



Adolescent Development

Given that the children and youth participating in our YVP study ranged in ages from 11 to 18 years, we thought it would be helpful to include a brief discussion of adolescent changes as they may relate to peer relationships, including peer mistreatment. Notably, recent researchers have highlighted the importance of targeting *adolescence* as a central focus when developing and implementing prevention and intervention programs (Sawyer et al., 2012).

Connections. As described throughout, the *Youth Voice Project* book has highlighted the importance of connections; connections between caring adults and students, as well as connections between students and their peers. This next section will also highlight the importance of connections. However, these connections are in a different context -- connections within the brain. This is not intended to be an exhaustive review of adolescent brain development, but instead a launching pad to help us think about different ways in which we may be better able to support and scaffold adolescent brain development to optimize students' developmental outcomes. When we support brain development we promote students' positive peer experiences. It is our hope that this brief glimpse into adolescent brain development will provide you with a different perspective and empower you to work with adolescents in more effective ways. Most people acknowledge and understand the importance of *social connections* in predicting positive adolescent outcomes, but what about the significance of *neural connections* in predicting positive adolescent outcomes? We have known for years that the environment (e.g., our social relationships) influences how our brain grows. Said another way, *how* we interact with others (e.g., how we treat others in our social relationships) designs and routes our neural networks, which in turn drives our subsequent response patterns. What we may forget is that these *growing connections* in our brains are just as important as the growing connections in our social relationships.

We need to be intentional. As we think about this corollary described above, consider how we typically grow relationships with our children and youth. Are these relationships haphazard, or are we as educators and caring adults, mindful and intentional about directing the social influences in our children's lives? For example, don't we as caring adults and parents, try and 'control' who and what we expose our children to? Don't we want children and adolescents making friends with individuals who will influence them in a positive direction instead of a negative one? The point is that we are very intentional about our children and adolescent's social relationships. Just like intentionally growing positive, constructive *social* relationships, it is also important for us to be mindful and intentional about growing positive, constructive, *neural pathways*.

Let's begin our journey into the growing adolescent brain by describing a typical teenager.

If you are anything like most folks, you might picture a stubborn, impulsive, in-the-moment, self-absorbed individual. As we will see as we discuss some important developmental changes during adolescence, there may be some truth to that statement! However, adolescence is also a time for phenomenal growth and potential. Before we dive into the importance of adolescent brain development, let's take some time to explore the period of adolescence as a *context* for bullying prevention and intervention efforts.



Change. Adolescence is often described as a very difficult time period for teens *and* for those who care about them---and it is. The majority of us would agree that this time period is exceedingly challenging, even for our most well adjusted adolescents and their parents. And it should be difficult, given the amount of change that an adolescent experiences during this time period. Let's briefly highlight some of those changes in adolescents' biological, social-emotional and cognitive development.

First, adolescents are struggling to adapt to a whole bucket full of physical changes. Some of these changes are obvious and evident on the outside (e.g., weight gain and acne), while other changes are more subtle and less obvious (e.g., structural changes in the brain) as evidenced by adolescents' seemingly never-ending struggles with impulsivity and poor planning. Second, at the same time adolescents are faced with these physical 'growing pains,' they are also faced with the social task of fitting in -- fitting in to a place where they are often unsure of themselves. Third, adolescents are simultaneously urgently searching for their own unique identities. To complicate matters even more, adolescents are developing new ways of thinking. For example, adolescents are developing the ability to think abstractly, including the ability to 'think about their own thinking,' a process called metacognition. As a result of these cognitive changes, it is not uncommon for an adolescent to spend time (a **lot** of time...) analyzing his or her own (and others') motivations 'all in his/her head' without ever talking to anyone. Unfortunately, this kind of *unchecked* rumination often leads to blundering communication errors. For example, a teenage girl can be sitting in her math class thinking about why one of her friends didn't acknowledge her in the hallway this morning. As she continues to mull this over during the course of her math class, she is becoming more and more convinced that her 'friend' is talking behind her back and intentionally sabotaging her friendships. This kind of thinking grows and takes on a life of its own and is done without ever checking with her friend who supposedly didn't acknowledge her. By the end of math class, this teenage girl is both outraged and devastated. As a result, she has decided she will never speak to her friend again... no matter what! Although this example may sound extreme, for an adolescent, this kind of emotional roller coaster often describes his or her *daily* experiences.

Although they are growing in their ability to take others' perspectives, adolescents are also experiencing a heightened level of self-consciousness, while being simultaneously preoccupied with sweeping generalizations of others' behaviors. For example, it is not uncommon to hear an adolescent respond; "Everyone drinks," "Everyone has a boy/girlfriend" (except the adolescent of course), "Everyone is looking at me," and "No one likes me." Are these claims true? More than likely, they are not. It is our job to help adolescents guard against believing these generalizations and instead help them become '*fact finders.*' We can help adolescents learn to objectively evaluate their thoughts. A bumper sticker Stan saw in San Francisco expresses one lesson that we want teens to learn:



In sum, adolescents are experiencing significant biological, social-emotional and cognitive changes. These changes often propel students into a state of what Piaget termed, 'disequilibrium.' This is a mental state characterized by confusion, angst, and discomfort that often leads to change and growth. If we listen and look close enough, we can often see



adolescent disequilibrium in our school hallways between classes. We can sense it in our homes at our dinner tables and in our neighborhoods. It is true that this ‘imbalance’ is uncomfortable, not easy, and requires significant time to work through. But what we also need to remember is that it is only in this state of disequilibrium, that we actually *grow*. Let’s think about it for a moment. We tend *not* to grow when things are comfortable and easy for us. Let’s contrast this concept of disequilibrium with our current culture. We are currently living in a culture that promotes, markets, and commercializes comfort and immediate gratification rather than overcoming challenges, perseverance, patience and hard work—a message we have advocated throughout the *Youth Voice Project* by highlighting Carol Dweck’s work. It is our job as adults to help adolescents embrace this state of disequilibrium and grow them through this process. We need to help them see the importance of coping with difficult situations with flexibility, effort, persistence and patience, rather than helplessness, anxiety and depression.

This concept of disequilibrium is most often discussed when addressing cognitive development. But, we can also apply this concept of disequilibrium to adolescents’ *social relationships*. *What about adolescent friendships?* Do adolescents experience a state of disequilibrium when they are growing *socially*? For example, when they are learning how to manage their feelings and thoughts after a peer excludes them from the group? Similar to cognitive disequilibrium, social disequilibrium also takes work, patience and time; time to sort out our own as well as others’ feelings and thoughts related to what has happened. It takes time to restore friendships and begin to establish trust again after a crisis. However, instead of time and opportunities to practice difficult social skills, we are living in a culture where the majority of our teens’ social world is played out in cryptic code via screen technology. Young people live in a world where their ‘playgrounds’ and social circles typically include places like Facebook and cell phones; places that can be explored by the click of a button without any regard for nonverbal cues, tone of voice or tears. These are places where adolescents can ‘unfriend’ someone in seconds without any accountability or regard for possible restoration. In short, youth today, may have fewer opportunities to *practice* managing complex relationships, and subsequently, are less likely to develop the necessary social skills needed for maintaining positive relationships. For example, do adolescents today have the opportunity to work through their friendships when things become ‘unbalanced,’ (as all relationships do) or instead, are they socialized by the current culture to move on to the next friend, without ever having to practice gentle, respectful discourse? Think about how much time we spend teaching our children how to *make* friends, in comparison to how to *keep* friends. Doug Wilhelm’s great young adult novel, *True Shoes (2011)* is one among many books that illuminate the complexity of maintaining relationships in adolescence.

And it’s not just adolescent *friendships* that this concept of disequilibrium applies to; it also applies to the *adolescent-adult* relationship. How we as adults communicate with adolescents, particularly around issues related to conflict, play an important part in adolescent’s socialization. For example, what typically happens when you as an adult, become frustrated with an adolescent? Is it easier for you to just walk away or to give in? To react with the same volatile heightened emotions that were just modeled to you by the adolescent? It is just as important for us to us to practice and model gentle respectful discourse with our adolescents as it is for them to practice this with their friends.



What does the brain have to do with it? How does the brain relate to adolescent behavior?

Now that we have discussed some developmental influences, we will turn our attention to two specific areas in the brain that may significantly influence how adolescents interact with others during this volatile time -- the prefrontal cortex (PFC), which is the anterior part of the frontal lobe and the amygdala, which is part of the limbic system. We will start with our frontal lobes.

What do our frontal lobes do? Thanks to Phineas Gage (whose story we will tell shortly), we know that different parts of our brain have different functions, specifically; we know that our frontal lobes represent the ‘thinking’ part of our brains. Our frontal lobe lies directly behind our forehead and is responsible for helping us make ‘executive decisions.’ A small area of the frontal lobe is called the prefrontal cortex, affectionately referred to as the *PFC*. Although this region is relatively small, it is very powerful and is responsible for our ability to think about the future, weigh pros and cons of our decisions, plan ahead, and evaluate risks and rewards. The PFC also serves as a filter that helps to inhibit our impulses and keep our emotions under control (otherwise known as ‘self-control’). What’s interesting about this prefrontal cortex is that it matures later than any other brain region. In fact, the PFC is actually being built during adolescence—it is *under construction*. And like anything under construction (Charisse is currently having a bathroom remodeled), things are messy, the timetable is often later than expected, we are often disappointed (we pictured something else), we are not as patient as we thought we’d be, it’s more work for us than we anticipated, and perhaps most importantly, we had no idea we would be this seriously inconvenienced!

But there’s more...as with any major change, other things often times get ‘shifted’ as a result. Let’s go back to our bathroom remodel referred to above. As Charisse’s second floor bathroom was being ‘plumbed’ for a new shower, her kitchen ceiling started to crack and water started to leak through. Although the plumber was working in the upstairs bathroom on this major change, the downstairs kitchen was also changing. Similarly, relating to an adolescent experiencing major brain changes often influences other parts of our ‘house’ to change. For example, relationships with other adults and other children often times ‘shift’ as a result of interacting closely with an adolescent.

The truth is that adolescence *is* often messy, requires a lot of work, requires an immeasurable amount of patience, often does not meet our expectations (shouldn’t they act more grown up by now?) and typically ‘shifts’ our daily lives. To add perspective and help us appreciate just how ‘messy’ the adolescent brain is, researchers have documented that the frontal lobe undergoes *more transformation* during adolescence than any other time period (Sowell et al, 1999). Said another way, the adolescent brain should be ‘messy’ given the amount of change that is going on! Amidst all this change, let’s remember there is always potential – yes, the potential for challenges is ever present, but inside those challenges also lie the potential for greatness. No one will dispute the fact that *change is difficult*. But just because the PFC is immature and still developing, does not mean we cannot intentionally train the PFC in ways that optimize adolescent development and minimize peer mistreatment. In fact, when we *act* like an adolescent’s PFC (e.g., by helping him or her with organizing, planning and other executive functions), we may be opening up the opportunity to *grow* his/her PFC in positive, constructive ways. In other words, we as adults can serve as a type of scaffold for adolescent brain development by providing the structural supports they need to optimize their development.



What does the limbic system do? The amygdala, often described as the ‘emotional’ part of our brain, is an almond shaped structure that is housed within the limbic system. The limbic system is responsible for how we process social and emotional information as well as how we think about rewards, for example, “Should we go along with our friends and try an illegal drug?” “What’s the harm?” “Should we post (or comment on) a nasty remark on Facebook?” “Should we blog about how much we dislike someone?” Instead of accessing their PFC, which includes the all-important ‘filter,’ adolescents typically access their amygdala and subsequently, tend to make split second decisions based on how they are feeling at that particular moment in time. As is with all things in life, timing is important; in this case, we are referring to the timing of different regions in our brain. Studies have shown that brain structures do not grow and mature at the same rate. Researchers call this asynchronous development. For example, the filter that keeps our impulses in check (also known as our prefrontal cortex) develops later than our limbic system. As a result of the earlier development of the limbic system (Casey, Getz, & Galvan, 2008), adolescents’ emotional reactions tend to trump their logical, well-reasoned responses that are influenced by their prefrontal cortex (Steinberg, 2008). As we result, adolescents often find themselves struggling daily to hold their impulses at bay. You may be wondering, “When is the developmental difference between the PFC and the limbic system the largest?” During early adolescence! This may explain in part, early adolescents’ propensity for unpredictable emotional reactions and reckless risk-taking behaviors. Young adolescents are particularly vulnerable to reacting with explosive emotional outbursts and reward seeking behaviors instead of careful, logical decision-making (Blakemore, Burnett & Dahl, 2010; Casey et al., 2008). These outbursts can reek havoc in adolescents’ social relationships. In short, the developmental changes in the adolescent brain have significant implications for how young people behave and interact with others. So what can we do about this? Adolescence can clearly be a volatile time. Charisse was talking with an occupational therapist, Christine Linkie, about this very thing. Her advice was priceless; “We need to provide the *external* supports until adolescents can develop the *internal* controls.” We are just beginning to respond to these salient adolescent changes as culture. For example, Laurence Steinberg’s work at Temple University has demonstrated that adolescents are more affected by stressful situations in the *presence of other peers* (Steinberg, 2008). Our legislation responded to this developmental finding---we now have rules limiting the number of passengers that can accompany a young driver (Thor & Gabler, 2010). Knowing that adolescents struggle with developing their internal controls, it is our responsibility as caring adults to provide effective external supports.

Daniel Goleman talked about this very struggle in his book, *Emotional Intelligence: Why It Can Matter More Than IQ*, by describing the concept of an amygdala hijack. According to Goleman (1996), an amygdala hijack is a process whereby our immediate emotional reactions are so overwhelming that they override our frontal lobes. In other words, instead of our emotional reactions being checked or filtered by our prefrontal cortex, our emotional system blew a fuse and is now ‘working alone.’ We can think of the amygdala hijack as a ‘short cut.’ But like most short cuts in life, there are consequences; there is fallout; a price to be paid. In this case, the shortcut whereby the amygdala bypasses the frontal cortex, triggers an emotional reaction that is way out of proportion to the situation at hand. For example, picture a typical scene on the home front between a mother and her adolescent daughter. The mother is calmly reminding (without raising her voice) her teenage daughter, Katie, to put away her clothes. “Katie, please put away



your clothes.” The teenage daughter responds by yelling back with gusto, “Why are you always yelling at me!!!!!!” Do these words sound familiar?

Developmental changes in the brain set the stage for peer mistreatment. In essence, the overactive amygdala affects how teenagers control their *behavior* as well as how they control their *words*. Given the power of the amygdala during this developmental time period, it becomes very important to teach our adolescents to control their words. Let’s make it simple for our youth: Words can either build up or tear down people. Charisse has heard it said another way, our words either represent a construction site (building up) or a demolition site (tearing down). This challenging time of brain development makes it extraordinarily difficult for adolescents to control their tongue. However, this does NOT mean we excuse or rationalize their behavior. Instead we work hard to create opportunities to help the adolescent reroute their neural connections to promote positive, constructive social relationships. We know from years of research that the brain is plastic and that fact is very good news for anyone working with adolescents!

What do we do?

So, if research studies suggest that the adolescents’ prefrontal cortex is under construction, do we just give up trying to work with students during this challenging developmental time period? No, absolutely not! Instead of giving up, think of adolescence as a wonderful time period for affecting change --what an honor for us to be part of this exciting process of designing and engineering neural pathways! As Jay Geidd, a neuroscientist working at the National Institute of Mental Health (NIMH), so eloquently reminds us, this is a precious time for ‘brain sculpting.’ At the peak of puberty (which is approximately two years earlier for girls), our children are experiencing a significant growth spurt, not just in their leg lengths, but also in their brain connections. Thanks to advances in magnetic resonance imaging, researchers are now better able to understand the structural changes that are associated with the neurobiological changes in the brain. This next section will highlight three of the processes that account for the dramatic brain changes during adolescence.

What are the some of the *processes* that account for these adolescent brain changes?

The first process is technically called cell proliferation, also referred to by many scientists, as ‘blossoming.’ This term basically describes the overproduction of neurons and their connections during this time. This developmental growth spurt is similar to the growth spurt during infancy. For example, as the baby explores his or her environment, the neurons begin to communicate in different ways. Similarly, as the teenager explores his or her environment, the neurons also communicate with each other in different ways. Synapses start to develop, connecting certain neurons with each other. Jay Geidd has studied this blossoming process as the gray matter (the thinking part of the brain) of the brain starts to thicken throughout childhood. During this process the gray matter grows extra neurons and connections, peaking at about age 11.5 for girls and 14.5 for boys (Lenroot et al., 2007). This time of brain blossoming has been conceptualized as a time for great potential where children can learn to be skilled in so many different areas. Consistent with the timing of this brain spurt, it makes sense for educators to *intentionally* build in relationship skills during the elementary years (e.g., include specific curriculum around developing and maintaining constructive relationships). As educators and parents, we spend



significant time and resources during this time period, making sure our children are exposed to different kinds of athletic activities, musical instruments, and even foreign languages; yet, what about children's relationship skills? Who teaches children *how* to provide support to a peer when s/he has been hurt? How to forgive someone who has injured you? How to restore a relationship when you have mistreated someone?

Like learning new mathematical concepts, learning to build and restore relationships requires skills, time and practice. Children need to be trained (*or intentionally socialized*) how to treat one another; they need to understand how different forms of mistreatment (e.g., covert and overt) may lead to hurtful outcomes. Children need to learn and practice what they can do when they see or hear about someone being mistreated. Specifically, what kinds of support help to make things better for someone who has been mistreated, instead of making things worse? What can children do to support someone who has been mistreated by a peer? Which types of behaviors and attitudes endorse aggressive behavior? What motivates children to mistreat others? Is it ever okay to spread rumors about someone, to exclude someone or to build alliances to hurt someone? Children need to be trained in methods to restore broken relationships, how to apologize; how to *show* someone you are sorry and not just how to *say* you are sorry. Youth need to know when and how to leave abusive relationships without making things worse or adding additional harm. We assume that our kids get these skills along the way, and they might—and they might not.

If we think these relationship skills are important to the health and subsequent adjustment of our children, then shouldn't we be allocating the appropriate resources to intentionally teach them during this developmental time period when their brains are ready, open and prepared to learn new things? In sum, it is during this 'building up' phase that children should be exposed to the important *relational* skills they will need to navigate increasingly complex interactions with their peers in the upcoming years.

The second process that accounts for adolescent brain changes is called 'pruning.' According to Dr. Geidd, this process follows the 'use it or lose it' principle. That is, those neurons and connections that are often used will grow and thrive, whereas those that are seldom used will eventually fade away and die. It is during this pruning process where the adolescent brain becomes fine-tuned. What is most interesting, as well as empowering about this process, is that this fine-tuning is determined by adolescent *experiences*—both constructive and destructive experiences. Brain researchers often use the analogy of a potter sculpting clay. For the project to be complete, the potter must *wipe away* the extra clay. Similarly, during the teenage years, the adolescent neurons that are not used are 'wiped away.' Interestingly, adolescent experiences can either promote positive, constructive roadways or negative, destructive roadways. The difference between how these roadways or neural pathways look hinges upon the adolescents' experiences...again, what magnificent potential exists during this time!

In sum, the brain has an amazing capacity to grow and change through experience. As educators and caring adults, we can intentionally structure our students' experiences in such a way as to promote positive prosocial behavior and reduce at-risk behavior. These experiences play a pivotal role in carving out adolescents' neuronal pathways, eventually giving way (via a process called myelination) to more efficient roadways (otherwise known as automated responses).



The third process we will discuss that influences adolescents' brain development is the process of myelination. Although students' gray matter is being 'pruned' during adolescence, their brain's white matter is actually growing. This white color describes the fatty tissue that insulates or coats the axons that transmits signals to other neurons. White matter is composed of millions of nerve fibers that connect neurons in different parts of the brain to form 'networks.' Like gray matter (the thinking part of the brain), research also suggests that the brain's white matter changes with experience (Fields, 2010). Once again, emphasizing the importance of adolescents' specific experiences in maximizing brain development. As a result of the myelination process, axons become more efficient and better able to transmit messages. When this happens, our response patterns become more automated. This is generally seen as a good thing, and it usually is. However, this can also be a mixed blessing. Research shows that once axons are myelinated, they lose flexibility. In other words, this is when learning becomes more 'hard-wired.' Subsequently, the most significant changes in the brain's white matter are in those places that have *not* yet been myelinated (Fields, 2010). Let's use a concrete example to help understand this process.

Imagine the axons in your brain are pipe cleaners. They bend each way, connect with others, and reconnect with others over and over again making possible many different pathways. However, over time, through experiences and practice, your axons become myelinated. This process of myelination coats or insulates the pipe cleaners with plastic straws. Although those myelinated axons are now more efficient and are guarded against interference, they also *restrict* the development of *new* 'pathways' (plastic straws don't bend as easily as the original pipe cleaners once did). A teenager's frontal lobe is among the *last* to be myelinated. The timing of this can be either a liability or an asset, depending upon which connections have been 'hard wired' in. For example, what if an adolescent has become habitually sarcastic, mean spirited and caustic when interacting with others? If this response pattern is not interrupted and instead, becomes myelinated, it will be much more difficult for the adolescent to rewire new pathways of responding once the white matter is in place. Similarly, our beliefs can also be "hard-wired" in. That is an important point to make because many studies have shown that adolescents' beliefs about peer mistreatment actually predict how they treat others (e.g., Nixon & Werner, 2010). Think about those adolescents who have repeatedly been targets of peer victimization. If they are not careful, those self-defeating beliefs and hostile attributions may become hard wired in their brains and subsequently lead to feelings of defeat and learned helplessness. What we know as researchers and educators is that beliefs need to be continually challenged. For example, is it ever okay to do *nothing* when you see a group of friends leaving someone out? Our job as caring adults is to help students understand that they do in fact, have control over their thought patterns.

What strategies can adolescents use to promote the PFC?

In sum, the *potential* for changing neural pathways among adolescent brains is considerable. What this means is that the window of sensitivity to optimize brain development is wide open during childhood (building up phase) and adolescence (pruning down phase). What an opportunity for us as educators! An important point to keep in mind is that science suggests that this window won't *always* be that wide open. Sure, the brain *is* plastic and we can change, but working with wet clay (childhood and adolescence) is much easier than working with dry clay (adulthood). In other words, it's much easier to 'wipe away' wet clay, than it is to 'chip away'



dry clay. After a piece of pottery has been fired in a kiln, changing it is much more difficult. The implications of these developmental brain changes for bullying prevention and intervention work are far reaching. Adolescents benefit greatly when we actively work with them to change their destructive cognitive and behavioral patterns and to help them learn prosocial, inclusive, and caring ways to relate to others. Never again will the window of brain development be this wide open for our adolescents. Let us take advantage of this and use this time to optimize their development.

Strategies to promote positive adolescent behavior

As we begin to think about ways to optimize adolescents' development, it is worth noting that it is important for adolescents to actually *act* on the change, not just talk about or read about it. Learning how to relate to others in a positive, supportive way is not an automatic process. As such, it requires directed effort. Imagine, as a parallel, that sports were taught and coached without providing students with practice opportunities-- or that math students only saw the teacher solving math problems, but did not actually practice solving math problems themselves? That there was no feedback? We wouldn't think of it! Similarly, just like with athletics and academics, we need to provide students with meaningful opportunities to *practice* constructive, social relationships; for example, supporting others who have been mistreated, to *practice* restoring relationships after trust has been broken. Regular opportunities for practice help adolescents 'wire in' constructive responses to peer mistreatment as well as more positive ways to interact with others. Practice strengthens our neural pathways, making them more resistant to change. For example, we can invite students to role-play typical social situations in small groups. As they are role-playing, have students first *act out* what the amygdala might look like when involved in peer mistreatment. Challenge them to role-play an overactive amygdala from all three perspectives—the bystander, the aggressor, and the target). Then, challenge students to act out how their frontal lobes can respond (instead of react) to peer mistreatment. Note the differences. Which response is more helpful and why? Ask students what they may need to promote their prefrontal cortex. Ask adolescents how they might access those needs. This is also a good place to talk about the value of boundary setting. Is there a way to structure the environment (e.g., classroom, home) to help adolescents gain control over their amygdalas and promote the use of their PFCs? What strategies can adolescents use to promote the PFC? Invite your students to be part of this important discussion. One of our favorite adages is not “practice makes perfect,” but instead, “practice makes *permanent*.” An important question to consider is, “what kinds of relationship skills are our adolescents currently practicing?”

Let's close this section with some practical tips.

Educate. Let adolescents know they are likely to be exploited by their own brains. We can help youth see that their amygdalas are likely to make mistakes when trying to interpret others' feelings and motivations. That it will require intentional effort on their behalf to gain access to their PFC.—it takes time and practice. If adolescents are not aware of these tendencies, they are more likely to react to events in damaging ways.

Train. Train the PFC. Although the PFC is still developing, research suggests that experience molds and shapes the connections in the brain. Findings suggest that the brain is plastic and is



influenced by experience. Empower adolescents to take control of their thought life and challenge their emotional reactions. Empower adolescents to train their PFC to override their emotional gut level reactions.

Be aware of the overactive amygdala. Teach constructive ways for adolescents to manage their emotions, particularly their negative emotions. Although both positive and negative emotions are vulnerable to this intensity, the consequences are typically much larger for the expression of intense negative emotions than they are for the expression of intense positive emotions.

Let students know that designing new neural pathways takes EFFORT – Like learning anything new, changing our behaviors and thought patterns require intentional effort. It is frustrating, it takes time and it may not feel ‘natural.’ However, over time, if we keep practicing, our neural pathways will eventually become automated.

Train adolescents to promote positive self-talk to help refocus their thinking. For example, when an adolescent is mistreated and is not responsible for contributing to that mistreatment, it is important to remind him/her that “it is not his/her fault.” This cognitive strategy, which is highlighted later in the book, may help adolescents bypass their automated emotional response generated by their amygdalas.

The time is now. Educate adolescents around the window of sensitivity. Let adolescents know how sensitive their brains are to experience – both negative and positive! Once connections become myelinated, they lose their flexibility. Caution adolescents to be careful which connections they choose (either consciously or subconsciously) to hardwire in (through the process of myelination), and which become eliminated (through the process of pruning).

Be intentional and provide opportunities for adolescents to PRACTICE constructive pathways in their frontal lobes. Empower adolescents to grow their own positive, constructive neural connections. Remind them that this process requires effort and time.

The importance of experience

Finally and most importantly, there is evidence to suggest that our brains, particularly adolescent brains, are plastic, malleable, and changeable. These findings suggest that there is lots of room for growth and potential! That instead of throwing our hands up and blaming the adolescents’ overactive amygdala, we can actually spend time to train and promote the prefrontal cortex—specifically, to train and promote intentional *constructive* neural pathways. In sum, through the process of brain plasticity, we are able to assist in ‘rewiring’ adolescents’ brains in such a way as to optimize their relationships with others.



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