand, observing the stop light would increase their time and decrease their potential reward but also decrease their risk of a crashing so they would be more likely to finish the game.

The study demonstrated not only that the adolescents' reward systems were much more active when they knew their peers were watching them, but that they also took greater risks to get the bigger rewards at the end of the track (i.e., they totally ignored the stop lights). The same was not true for the adult participants. Interestingly, the adolescents took no more risks than the adults *when they were not being watched by their peers.*(38)

The results of the driving game experiment were validated by a study conducted by the AAA Foundation for Traffic Safety in 2012. AAA examined data from years 2007 through 2010 to determine the statistical risk of car crash fatalities and police-reported car crashes, per mile, for 16 and 17-year-old drivers.

The study found, compared to driving without passengers, the driver's risk of death increased by a whopping 44% with one passenger under age 21; doubled with two passengers under 21 and quadrupled with three or more passengers under 21.

Alternatively, with an adult passenger present, age 35 or older, there was a 62% *decrease* in the risk of death to the driver and a 46% decrease in police-reported crashes.(39)





These studies do nothing to quell parents' fears about young drivers. In fact, they only confirm what most of us already knew in our gut; new drivers should not drive with other teens in the car. States have attempted to combat the problem with a graduated driver's license, but laws as to how many passengers are allowed, and other restrictions, vary.

Of course, that's easier said than done. Kids look forward to this rite of passage because it affords them greater independence and more opportunity for unsupervised social interaction with peers, both normal parts of adolescent development. Unfortunately, it is precisely this type of social interaction that amps up the reward system and increases risky behavior. As a matter of fact, compared to childhood, *an adolescent's chance of death increases by 200% due to risky behavior alone.*(40)

There are other risky behaviors that compound the driving problem. According to recent statistics from the National Institute on Alcohol Abuse and Alcoholism, almost 30% of teens have had at least one drink of alcohol by age 15 and teen use of marijuana is the highest it has been in 30 years. As a matter of fact, kids today are more likely to use marijuana than tobacco with at least 19% of teen drivers reporting having driven under the influence of marijuana. Risky behaviors such as these are why accidents are the leading cause of death for adolescents in the US.(41)

Because adolescents are much more susceptible to the reward system than adults, they are also more vulnerable to addiction or addiction-like behavior.(42) Even seemingly innocuous and solitary activities such as playing video games, posting on social media, watching YouTube videos, scrolling Instagram, Snapchat, etc., can trigger the reward system and lead to behavioral issues.(43)

As researchers from UCLA and Temple pointed out in a 2018 study on social media feedback, “physical isolation is no longer necessarily social isolation”. Thanks to the internet, adolescents and adults alike can connect socially without being in physical proximity to others. Certainly we've seen this increase exponentially during the pandemic as in-person socializing turned to online socializing overnight.

This 2018 study indicated that both giving “likes” and receiving “likes” on social media utilizes overlapping circuits of the reward system in the same way as other motivational rewards. The researchers also mentioned that both seeking and receiving likes as well as providing likes to others has an evolutionary role in bonding with peers.(44)

As we've seen all too often, the internet and social media provides fertile ground for risky and dangerous adolescent behavior and now we know the reward system is at least partially to blame. As I sit editing this ebook, the news is reporting a Facebook livestream set up by a 27-year-old suspect before assaulting two Orlando police officers with a brick. Yes, he is over 25, but remember, 25 is not a magic number; genetics, environment, temperament, etc. all play a roll in the speed at which the synapses complete the programming process. Nevertheless, this is a good example of the dangers of social media and adolescents.

Additionally, don't forget, as discussed earlier, neuroplasticity enables the behaviors learned and repeated during adolescence to be reinforced through strengthening of synaptic connections, making it harder to break the behavioral cycle and easier to continue the behavior into adulthood.

So, what do we do about adolescents and all this reward-seeking and risky behavior? We educate them about the dangers, give them the statistics and teach them why they should modify their behavior, right? *Wrong.*

It turns out, education about the dangers and consequences of risky behavior is not the issue. Research shows that when adolescents are not in the heat of the moment (around their peers and presented with some rewarding experience), they are as capable as adults to make reasoned decisions and control impulses.

For example, one study found that 14-year-olds answered the same as any reasonable adult when asked whether certain activities were risky.(45)

But when presented with an opportunity, especially with friends around, knowing *how* to avoid risk is vastly different from *actually doing so*. As adolescence expert Laurence Steinburg, said it's "...an uphill battle against evolution and endocrinology..."(46)

Under *cool* circumstances, such as hypothetical situations presented in writing, in a laboratory setting, adolescents can and do respond appropriately and know what is and is not risky and what they should do in risky situations.

However, we know when adolescents are around their peers and the reward system is activated, their prefrontal cortex is generally not strong enough to stop them from engaging in risky behaviors.



This is why traditional education-based prevention programs do *not* work to prevent risky adolescent behaviors like substance use, reckless driving, and sex. Research has proven over and over again that such programs are totally ineffective and that some even *increase* risky behavior.(47)

So, if education doesn't work, what does?

Numerous scientific studies have indicated various public policy solutions for risky adolescent behaviors including; a) increased time in afterschool programs which decreases likelihood of drinking, drug use and sexual activity, b) later start times for school which increases student performance and decreases car crashes, depression and substance abuse, c) decreased density of stores selling alcohol which decreases underage drinking, d) raise the age to purchase cigarettes which decreases teen smoking, e) impose graduated driver's licenses that restrict teen passengers which greatly reduces teen car crash fatalities, etc.(48) Protecting adolescents from themselves in this manner is not only advisable but scientifically proven to help.

Obviously, the likelihood that all of these laws, regulations and policies will be enacted throughout the country at the state and local level is extremely low. And even if they were, all adolescent risky behavior can't be legislated away. What else then can we, as parents, do to insure our adolescent not only avoids becoming a statistic but also succeeds in life?

Research regarding traditional education-based prevention programs tells us these programs are not successful because they attempt to increase knowledge rather than address factors impacting the adolescent at a personal and individual level (e.g., poor emotion regulation, self-control, self-esteem and assertiveness).(49) Therefore, these studies say, we must teach kids these very basic life skills - the skills their weak prefrontal cortex has not yet mastered. Luckily, additional research proves it *can* be done.



Back in 1995, Daniel Goleman, author of worldwide best seller, *Emotional Intelligence: Why It Can Matter More Than IQ*, wrote that most prevention programs are “the equivalent of solving a problem by sending an ambulance to the rescue rather than giving an inoculation that would ward off the disease in the first place”.(50)

He argued that while most prevention programs focus on disseminating information and lecturing young people about their risky behavior, they should instead be teaching emotional and social competencies.

It has been shown that children who, at an early age, develop social and emotional skills, persistence, confidence in their emotions, assertiveness, and the like, are much more resilient and therefore more likely to be able to handle all types of challenges.

With his book, Goleman brought the concept of emotional intelligence from academia (introduced in 1990 by researchers Mayer and Salovey) to the masses. He emphasized how indispensable it is to overall personal success and how, unlike IQ, emotional intelligence is teachable and quite attainable. Emotional Intelligence, he argued, could be broken down into 5 simple and teachable elements; a) emotional awareness, b) emotional regulation, c) motivation, d) empathy and e) social skills/relationships.

The idea that there was something more central to success than IQ was an intriguing and even hopeful idea that initiated a world-wide awakening of sorts. Since 1995, myriad books, scientific studies and peer-reviewed journal articles, blogs, websites, non-profit organizations and businesses have been dedicated to the subject of *emotional intelligence* – now, a buzzword that knows no bounds.

Corporations across the globe began to hire consultants to train employees in emotional intelligence, human resource departments give emotional intelligence tests to key personnel before hiring and schools have incorporated social and emotional learning or SEL into their curricula.

Emotional Intelligence is popularly known as EQ (emotion quotient), but is also referred to as soft skills, noncognitive skills, 21st-century skills, emotional literacy, emotional agility, and the like.

Additionally, various authors and researchers may include slightly different skills under the umbrella of EQ, depending on the field of study, etc. You may even recognize areas of overlap between EQ and character education, personality training, growth mindset, etc.

Over the years scientific research has continued into EQ regarding children and adolescents, both inside and outside the school setting with many scientists focusing their efforts on EQ's link to adolescent behavior and emotional health.

A plethora of scientific journal articles and research studies have indicated that, overall, higher levels of EQ equate to positive adolescent outcomes and lower levels of EQ equate to negative adolescent outcomes.

For example, a longitudinal study from 2010 examined the relationship between “emotional competence” and adolescent risk-taking behavior in a group of children, ages 9 through 16.

The results indicated a) lower levels of emotional awareness (being aware of your own emotions and being able to communicate them properly) and lower levels of emotional regulation (controlling and managing emotions) is highly correlated to a greater risk of “using hard drugs”, b) lower levels of emotional regulation is highly correlated to a greater number of sexual partners, and c) lower levels of emotional regulation and expression is highly correlated to “greater behavioral adjustment problems”. The authors of the study surmised, based on the findings, that risk-taking behavior during adolescence may be decreased by increasing emotional competence during childhood.(51)

Again, in 2010, a separate study investigated the relationship between emotional intelligence and mental health in high school students. Researchers specifically explored the areas of adolescent depression, social dysfunction, anxiety and somatic symptoms and found that lower levels of emotional intelligence were associated with these negative mental health issues.(52)

Similar studies have found associations between low levels of emotion regulation and involvement with the juvenile justice system(53), increased confrontational behavior(54), engagement in minor delinquent acts(55) and issues with anger, anxiety, depression, dissociation and posttraumatic stress.(56) The research leaves little doubt that children, adolescents, and adults fare much better in all areas of life if they have some higher level of emotional intelligence. To date, there are simply not enough schools incorporating SEL into their curriculum and not all those that do, are doing it well.

Our kids desperately need to develop these skills. And while every element of emotional intelligence is necessary for overall life success, it is imperative to the health, safety, and mental well-being of all adolescents to become more aware of and learn to regulate their emotions. These are the skills that will help our kids boost the power of their prefrontal cortex so it can jump in and take over from the amygdala and reward system.

Hey there!

I'm Ann Coleman and struggled parenting my son during his teen years. After turning things around, I continued studying the science of adolescence and of parenting adolescents. I made the switch from attorney to parent educator and podcaster to help you avoid the mistakes I made.

If you enjoyed this Guide, you may be interested in the Speaking of Teens PARENT CAMP to help you strengthen the relationship with your teen, decrease the conflict and improve their behavior. Check out the PARENT CAMP membership and learn about the course, the weekly meetups with me, the monthly expert Q & As with subject matter experts who cover everything from drug use to self-harm, and the community forum, weekly challenges, and more.

Ann Coleman



Speaking *of* Teens



the podcast can be found on any podcast app like Apple, Spotify, Amazon, etc. or on the website at SpeakingofTeens.com/podcast



End Notes

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