

#### **GRAY MATTER MATTERS** A helpful glimpse at the science behind the change and the beauty of the adolescent brain.

# The capacity of a person to learn will never be greater than during adolescence.



### "In many ways, it's the most tumultuous time of brain development since coming out of the womb,"

Neuroscientist, Dr. Jay Giedd



"Having a scientific perspective on the biological challenges of adolescence will help you interact more objectively with your child, maintain your cool, and offer guidance that can improve his or her life."

DR. DAVID WALSH, FROM "WHY DO THEY ACT THAT WAY: A SURVIVAL GUIDE TO THE ADOLESCENT BRAIN FOR YOU AND YOUR TEEN" (P.12).

#### WHY IS MY CHILD ACTING LIKE AN ALIEN?



#### SEVERAL POSSIBILITIES

- abducted by a UFO and aliens are actually dwelling inside your once precious child
- an unfortunate genetic mutation caused by the local drinking water
- hallucinations
- government experiment...OR

•Your child is going through a period of rapid construction and this is causing a major change in their brain chemistry!

#### ADOLESCENCT METAPHOR:

• Teens are like unskilled drivers trying to maneuver a car that has just been turbocharged by puberty. *Dr. Ron Dahl* 



BASED ON THE STAGE OF THEIR BRAIN DEVELOPMENT ADOLESCENTS ARE MORE LIKELY TO:

- Act on impulse
- Misread or misinterpret social cues and emotions
- Get into accidents of all kinds
- Get involved in fights
- Engage in risky or dangerous behavior



#### ADOLESCENTS ARE LESS LIKELY TO:

- Think before they act or speak (impulsive)
- Pause to consider possible consequences
- Modify inappropriate or dangerous behaviors
- Plan, organize, remember, predict, or discern
- Walk away from the crowd



"One of the things I think that this research could help inform us about is the fact that the teenager is not going to take the information that is in the outside world, and organize it and understand it the same way we do."



--Deborah Yurgalen-Todd Social Psychologist



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ADOLESCENT BRAIN DEVELOPMENT CAN BE DIVIDED INTO THREE PROCESSES:

- 1. <u>**Proliferation</u></u> rapid growth of brain matter and the formation of new connections within the brain</u>**
- 2. <u>**Pruning</u>** cutting away of unused or unimportant to connections</u>
- 3. <u>Myelination</u> insulating of brain pathways to make them faster and more stable (Sowell et al., 1999; Sowell et al., 2001)

#### **PROLIFERATION: GREY MATTER**



Grey matter develops quickly during childhood, but slows during adolescence.

Grey matter volume peaks at age 11 in **girls** and at age 13 in **boys**.

Then, the volume of grey matter begins to decline.

Lenroot & Giedd (2006)

#### PRUNING: GREY MATTER MATURATION

• The maturation of grey matter is best described as a constant "push and pull". New pathways grow, while others are pruned back.

- Pruning is greatly influenced by experience, so it really is a case of *use it or lose it*!
- This makes the adolescent brain extremely versatile, and able to make changes depending on the demands of the environment.

#### PRUNING: GREY MATTER MATURATION

The brain matures in a back-to-front pattern. The frontal & temporal lobes are the last to mature.

**Remember:** the frontal lobe is the home of planning, organization, judgment, impulse control and reasoning!





 Male (Predicted) Female (Predicted)
 95% Confidence Intervals (Male)
 95% Confidence Intervals (Female)



Lenroot & Giedd (2006)

## RESPONSIBILITIES OF THE PRE-FRONTAL LOBE...THE CEO OF THE BRAIN



## PROBLEM FOR ADOLESCENTS: THE CEO IS ON VACATION!

What does this mean?

• The frontal lobe controls decision making, planning, working memory, organization, and mood. AND

### SO, the limbic system is in charge!

• The Emotional Basket Case leads the way usually without the assistance of the Filter and Processor!

•It is on an extended getaway!



## MAYBE NOT SO MUCH A VACATION AS AN INTENSE WORKOUT PROGRAM.

- Imagine the prefrontal lobe as a flabby muscle in need of some serious strength training and toning.
- This training and toning is known as PRUNING.



PRUNING is the refinement of brain pathways. Eliminates roads not used and paves frequently used roads.

## EXECUTIVE FUNCTIONS (CEO'S RESPONSIBILITIES) EXPLAINED....

#### What it does:

- Analyze a task. Figure out what needs to be done.
- Plan how to handle the task.
- Get organized. Break down the plan into a series of steps.
- Figure out how much time is needed to carry out the plan, and set aside the time.
- Make adjustments as needed
- Finish the task in the time allotted.

### BUT...when it's on vacation it is difficult to:

- Keep track of time
- Make plans
- Make sure work is finished on time
- Multitask
- Apply previously learned information to solve problems
- Analyze ideas
- Look for help or more information when it is needed

## NORMAL ADULT BRAIN RESPONSE PATTERN:



AN ADOLESCENT BRAIN OFTEN SKIPS THE FILTER AND FAILS TO INTERPRET THE SITUATION WITH REASON AND LOGIC. THEY RESPOND BASED ON EMOTION.



#### Adolescent Response



### TEEN VS. ADULT



When reading emotion, teens (left) rely more on the amygdala, while adults (right) rely more on the frontal cortex.

## REMEMBER THAT THE ADOLESCENT BRAIN IS IN A CONSTANT TUG-OF-WAR...



Unfortunately, the reward system often outmuscles the master planner!

VS.

IMPULSIVE

LOGICAL

#### **RISK AND REWARD**



It's **not** that teens are stupid, or have no control over their own brain. Studies have shown that teens **know** when they are engaging in risky behavior (like unprotected sex, drinking, or drugs). However, they are more likely to think that the benefits of those behaviors outweigh any potential harm.

Photo credit (CC 2.0): winnifredxoxo

Reyna & Farley (2007)

#### WHAT'S A PARENT TO DO?



#### CHIEF EXECUTIVE OFFICER



- Roll up your sleeves and prepare for the challenge.
- Teach them the skills they lack...teach them to <u>foresee consequences</u>, <u>plan</u>, <u>manage time</u>, <u>prioritize</u>, <u>follow</u> <u>directions</u>...this will require repetition, consistency , and leadership on your part.



#### THESE SKILLS ARE NOT INNATE. THEY MUST BE TAUGHT! As a Parent, you must Teach the skills they need. Holding them accountable to expectations that were never modeled and taught is no different than a teacher testing them on content material never TAUGHT.

- These brain differences do NOT mean that adolescents cannot make good decisions or tell the difference between right and wrong!
- It does NOT mean they shouldn't be held responsible for their actions.
- The awareness of the differences can help parents and teachers understand, anticipate, and manage adolescent behaviors.



A few more things...

- 1. When placed in challenging and uncomfortable situations the brain produces CORTISOL.
- 2. Cortisol BLOCKS a person's ability to learn (only functioning in fight or flight mode).
- 3. When a person is placed in a safe, fun environment or presented with a positive challenge

...ENDORPHINS and other feel goods (Serotonin) are produced

4. The "feel goods" create a rich and motivated learning environment.

Don't feed into negativity. You are enabling students to fail.

Encourage your student to see the lessons in struggles.

Make challenges exciting..not threatening.

WHAT'S

THE

POINT

Encourage your students to work through the problem..NOT around it.

Build their confidence by praising their <u>efforts in the</u> <u>process</u> **more** than the end product.

### Fight, Flight or Freeze?

Once the amygdala is activated in class, it takes at least 30 - 90 minutes to calm down for quality learning.



Threats, insults, putdowns and sarcasm activate the amygdala

#### THE BRAIN AND LEARNING:

• In the classroom, the more ways the content is introduced to the brain and reviewed, the more dendritic pathways of access will be created. There will be more cell-to-cell bridges and these pathways will be used more often, become stronger and remain safe from pruning.



--Dr. Judy Willis, Neurologist, 2006.

#### GOOD NEWS FOR ADULTS...

"Even though the public perception is about building bigger and better brains, what the research shows is that it's the relationships, it's the connections, it's the people in children's lives who make the biggest difference."

#### A PROBLEM...

Many of the things adults do and say to help and to motivate our children conspire to help them become non-learners. SOMETIMES WE PUT TOO MUCH EMPHASIS ON:

- Labels
- Test scores
- Grades
- Getting into the right schools

#### **RESILIENCY 101**

•Simply put, the Merriam-Webster dictionary defines resilience as "an ability to recover from or adjust easily to misfortune or change." •Resilience is not a trait that people either have or do not have. It involves behaviors, thoughts and actions that can be learned and developed in anyone."

#### Some reasons Gifted Kids avoid taking risks:

- 1. Perfectionism (Healthy, Paralytic, Neurotic)
- 2. Heightened sensitivities
- 3. Defining self by ability
- 4. Previous failures in social situations

Each time we steal a student's struggle, we steal the opportunity for them to build self-confidence. They must learn to do hard things to feel good about themselves.

Dr. Sylvia Rimm

venspired.com



THE EXPERIENCE **OF FAILURE ITSELF IS NOT** HELPFUL. WHAT MATTERS IS WHAT THE CHILD LEARNS FROM IT.

#### WHAT CAN YOU DO TO HELP YOUR CHILD DEVELOP RESILIENCY?

• Encourage your child to take academic risks (Don't let your child settle for shortcuts, or lavish praise over accomplishments that come too easily) • Distinguish between process and outcome (Your child's job is to take on challenges he or she has not already mastered. Let your child know that you care as much about how he or she approaches learning as what is produced)

#### WHAT CAN YOU DO TO HELP YOUR CHILD DEVELOP RESILIENCY?

• Teach coping strategies (Help your child learn how to accept disappointment and loss without either blaming others or engaging in harsh self-criticism.)

• Emphasize values (Let your child know that actions and behaviors speak more about character than accomplishments, and that how one behaves is more important than always being the best)

#### **REMEMBER TO:**

- Focus on effort, struggle, persistence despite setbacks
- Choose difficult tasks
- Focus on Strategies
- Reflect on different strategies that work and don't work
- Focus on Learning and improving
- Seek challenges
- Work hard

#### GO AHEAD...DISAPPOINT

#### Kids need disappointment

- Say "NO" just because.
- Strong willed kids learn by doing and learn best by failing.

#### SIGNS OF CONFIDENCE ISSUES

### Kids who change the rules, quit, or cheat do so because they lack

A Star	FEELINGS OF CONFIPENCE 50¢
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#### **DEVELOP CONFIDENCE BY...**

#### Give OWNERSHIP not control

- Let them make their own food
- Wash their own clothes
- Figure out how to put something together
- Problem solve



When we step back as parents, it gives our children the ability to step up!

### THE CYCLE OF UNMET NEED



#### GIVE TOOLS INSTEAD OF CONSEQUENCES

•See distractions/struggles as an opportunity for teaching oIt takes longer to target the "heart" issue than to punish a child. Don't do lazy parenting! Take the time to address and develop the area that triggers the behaviors.

#### TOOLS...

•Depersonalize and keep a handicap perspective. •Be positive and give frequent, quick feedback! •Change environment/Walk away: MOTION CHANGES **EMOTION** 

#### REMINDER...

- Tools change behaviors...consequences hold them accountable, but the behavior will return without TOOLS. YOU must give your child tools to handle behaviors successfully.
- Time management, prioritizing, anger management, study skills, problem solving, coping skills



#### Meltdowns

- A kid who is experiencing a meltdown is emotionally on fire! No learning can occur and NOTHING you say or do will be effective at this time.
- Don't set your child up for failure by forcing them to respond. Take a time out
- As a parent you LOSE authority when you lose control over your emotions.
- Don't force a child to look you in the eye when he or she is angry

#### DISCIPLINE...

- Ignore minor behaviors
- Don't need to provide a consequence every time there are natural consequences.
- Talk about the behavior not the child and treat the child with respect ( Model what you want to see)
- Control your emotions and SIT DOWN when a disagreement surfaces

NEWS FLASH...

•PUNISHMENT will not grow more white matter (connective tissue) increase neurotransmitters, or teach new skills!

THE POWER OF ACKKNOWLEDGEMENT

I see your point
I understand your frustration
I know you're upset

EXAMPLE OF EFFECTIVE ACKNOWLEDGEMENT

oI know you know \_\_\_\_ **1**S wrong. I know you know there are dire consequences for doing \_\_\_\_\_ and your anger and hurt must be so great for you not to fear the consequences.

#### GIVE CHOICES AND KEEP YOUR PROMISES

- You have a choice to \_\_\_\_\_ OR \_\_\_\_\_. If you do not do \_\_\_\_\_ OR \_\_\_\_\_, I promise you will lose your \_\_\_\_\_ for (1 day). I keep my word so you can always count on me.
- Don't make the mistake of punishing in anger; have a clear, fair plan for consequences.

#### ABSOLUTELY NOT



• These cast permanent judgment and are lies.

"Sincere apologies are for those that make them, not for those to whom they are made." ~Greg LeMond

An apology is good for the child's soul.

•True contrition is the goal.

•Contrition means the child is learning.

•It gives hope for rebuilding, and puts value on the relationship rather than the individual's pride.



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