SESSION 2

The Brilliant Resilient Brain

Objectives

1. Participants will be able to explain the function of the prefrontal cortex specific to how it affects adolescent decision making.
2. Participants will be able to explain the function of the amygdala specific to how it affects adolescent decision making.
3. Participants will be able to recognize that they can be trusted to make safe and healthy decisions.
4. Participants will be able to demonstrate how natural patterns of brain development affect adolescent decision making.

Key Questions

1. The adolescent brain is naturally drawn to taking risks. Based on what you just learned about the adolescent brain, why do you think that is?
2. How might the way the prefrontal cortex and amygdala function during adolescence impact the way adolescents make decisions?
3. In what types of situations are adolescents more likely to take an unhealthy or dangerous risk (as opposed to deciding not to take an unhealthy or dangerous risk)?
4. Sometimes adults don't trust adolescents to make good decisions. What would you tell an adult about the adolescent brain, or about yourself, that would convince him or her that adolescents really can be trusted to make safe and healthy decisions?

Takeaway

The adolescent brain is wired to take risks. This is important for moving toward independence, but not all risks are worth taking. The key to staying safe and healthy is to find opportunities to take healthy risks and to avoid taking unhealthy risks. Because the adolescent brain values "fitting in" more than other rewards, young people are much more likely to take dangerous or unhealthy risks when they are with their peers—and adolescents spend more time with their peers than any other age group. By knowing how the adolescent brain functions and paying attention to outside influences on their decisions, adolescents can avoid dangerous risks and choose opportunities for taking healthy risks.

Vocabulary

Adolescent/Adolescence
Amygdala
Brain plasticity
Brain stem
Cerebellum
Consequence
Fight-or-flight response
Gut instinct
Healthy risk
Hippocampus
Hormones (chemical messenger)
Limbic System
Long-term consequences
Pituitary gland
Prefrontal cortex
Unhealthy risk

The Great Brain Workout (Whole group, 5 minutes)

Purpose: Build connectedness among participants with a medium-risk activity that encourages cross-lateral movement.

Materials: None

Do

Finger Walk

1. Participants place the tip of the index finger of the left hand on the tip of the thumb on the right hand.
2. While keeping those two fingers together, rotate the hands so that the tip of the index finger on the right hand touches the tip of the thumb on the left hand above the two fingers that are already connected.
3. Continue to "walk" the fingers up so that the index finger and thumb that are on top rotate (this will look like a hand movement from The Itsy Bitsy Spider).
4. Encourage participants to continue moving their hands like this for a full minute, getting faster and faster, or challenge participants to continue the activity with their eyes closed until time is up.

Best Practice

Encourage participants to laugh with each other, but note that it is never okay to laugh at another participant.

Exaggerate and be prepared to act silly when showing participants how to do the Finger Walk the first time.

Ask

What was easy/difficult about this activity?

What would have made it easier/even more difficult?

Say

Any action that gives your brain a "workout" by requiring you to use both sides of your body at the same time in different ways forces the two sides of your brain to communicate and makes your brain stronger.

Adolescence is a time of development—physically, emotionally, and mentally—and it is equally important to exercise your brain and your body.

In today's session, we are going to be learning all about the adolescent brain—how the adolescent brain functions and how that can impact learning, risk taking, and decision making during this time in your life.

In the next activity, we will discover some information about how the adolescent brain functions.

Wacky Facts Writeabout (Whole group, 15–20 minutes)

Purpose: Increase competence regarding explaining adolescent brain functioning and how it influences learning, risk taking, and decision making.

Materials: One marker for each participant, Posters hung around the room with the Wacky Facts Writeabout Statements from the Wacky Facts Writeabout Instructor Cheat Sheet written at the top with the word(s) in all capital letters covered up with an additional sheet of paper

Do

1. Provide each participant with one marker and allow 5 to 7 minutes for participants to walk around the room reading the Wacky Facts Writeabout Statements and writing one word they believe completes the sentence on the poster.

   Example: The _____ is the most powerful sexual organ in the body.

2. After 5 to 7 minutes, invite all participants to return to their seats. Review the answers that participants wrote on the posters, and then uncover the correct answers and review the information on the Wacky Facts Writeabout Instructor Cheat Sheet.

Best Practice:

Encourage participants to take an intellectual risk by guessing what the answer is and writing it down, even if they are not sure it is correct.

Make a rule that each participant must write one word on at least half of the posters hung around the room.

Draw a large rectangle at the bottom of each poster and ask participants to write their suggested words inside the box.

Ask

Which fact(s) about the brain did you already know?

Which fact(s) about the brain did you not know before?

Were any facts about the brain surprising or funny? Which ones?

Which fact(s) about the brain is/are the most important for adolescents to know? Why do you think that/those fact(s) is/are the most important?

The adolescent brain is naturally drawn to taking risks. Based on what you just learned about the adolescent brain, why do you think that is?

How might the way the prefrontal cortex and the amygdala function during adolescence impact the way adolescents make decisions?

In what types of situations are adolescents more likely to take an unhealthy or dangerous risk (as opposed to deciding not to take an unhealthy or dangerous risk)?

Say

Adolescence is a time of significant brain development, and the way the brain is developing impacts the way adolescents approach risk taking.

Taking risks is a key element of adolescence and is important for moving down the path toward independence, but some risks are healthy and some are unhealthy or dangerous.

The key to staying safe and healthy during adolescence is to find opportunities to take healthy risks and to avoid taking unhealthy risks.

In the next activity, we will explore more about what is happening inside the adolescent brain when you are faced with a decision about taking a risk.

Extension Activity:

Each participant uses the information he or she learned from this activity to create a Wacky Facts Writeabout Worksheet to take home and give to an interested adult.

Notes

Wacky Facts Writeabout

INSTRUCTOR CHEAT SHEET

1. The BRAIN is the most powerful sexual organ in the body.

The skin is the largest sexual organ in the body, but the brain is the most powerful. All feelings of romance and arousal begin in the brain (the pupils even dilate when the brain recognizes something it is attracted to). Though these feelings cannot be controlled, individuals can decide if or when they want to act on them.

2. Adolescents often OVERESTIMATE the risk of negative consequences.

In one study, adolescents estimated that an adolescent girl who was sexually active had a 60% chance of contracting HIV. In reality the risk of contracting HIV is miniscule for most Americans. Adolescents often follow through with risky behaviors not because they cannot estimate the negative risk involved but because social acceptance weighs more heavily than the potential for loss or harm.

3. Adolescents make decisions by WEIGHING PROS AND CONS.

Weighing pros and cons slows down adolescent decision making. Because adolescents often give more weight to the "pro" of social acceptance than to any of the possible "cons" of negative consequences, this can lead to taking unhealthy or dangerous risks. Adults are more likely to make decisions based on gut instinct: the feeling of butterflies in the stomach, increased body temperature, or feelings of anxiety produced by the brain stem and autonomic nervous system in reaction to sensing danger.

4. Adolescents take MORE time to make decisions about extremely risky behaviors than adults.

Evidence suggests that adolescents use the rational, thinking part of the brain (weighing pros and cons) to make decisions about extremely risky behaviors like playing Russian Roulette. Because adolescents often give more weight to the "pro" of social acceptance than to any of the possible "cons" of negative consequences, this leads to an increased likelihood of taking extreme risks. Adults are more likely to make decisions about extreme risk in a split second based on gut instinct and the fight-or-flight reflex.

5. The adolescent brain values SOCIAL ACCEPTANCE over other types of rewards like winning, food, or money.

When the brain recognizes a "reward," it secretes a chemical messenger called dopamine that makes a person feel good. When the brain secretes dopamine in reaction to a specific "rewarding" behavior, it makes the brain want to seek out that same behavior again to experience the same good feelings. The adolescent brain secretes more dopamine in reaction to experiencing social acceptance than it does in reaction to other common rewards like food, money, or winning a game. This is why adolescents are much more likely to take dangerous risks in groups than when they are by themselves.

6. The part of the brain called the prefrontal cortex is not fully developed during adolescence. The prefrontal cortex is responsible for LONG-TERM PLANNING.

The prefrontal cortex is often thought of as the part of the brain responsible for the "sober second thought." It is responsible for planning, organizing, and understanding long-term consequences. This part of the brain will not be fully developed until around 25 years of age; it often gets "overshadowed" by the highly developed limbic system (amygdala and hippocampus) that is responsible for sensing pleasure and rewards.

7. The part of the brain called the amygdala is fully developed during adolescence. The amygdala is responsible for recognizing PLEASURE AND REWARDS.

Adolescent decision making is highly driven by the amygdala, which explains much of the risk-taking behavior and poor decision making that is common during adolescence. With guidance, adolescents can seek out and take advantage of opportunities for taking healthy risks. Healthy risks allow young people to experience the same sense of vulnerability and potential for loss or failure—without the potential for harm or negative, lifelong consequences.

Wacky Facts Writeabout

INSTRUCTOR CHEAT SHEET (continued)

8. Dopamine is a chemical messenger that plays a major role in reward-seeking behavior. The adolescent brain produces MORE dopamine than the adult brain.

Dopamine is the chemical messenger secreted by the brain in response to something that feels rewarding. Rewards come in many forms, for example: winning a game, unexpectedly running into a friend on the street, food, or social acceptance (and as we get older, our brains also begin to view sex as a reward). Each secretion of dopamine is like a reminder to seek out that good-feeling behavior again.

9. Oxytocin is a bonding hormone. The adolescent brain produces MORE oxytocin than the adult brain.

Oxytocin is released in large amount during and after childbirth, when a woman is breastfeeding, and during the early stages of new romantic relationships. It has even been reported that people who claim to be "falling in love" have higher levels of oxytocin in their blood. Oxytocin is also involved in social bonding, the formation of trust between people and in reducing feelings of fear.

10. The brain stem is fully developed during adolescence. The brain stem is responsible for basic SURVIVAL and plays a role in the fight-or-flight response.

The majority of the functions controlled by the autonomic nervous system (which includes the medulla oblongata and the lower brain stem) are involuntary: regulating the cycle of hunger and digestion, sex drive, heart rate, respiration, and the "flight-or-fight" response. When the brain senses danger, it sends out signals to put up a fight or to take flight (run away). This system is very sensitive to unhealthy risk taking and sends out alerts. These alerts create the feeling of butterflies in the stomach or what some people call having a "gut instinct." You may notice an increased sweat response. Encouraging young people to rely on their gut instincts to make decisions, rather than relying on step-by-step decision making models, increases the likelihood they will make safer decisions "in the moment."

11. The adolescent brain is attracted to NEW experiences.

The reason for this is most likely related to the increased amount of dopamine that is secreted in reaction to the reward of a positive prediction error in the adolescent brain. A positive prediction error occurs when the result of a behavior exceeds one's expectations for what will happen. Adolescents simply have fewer life experiences to draw on, and therefore they are more likely to experience positive prediction errors. When they do, they experience a surge of dopamine in response, which results in the adolescent being motivated to seek out other novel experiences.

12. Compared to adults, adolescents have a more difficult time INTERRUPTING a behavior already underway.

This phenomenon is true for behaviors that the adolescent is personally involved in. It is not difficult for an adolescent to interrupt a behavior or activity that someone else (like a teacher or a parent) is in the middle of. Difficulty in interrupting behaviors already underway is the reason that many adolescents get caught up in the "moment" and feel like things just "happened," even when they did not plan for something to happen. To work around this, it is good practice for adolescents to make a plan in advance when they are going to be in an environment—especially one in which they are surrounded by peers—where things can get out of control (e.g., going to a party or being alone in a bedroom with a sexual partner).

13. During adolescence, the synapses (nerve cells) that are used are STRENGTHENED, and the synapses that are not used are pruned away.

This is commonly referred to as the "use it or lose it" principle. The cells (neurons) and connections (synapses) that are used during adolescence will grow and get stronger (use it!), and the ones that are not used will wither and die (lose it!). The way adolescents spend their time literally shapes the synapses and connections in their brains. If an adolescent spends his or her time exercising, playing an instrument, or learning a new language, those are the connections that get stronger. But, if an adolescent spends time playing video games and watching TV, those connections with thrive. For this reason, adolescents should be encouraged to "use" their brains wisely.

Formal Fishbowl (Whole group, 10–15 minutes)

Purpose: Increase competence regarding making healthy decisions and avoiding unhealthy risks during adolescence.

Materials: Formal Fishbowl Character Cards, Blindfolds (optional)

Do

1. Participants stand in a circle, facing in. These participants are the "fishbowl." Ask for two or three participant volunteers to stand (blindfolded) in the middle of the circle. These participants are the "fish."
2. Provide Formal Fishbowl Character Cards to the "fishbowl" participants and allow 1 minute for them to read their cards and ask any clarifying questions about what their "character" should do.
3. After all questions have been addressed, read the Formal Fishbowl scenario below out loud to the group, and explain that the participant volunteers in the middle of the circle ("the fish") will need to make a decision about what they would do if they were in that situation in real life. Then, indicate that the participants with Formal Fishbowl Character Cards ("the fishbowl") should begin saying what is on their card, repeating it over and over. Allow this to go on for 1 minute.
4. After 1 minute, ask the participants in the middle of the circle ("the fish") to take off their blindfolds and share their decisions with the group.

Best Practice:

Be mindful of which participants are getting which Formal Fishbowl Character Cards. If you have a large group, make more than one copy of the Formal Fishbowl Character Cards; more than one participant can have the same card.

Formal Fishbowl Scenario:

Someone your age has asked you to send him or her a "sexy" photo of your body. You are deciding whether or not to do it.

Ask the "fish":

What are some of the things you heard people in the fishbowl saying? Who was loudest? Who could you barely hear? Who could you not hear at all?

Was it difficult to make a decision about what to do? If yes, what made it difficult? What could have made it easier to make a decision in this situation?

Do you think you might make a different decision if you were experiencing this in real life instead of during this activity? Why do you think that?

Ask the "fishbowl":

You were each told to speak in a certain type of way. Why do you think your card told you to speak that way?

Ask everyone:

Sometimes adults don't trust adolescents to make good decisions. What would you tell an adult about the adolescent brain, or about yourself, that would convince him or her that adolescents really can be trusted to make safe and healthy decisions?

Say

This activity was intended to simulate what is going on inside the adolescent brain each time you have to make a decision about taking a risk.

Because the adolescent brain values "fitting in" more so than other rewards, you are much more likely to take dangerous or unhealthy risks when you are with your peers.

Adolescents spend more time with their peers than any other group of people (e.g., younger children, adults, family).

In the next activity, we will continue to practice making decisions about taking risks to build up our confidence to make safe, healthy decisions even when we are with our peers.

Notes

Formal Fishbowl Character Cards

INSTRUCTOR CHEAT SHEET

Formal Fishbowl Scenario: Someone your age has asked you to send him or her a "sexy" photo of your body. You are deciding whether or not to do it.

Prefrontal cortex

Remember, you are the part of the brain responsible for long-term planning. You will not be fully developed until around age 25.

You must speak softly.

Say: You might want to be careful. Those pictures could get out. You could get in trouble.

Amygdala

Remember, you are the part of the brain responsible for recognizing rewards. You are fully developed during adolescence, and you value social acceptance more than anything else.

You must speak loudly.

Say: Do it! If you do it, the other person will like you more! Do it! Send it!

Brain stem

Remember, you are the part of the brain responsible for recognizing danger and the fight-or-flight reflex. You are fully developed during adolescence, but you are easy to ignore.

You must speak at a medium volume.

Say: Uh oh! Uh oh! Uh oh! Danger! Danger! Danger!

Dopamine

Remember, you are the chemical messenger that is secreted by the brain in response to something that feels rewarding, and you are not easy to ignore.

You must speak loudly.

Say: You'll never know how you'll feel about it unless you do it! Do it! Do it!

Oxytocin

Remember, you are the chemical messenger involved in social bonding, the formation of trust between people, and the reduction of feelings of fear. You are not easy to ignore!

You must speak loudly.

Say: Have no fear! This could be the beginning of true love!

Social acceptance

Remember, the adolescent brain values social acceptance and fitting in over any other reward like food, money, or sex.

You must speak very loudly.

Say: Everybody's doing it! You should do it too!

Weighing the pros and cons

Remember, adolescents use the "rational thought" part of their brain to make decisions about extreme risk. This means that adolescents take longer to make decisions regarding risk than adults do, because adults rely more on their gut instincts.

You must speak slowly.

Say: This could turn out bad. Then again, it could be fine.

Overestimating risk

Remember, adolescents overestimate the negative consequences involved in taking dangerous risks. But, hesitation regarding taking unhealthy risks can easily be overwhelmed by the desire to experience social acceptance and fitting in with peers.

You must speak quickly.

Say: Embarrassment! Trouble! Regret! Guilt! Rejection!

Supportive friend

Remember, adolescents are heavily influenced by their peers. Having supportive friends who have your best interests in mind can help you stay away from unhealthy or dangerous risks.

You must speak at medium volume in a nice voice.

Say: *I don't think this is a great idea.*

Bully

Remember, adolescents are heavily influenced by their peers, but not all of your peers have your best interests in mind.

You must speak loudly and in a mean voice.

Say: How much longer do you want to be a loser?

Trusted adult

Remember, a trusted adult is someone you can go to when you need guidance. Even though adolescents are sometimes more influenced by their peers, talking to a trusted adult can help you avoid unhealthy or dangerous risks.

You must speak at medium volume in a nice voice.

Say: I worry about you, and I want to keep you safe. Please don't do it.

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You must speak softly.

SAY: You might want to be careful. Those pictures could get out. You could get in trouble.

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FOR: Formal Fishbowl

WHAT: Formal Fishbowl Character Cards

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Bully

Remember, adolescents are heavily influenced by their peers, but not all of your peers have your best interests in mind.

You must speak loudly and in a mean voice.

SAY: How much longer do you want to be a loser?

FOR: Formal Fishbowl

WHAT: Formal Fishbowl Character Cards

Freestyle Fishbowl (Whole group, 15–20 minutes)

Purpose: Build confidence to make safe, healthy decisions as an adolescent.

Materials: Space at the front of the room to record answers

Do

1. Facilitate a 2- to 3-minute brainstorm of the types of situations in which adolescents would be faced with opportunities to take an unhealthy or dangerous risk (e.g., drinking alcohol or using drugs at a party, meeting someone you've only known online in person) and record the answers at the front of the room.
2. Facilitate a 2- to 3-minute brainstorm of what adolescents can do to help themselves avoid taking unhealthy risks in those situations (talk to a trusted adult, remind yourself of the risks involved that are actually more important than "fitting in"), and record the answers at the front of the room.
3. With all participants sitting in the "fishbowl" choose one situation from the list at the front of the room. Facilitate a discussion with the whole group using the following prompts:

- How might each of the Formal Fishbowl Characters influence someone your age who is trying to make a decision in this scenario?
- What strategies could you use to help you avoid taking an unhealthy or dangerous risk in this situation?
- Can you find an opportunity to take a healthy risk in this situation?

Best Practice:

Post a list of the Formal Fishbowl Characters at the front of the room for reference during this activity.

Ask

On the count of three: everyone say out loud how confident you feel, on a scale from 1 to 5 (1 being not at all confident and 5 being completely confident) about making safe, healthy decisions.

Say

It is natural, normal, and healthy to want to take risks during adolescence, but not all risks are worth taking.

There are a variety of things that influence our decisions: chemicals in our brains, what our friends do and say, what people around us do and say, our parents and other trusted adults, religion and culture, and our personal values. Making safe, healthy decisions means you might have to learn to listen to some of these and tune out others.

Fascinating Facts:

THE BRILLIANT RESILIENT BRAIN

The human brain goes through a period of dramatic development during adolescence. The human brain stops growing in size at age 18, but it does not stop making new connections or building new memories.

The adolescent human brain relies more on "reward seeking" than "thinking" to make decisions.

The way the brain changes during adolescence influences changes in the sleep cycle that contribute to the tendency of many adolescents to want to stay up late. Sleep deprivation in adolescents can lead to increased irritability, depression, and impulsivity.

The adolescent brain is wired to take risks. Like taking unhealthy risks, taking healthy risks involves pushing boundaries, potentially experiencing failure, and experiencing the same kind of social, emotional, and/or physical vulnerability. Healthy risks, however, can increase self-esteem and aid self-discovery.

Making mistakes is a key part of learning. When we make mistakes, we train our brains to remember the mistake we made and to try a different strategy the next time we are in the same situation. The brain keeps track of the mistakes that have been made until it gets something right. Being willing to risk being wrong helps you "stretch" your brain and learn new skills much faster than if you never take a risk at being wrong.

DID YOU KNOW?

- An adult human brain weighs about 3 pounds.
- Your skin weighs about twice as much as your brain.
- The human brain is made up of about 75% water.
- There are no pain receptors in the human brain.
- There are about 100,000 miles of blood vessels in the human brain.
- The human brain is at least 60% fat, making it the fattest organ in the human body.
- The human brain uses 20% of the total oxygen in your body.
- Your brain uses about 20% of the blood circulating in your body.
- The first area of the brain to develop in a growing fetus is the brain stem.
- Anomia is the term for when you can almost remember a word, but it just won't quite come to you.
- Humans are believed to experience about 70,000 thoughts each day.
- It is believed that yawning sends more oxygen to the brain to cool it down and wake it up.
- The right side of the brain controls the left side of the body, and the left side of the brain controls the right side of the body.

The Brilliant Resilient Brain Resources

American Brain Tumor Association. (2013). Headaches. Retrieved from http://www.abta.org/understanding-brain-tumors/symptoms/headaches.html

"Brain." UXL Encyclopedia of Science. 2002. Retrieved from http://www.encyclopedia.com/topic/brain.aspx

BrainFacts.org. (2012, March). Yawning. Retrieved from http://www.brainfacts.org/sensing-thinking-behaving/sleep/articles/2012/yawning/

Eshel, N., Nelson, E., & Blair, J. (2007). Neural substrates of choice selection in adolescents and adults: development of the ventrolateral prefrontal and anterior cingulate cortices. Neuropsychologia, 45(6), 1270-1279. Retrieved from http://www.nimh.nih.gov/news/science-news/2007/adolescent-brains-show-lower-activity-in-areas-that-control-risky-choices.shtml

Hampstead, B., Sathian, K., & Stringer, A. (2012). Mnemonic strategy training improves memory for object location associations in both healthy elderly and patients with amnestic mild cognitive impairment: a randomized, single-blind study.Neuropsychology, 26(3), Retrieved from http://www.ncbi.nlm.nih.gov/pmc/articles/PMC3348454/

Miller, G. (2010, May). How Our Brains Make Memories. Smithsonian, Retrieved from http://www.smithsonianmag.com/science-nature/How-Our-Brains-Make-Memories.html?c=y&page=2

Papagno, C., & Capitani, E. (1998). Proper name anomia: a case with sparing of the first-letter knowledge. Neuropsychologia, 36(7), 669-79. Retrieved from http://www.ncbi.nlm.nih.gov/pubmed/9723938

Spinks, S. (2002). Adolescent brains are works in progress. Frontline, Retrieved from http://www.pbs.org/wgbh/pages/frontline/shows/teenbrain/work/adolescent.html

The DBS Foundation. (2013). Psychology of the Brain. Retrieved from http://www.dbsfoundation.org.za/index.php/the-neuron/fun-brain-facts/psychology-of-the-brain

The Franklin Institute. (2004). Nourish Fats. Retrieved from http://www.fi.edu/learn/brain/fats.html

The Gabriel Lab at MIT. (n.d.). Kids Corner-Brain Gear. Retrieved from http://gablab.mit.edu/index.php/14-sample-data-articles/149

The USGS Water Science School. (n.d.). The water in you. Retrieved from http://ga.water.usgs.gov/edu/propertyyou.html