



Middle Senior School Knowledge Café

The Teenage Brain

December 5, 2024

Session goals– What is happening to our child?



- The Developing Brain
- Adolescent Brain: *A Brain Under Construction*
- Age and Stage Development – What we see – It's normal

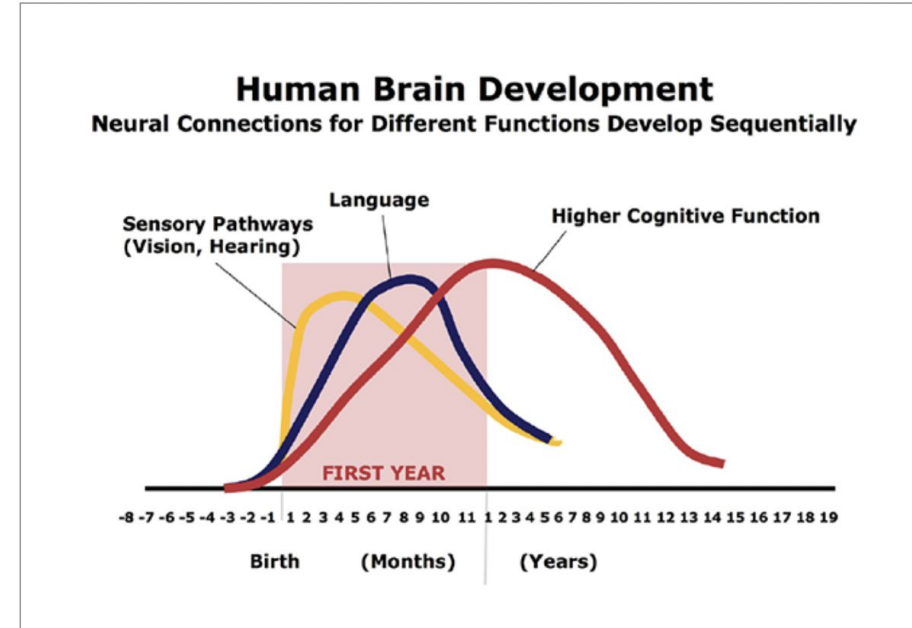
The Developing Brain



The Developing Brain



- Brains are built from the bottom up
 - Increasingly complex circuits are built on more simple circuits
- Sensitive periods of brain development begin and end at different ages



In the proliferation and pruning process, simpler neural connections form first, followed by more complex circuits. The timing is genetic, but early experiences determine whether the circuits are strong or weak. Source: C.A. Nelson (2000). Credit: Center on the Developing Child

The Developing Brain



Early Childhood (0-3)

- Rapid development of brain systems (senses and motor skills)
- Neurons forming new connections at a rate of over 1 million/second
- Majority of energy consumption is allocated to brain development

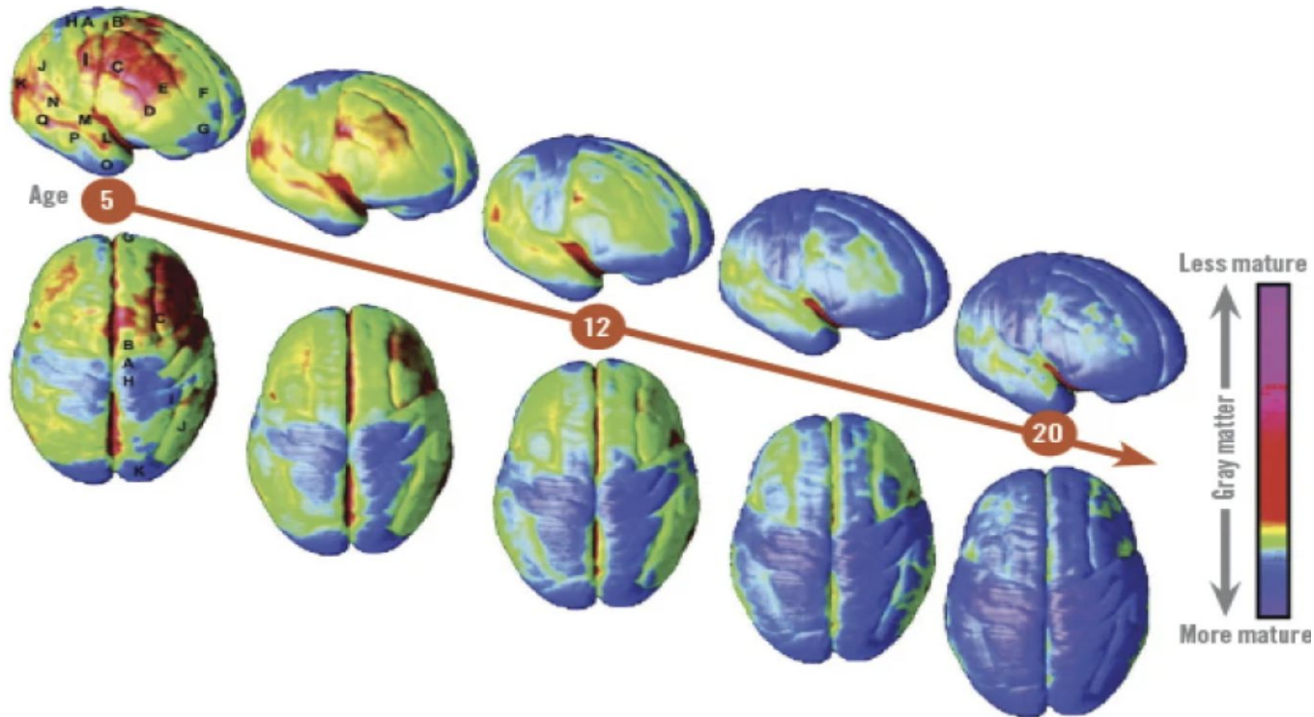
Childhood (4-11)

- Brain developing communication and language skills
- Understanding of concrete objects, logical sequences, manipulating numbers, letters, words
- Building problem solving, coping, emotional regulation skills

Adolescence (12-25)

- Systems dedicated to executive functions and abstract thinking are maturing
- Intense period of neural integration and pruning
- Neural connections are firing faster than ever before!

The Developing Brain- 101



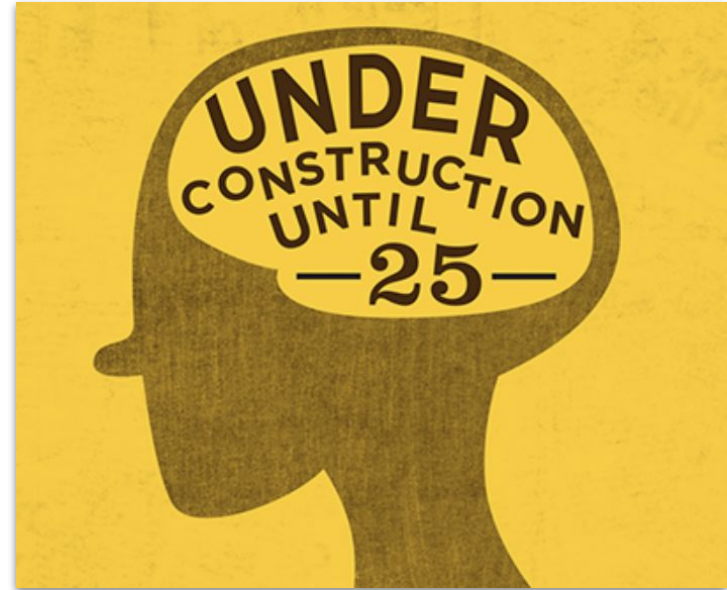


Brain changes that mark adolescence
make this a time of great
OPPORTUNITY and GROWTH.

Adolescence- A brain under construction



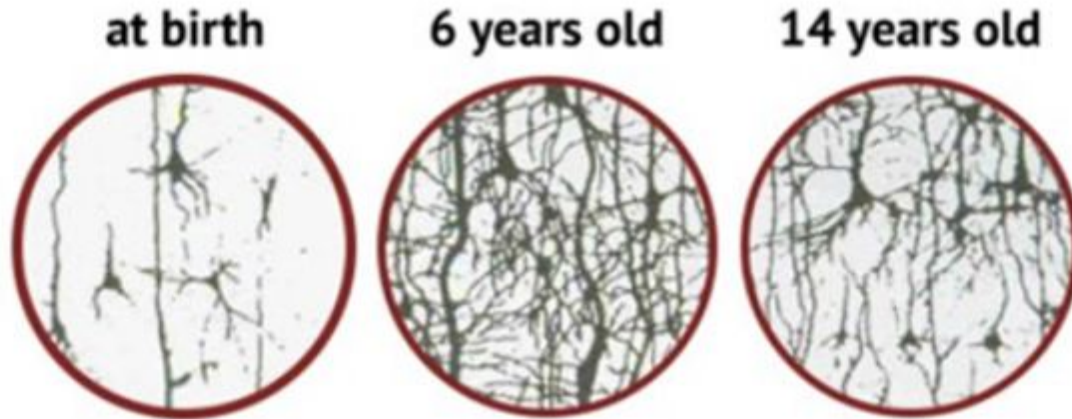
- General changes that occur:
 - Myelination
 - Pruning



A Brain Under Construction: Pruning



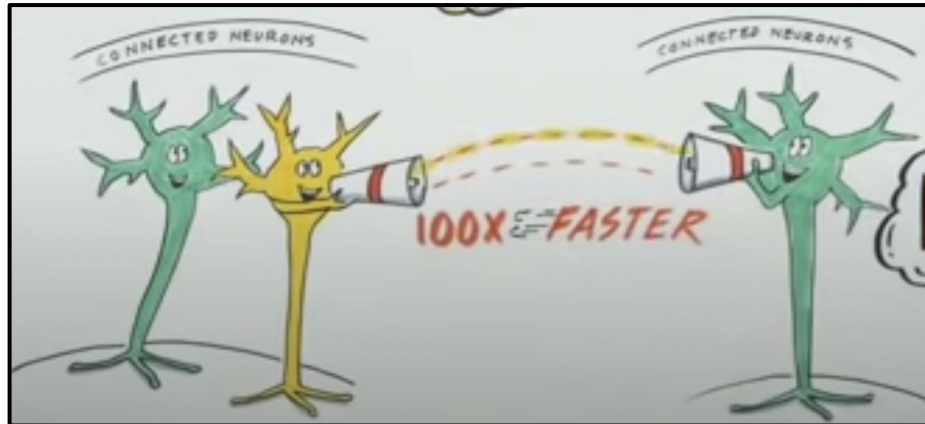
- Unused/weak connections are removed (use it or lose it)
- Allows the brain/body to focus on the connections it uses the most



A Brain Under Construction: Myelination



- Myelination increases the effectiveness and speed of communication between neurons
 - Allowing neurons to connect with each other faster and communicate between areas of the brain more efficiently





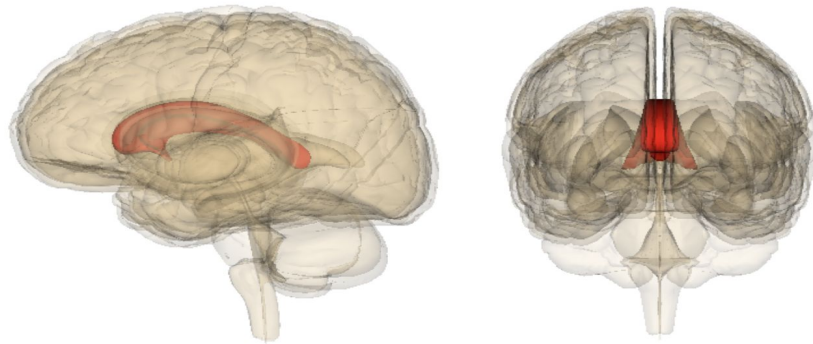
Specific changes

Corpus Callosum growth
Prefrontal cortex + Limbic system

A Brain Under Construction: Corpus callosum



- Connects the right and left hemispheres of the brain helping both areas communicate better with each other
- It thickens during adolescence improving adolescents' ability to process information

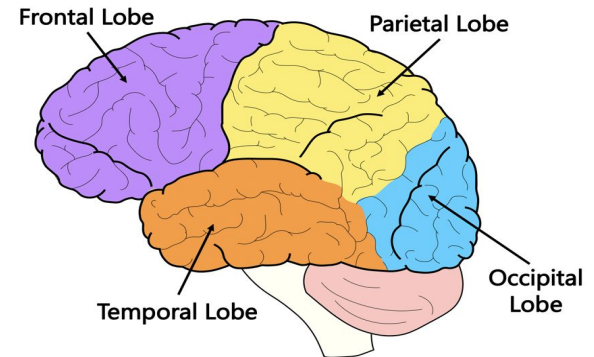


A Brain Under Construction: The Frontal Lobe



The brain is only about 80% developed in adolescents

- The **last section to connect is the frontal lobe**
 - **Frontal lobe** – Specifically the **prefrontal cortex** is responsible for cognitive processes such as reasoning, planning and judgment
- Typically this mental merger is not complete somewhere between ages of 25 and 30



A Brain Under Construction: Prefrontal cortex



The Prefrontal Cortex (part of the frontal lobe) is the last area of the brain to develop and it is responsible for :

- Emotional regulation
- Reasoning
- Problem-solving
- Planning and organization
- Working memory
- Focus and attention
- Developing and carrying out goals or directions
- Impulse control
- Transitioning from one task to another

A Brain Under Construction: The Limbic System



Limbic system - complex network of brain structures

- **Involved in:** Emotion, Motivation, Memory, and Behaviour Regulation

Emotional spark in the brain:

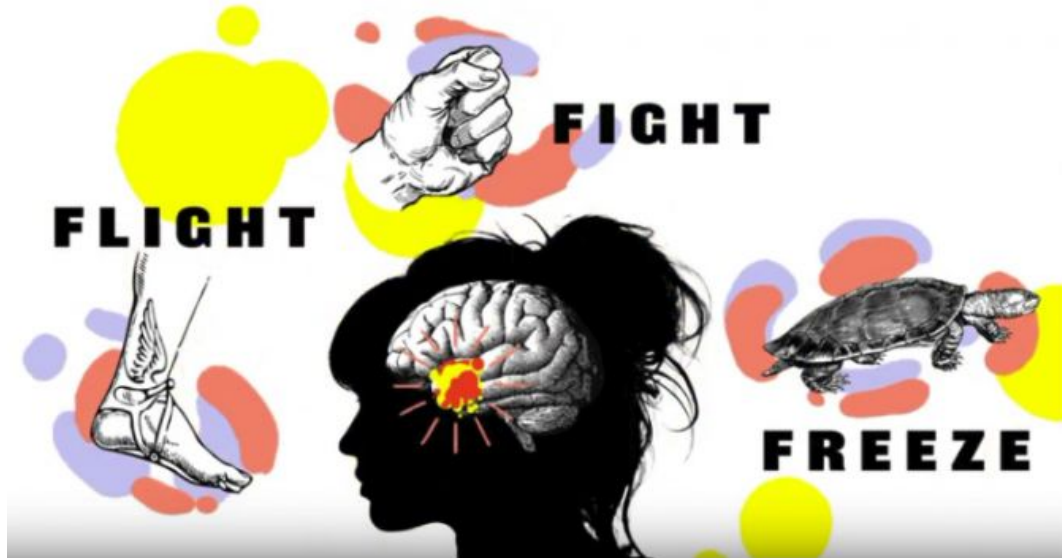
- Enhances the way emotions are generated from sub-cortical areas of the brain
- This emotional spark washes over the cortical circuits of reasoning



Dan Siegel

Hand Model of the Brain

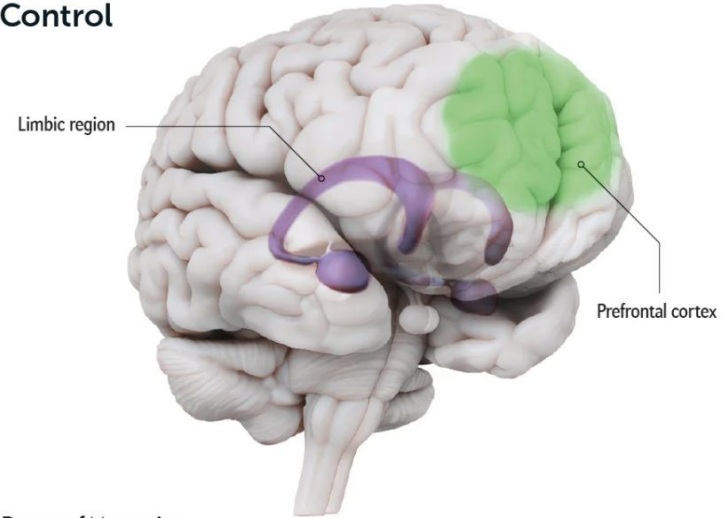
A Brain Under Construction: Amygdala



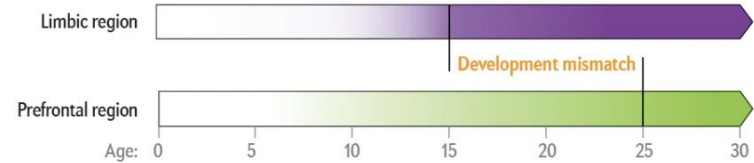
ESSENTIAL for SURVIVAL

DEVELOPMENTAL MISMATCH

Emotion vs. Control



Degree of Maturation



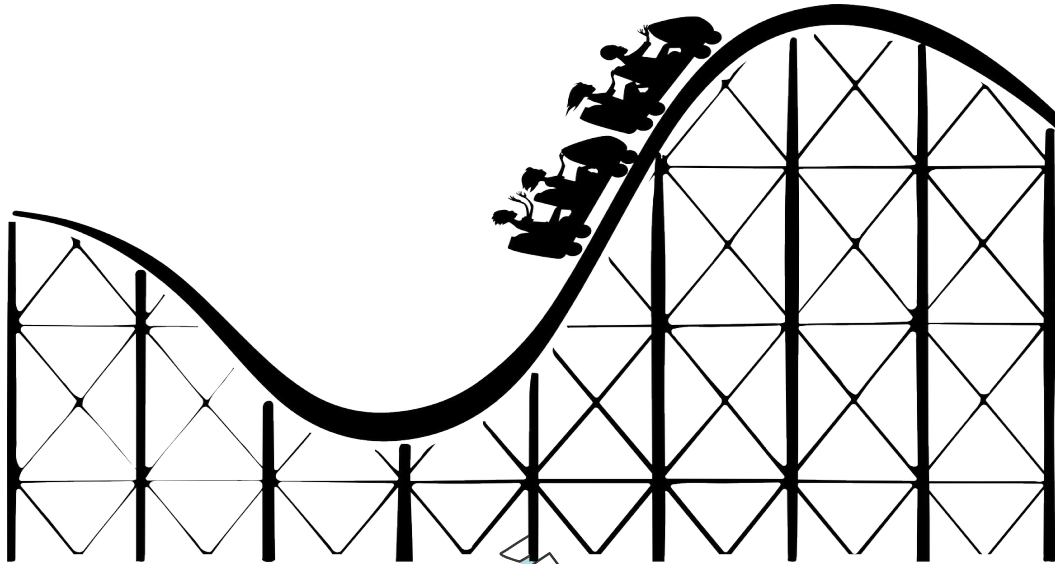
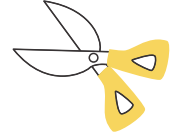
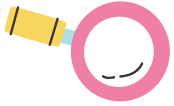
Teenagers are more likely than children or adults to engage in risky behavior, in part because of a mismatch between two major brain regions. Development of the hormone-fueled limbic system (purple), which drives emotions, intensifies as puberty begins (typically between ages 10 to 12), and the system matures over the next several years. But the prefrontal cortex (green), which keeps a lid on impulsive actions, does not approach full development until a decade later, leaving an imbalance during the interim years. Puberty is starting earlier, too, boosting hormones when the prefrontal cortex is even less mature.

DAVID KILLPACK (brain) AND JEN CHRISTIANSEN (graph); SOURCE: JAY N. GIEDD

A Brain Under Construction: A review



Age and Stage - Development



Stage of Brain Development



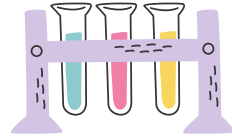
The Teenage Brain is in a constant state of development

Prefrontal Cortex

Thinks about things logically, weighs the pros and cons, and restrains because they mature later.

What does this mean?

Teens can be prone to riskier and more impulsive behaviours, and less likely to consider consequences than an adult would.



Risk and Reward



What's important?

Take a step back and realize that though not every risky choice will result in harm – **some will.**



Proper Understanding

It's not enough to know there's risk, they need to also understand the consequences. It could impact the rest of their life in a really negative way.



Risk and Reward continued...

Studies have shown that teens **know** when they are engaging in risky behaviour, however, they are more likely to think that the benefits of those behaviors outweigh any potential harm.



Brain Development and Surviving Teenagehood



Common challenges faced by teenagers during adolescence.

Strategies for parents to support their teens' emotional, social, and cognitive growth.



Scenarios You May Relate To



Scenario 1: The Impulse Buy

- **What Happened:** A teen uses their savings to buy an expensive pair of shoes without considering their budget or upcoming expenses.
- **Neurological Basis:** The limbic system, responsible for processing emotions and rewards, is highly active during adolescence. However, the prefrontal cortex, which regulates decision-making and impulse control, is still developing. This imbalance leads to prioritizing immediate rewards over long-term planning.





Scenarios You May Relate To

Scenario 2: Risky Social Media Post

- **What Happened:** A teen shares a photo on social media without considering the potential for embarrassment or misuse.
- **Neurological Basis:** Teens often seek peer approval due to heightened sensitivity to social rewards. The dopamine rush from likes and positive feedback can override caution, as the brain's reward centers dominate over regulatory mechanisms.



Scenarios You May Relate To

Scenario 3: Procrastinating on Homework

- **What Happened:** A teen chooses to scroll on social media instead of completing an assignment due the next day.
- **Neurological Basis:** The adolescent brain is drawn to instant gratification and struggle with delayed rewards. The underdeveloped prefrontal cortex makes it harder to prioritize long-term benefits (finishing homework) over short-term enjoyment (social media).

How Can You Help



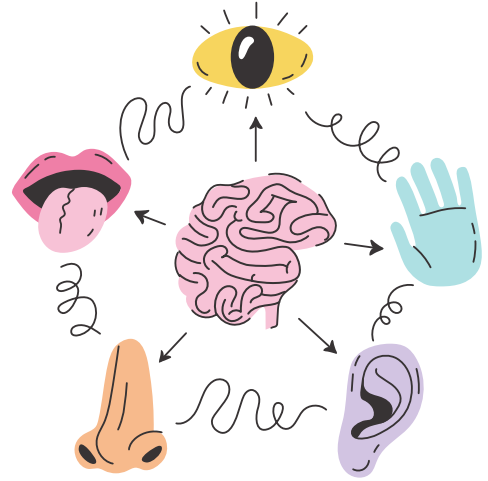
- **Validate Their Feelings:** Help teens reflect on why they made certain decisions without shaming them.
- **Teach Self-Regulation:** Use scenarios as teachable moments to explain how their brains process rewards and risks.
- **Provide Supportive Boundaries:** Offer guidance to help teens make thoughtful decisions while fostering independence.

Impulsive behaviors are a natural part of brain development and emphasize the importance of guidance and patience.



How to handle situations where a teenager has acted impulsively:

- 1. Stay Calm and Avoid Overreacting
- 2. Help Them Reflect
- 3. Discuss Natural Consequences
- 4. Set Clear Boundaries and Expectations
- 5. Praise Efforts to Improve
- 6. Share examples of times when you've made impulsive decisions and what you learned
- 7. Seek Support if Needed



Thanks!

Do you have any questions?

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