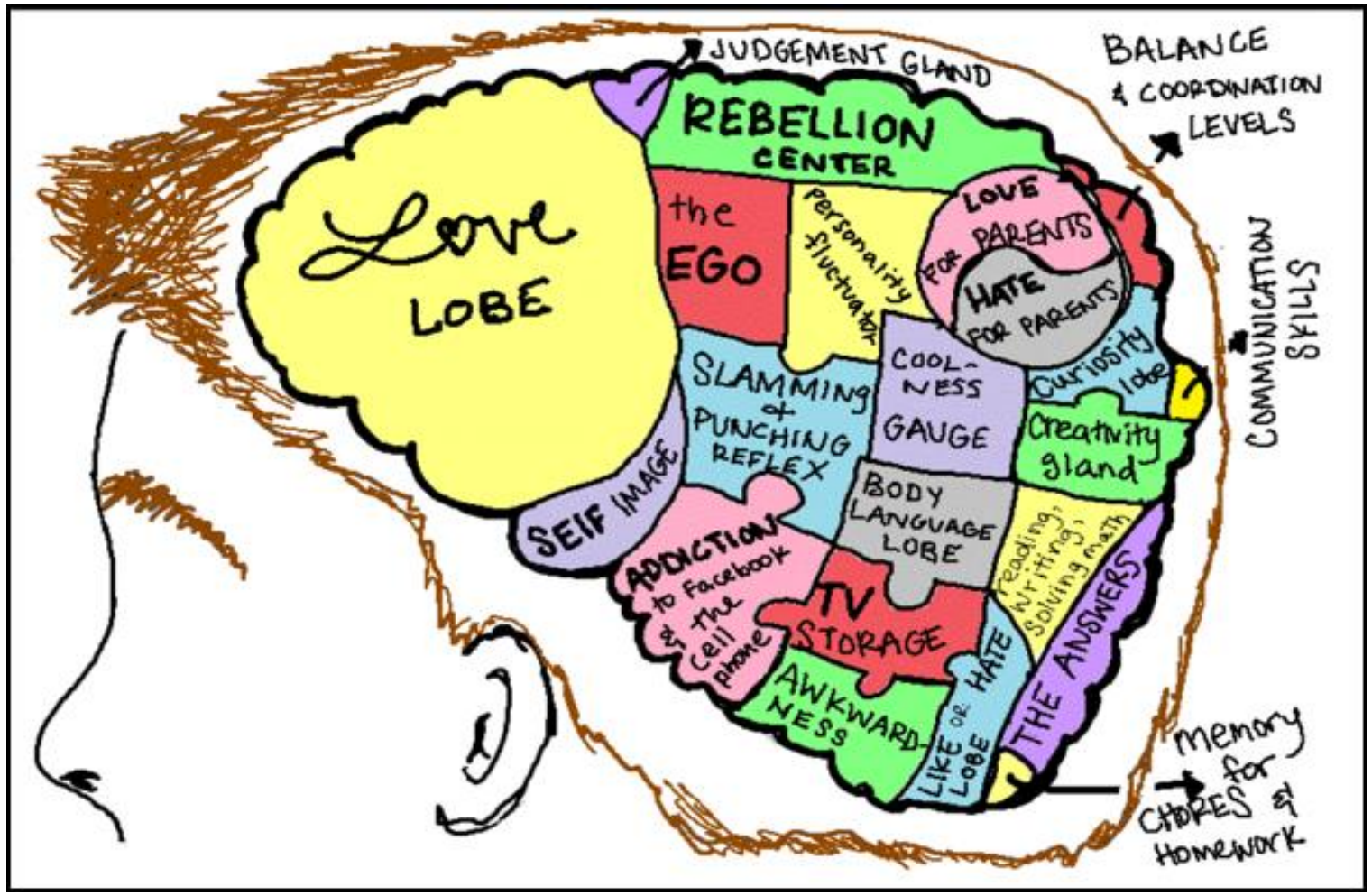
HOW THE DEVELOPING ADOLESCENT BRAIN DRIVES BEHAVIOR



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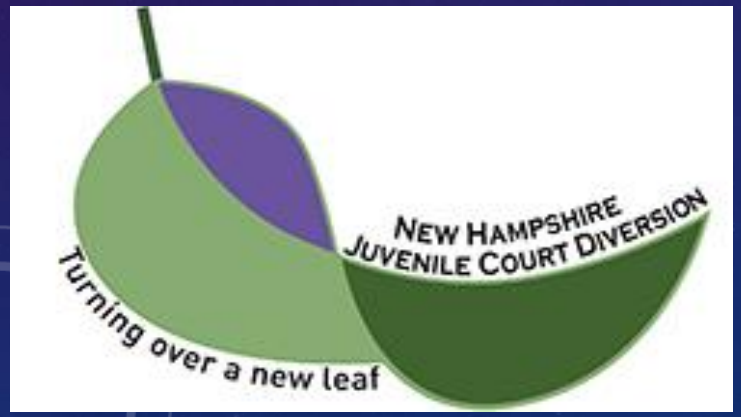
JUVENILE DELINQUENCY AND JUSTICE STATISTICS

- Males more than females (Santrock, 2024)
- Lower SES, lack of parental monitoring, siblings/delinquent peers (Santrock, 2024)
  - Intensive individualized attention, community-wide multiagency collaborative approaches, early identification and intervention
- Estimated 1 million arrest under 18, 75% are processed through a court system (adult or juvenile) (DeFosset et al.,2017)
- Case study of Los Angeles county: Typical juvenile diversions or teens court align with three perspectives: retributive , rehabilitative*** and reparative. (DeFosset et al.,2017)



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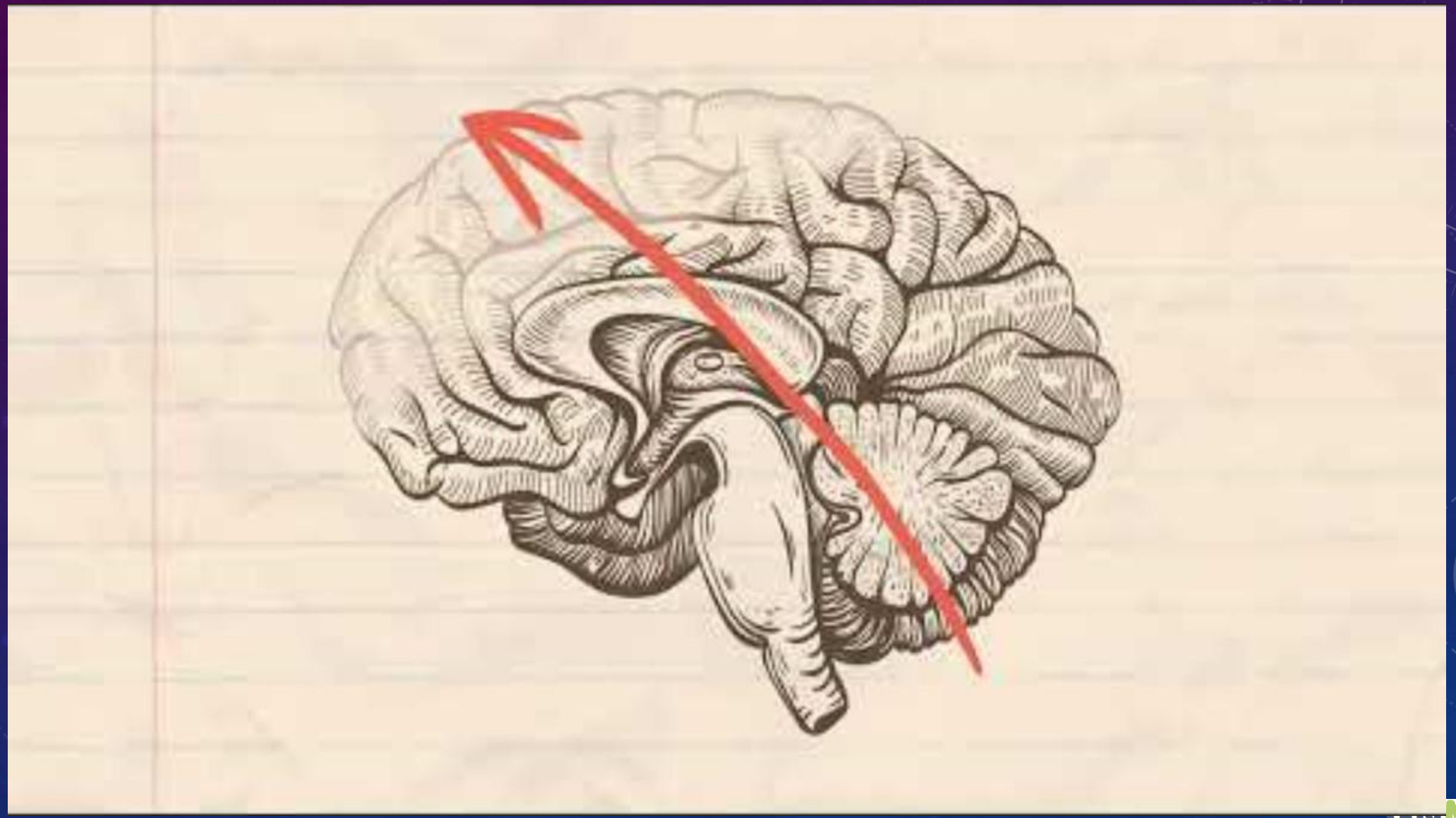
SUMMARY OF ADOLESCENT BRAIN DEVELOPMENT



WHAT DOES IT ALL MEAN?

- Let's start with BIOLOGY: the different parts of the brain and how they *DEVELOP*
- Then COGNITION: and how the different parts of the brain involved in thinking *DEVELOP*
- FINALLY: how does socio-emotional experience influence how the brain *DEVELOPS*
- How does **ALL** of this drive decision-making, risk-taking and perspective-taking behaviors during adolescence.

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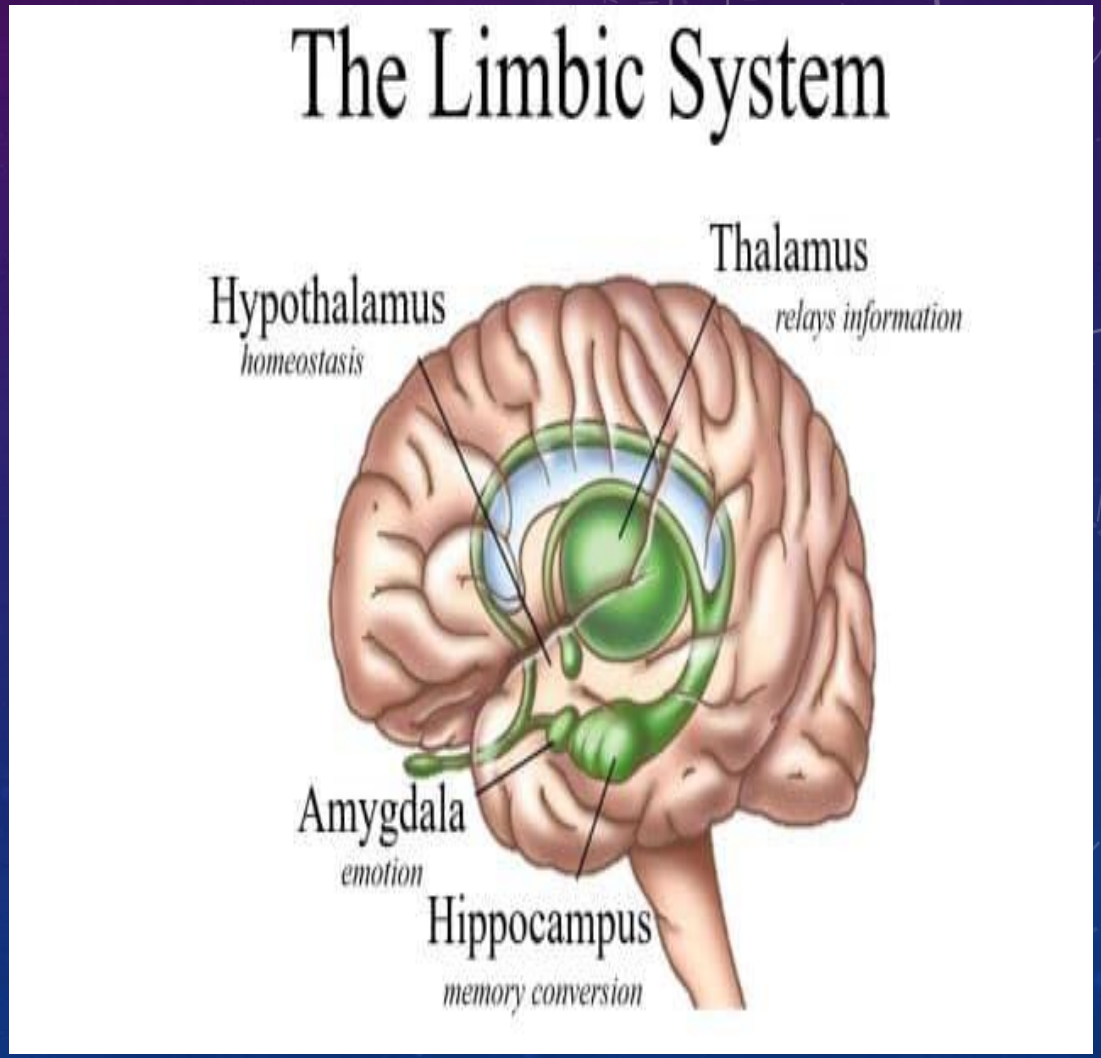
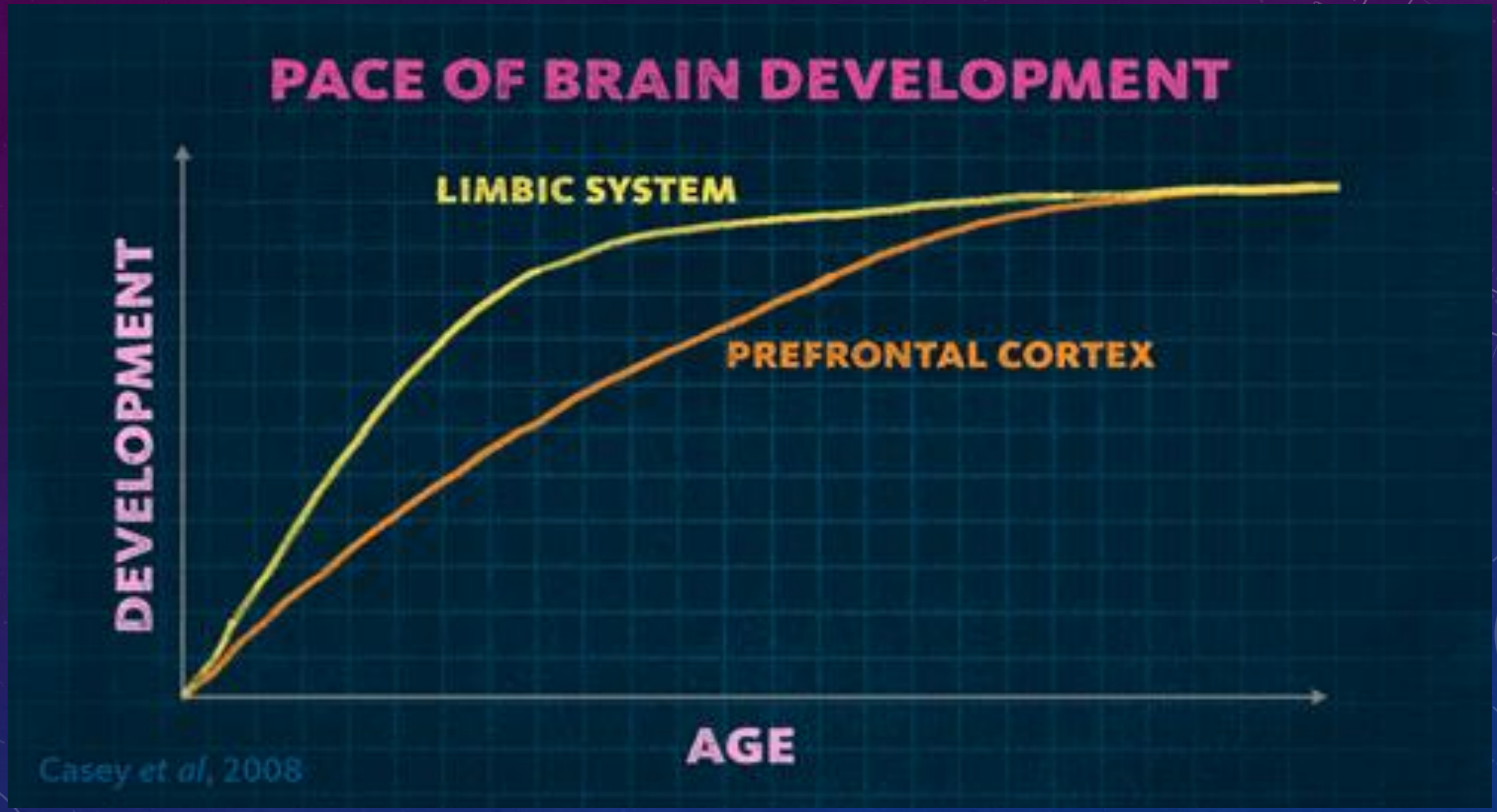
ADOLESCENT BRAIN DEVELOPMENT (BIOLOGICAL)

Important Structures in the Brain (Blankenstein et al.,2020) and (Casey et al., 2025)

- Limbic system: emotions and rewards are processed:
  - **Amygdala** (emotions): how you experience emotion and interpretations
  - **Hippocampus** (memories): forming new ones
  - **Hypothalamus:** monitors hunger, sleep-wake cycle, and sex drive, hormone functioning and ANS (breathing, heart rate, digestion)
  - **Thalamus:** Processes sensory input, contributes to memory and emotions





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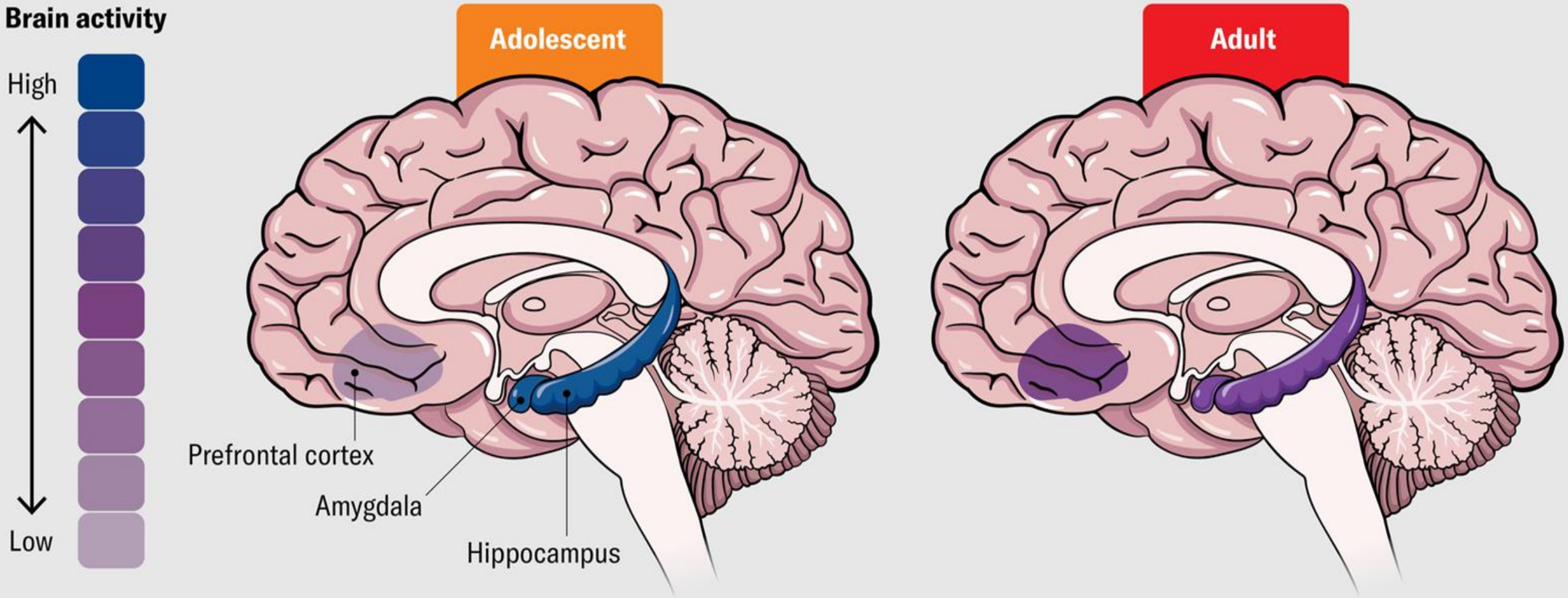
The Adolescent Brain Is Different

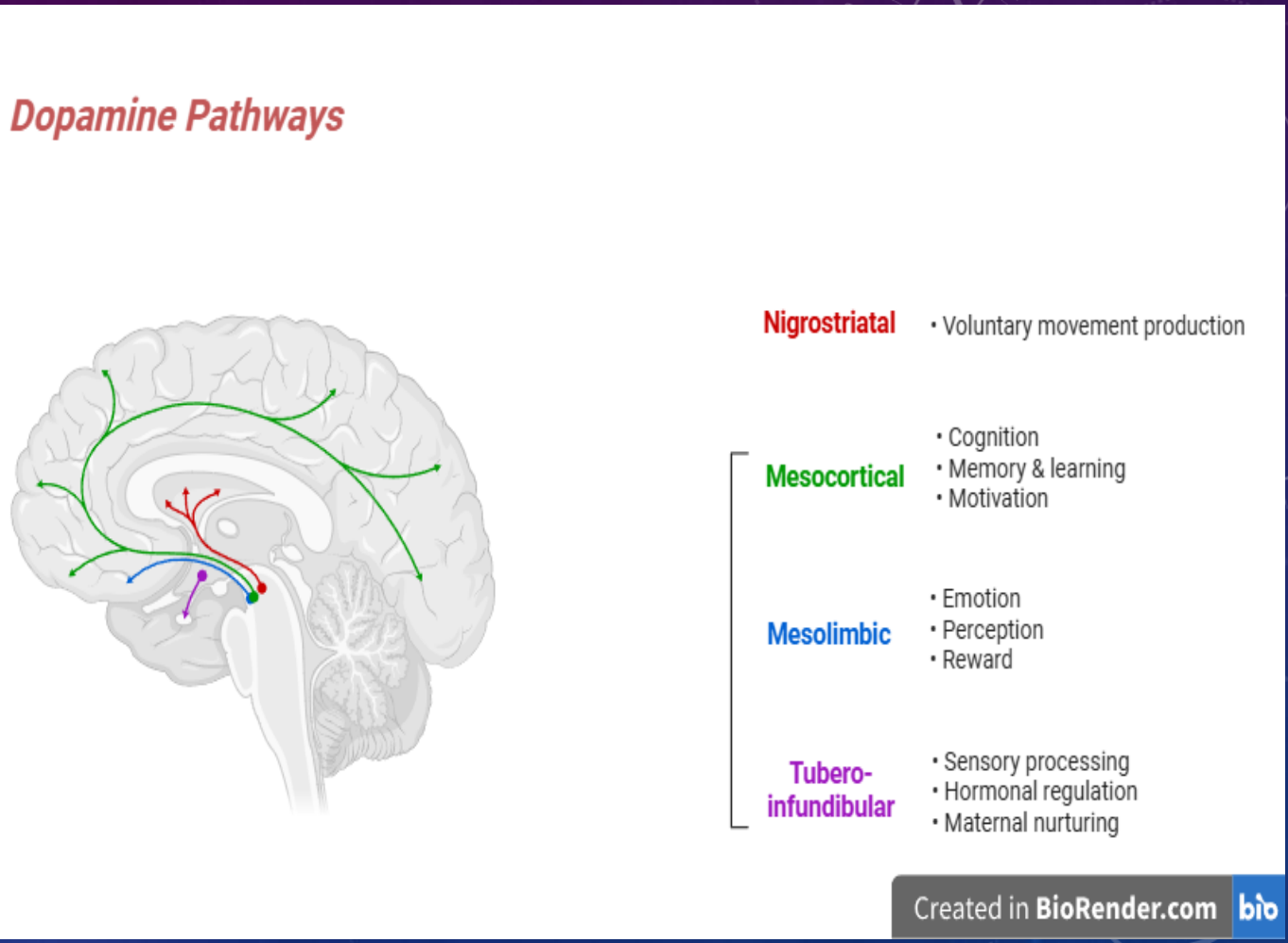
Changes occurring in specific brain areas take place at varying rates during adolescence. The amygdala and hippocampus, brain structures involved with the processing and recall of emotional experiences, are activated at higher levels than in the adult brain. But the prefrontal cortex, involved in the regulation of emotions, does not achieve peak activity levels until well into adulthood.

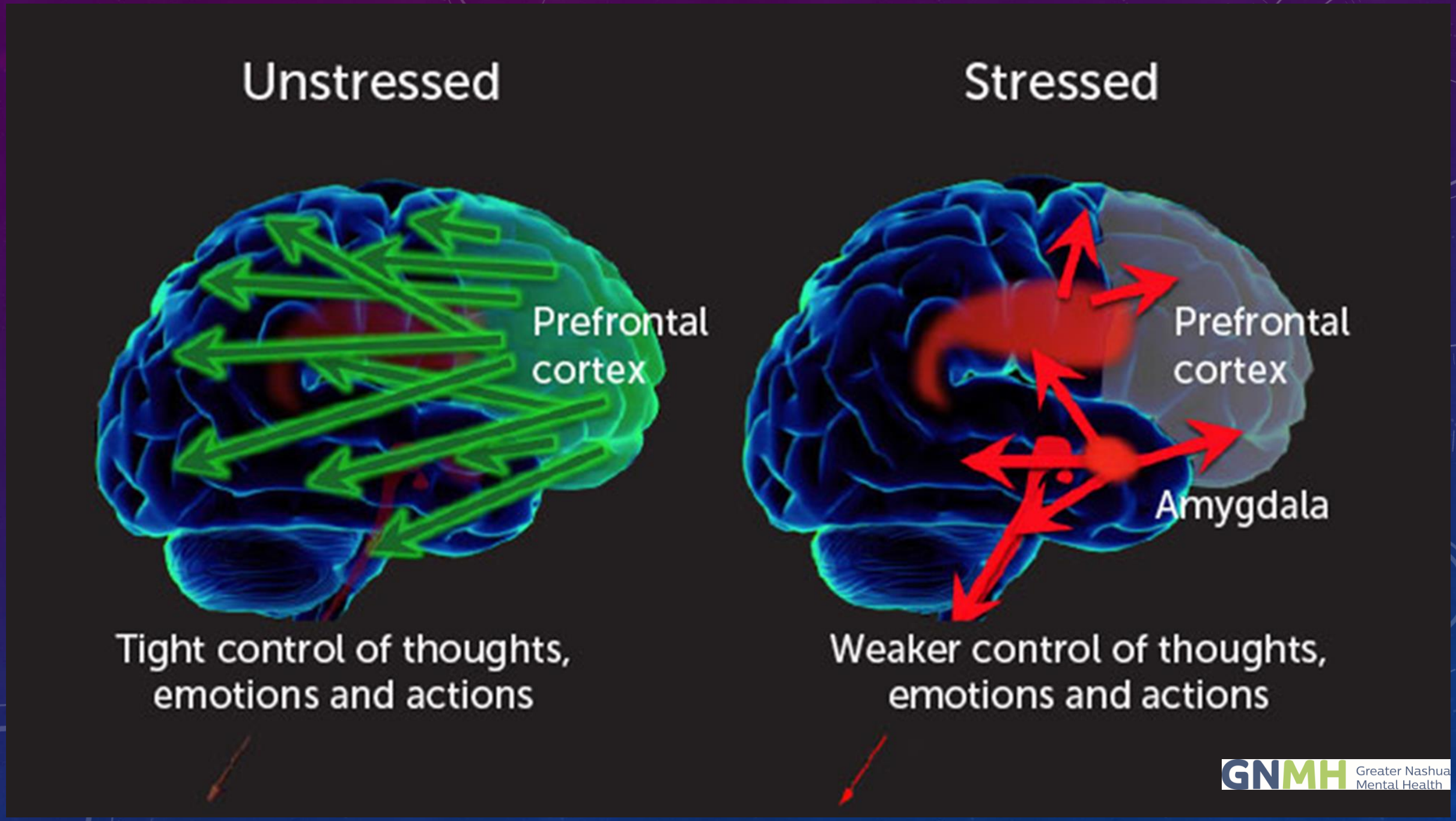


Dopamine Pathways

(Connaughton et al. 2024)

- There are SEVERAL structures involved with mesolimbic system.
- The important thing to understand are the PATHWAYS:
- HERE are FOUR MAJOR pathways: and what behaviors that DRIVE in adolescence.
- Consider how hormones then affect these pathways!
  - Ex: Mesolimbic




Unstressed
Prefrontal cortex
Tight control of thoughts, emotions and actions
Stressed
Prefrontal cortex
Amygdala
Weaker control of thoughts, emotions and actions
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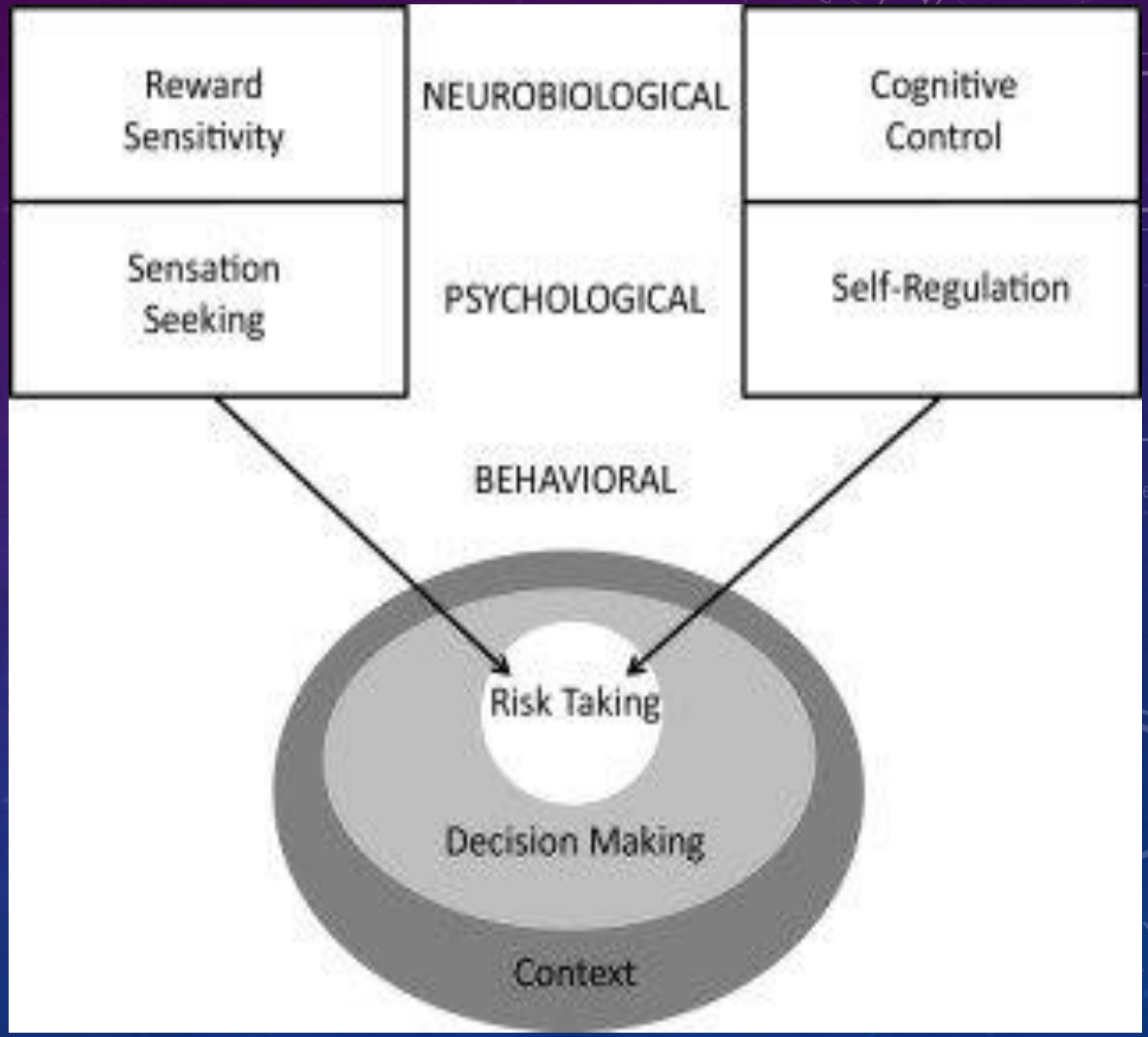
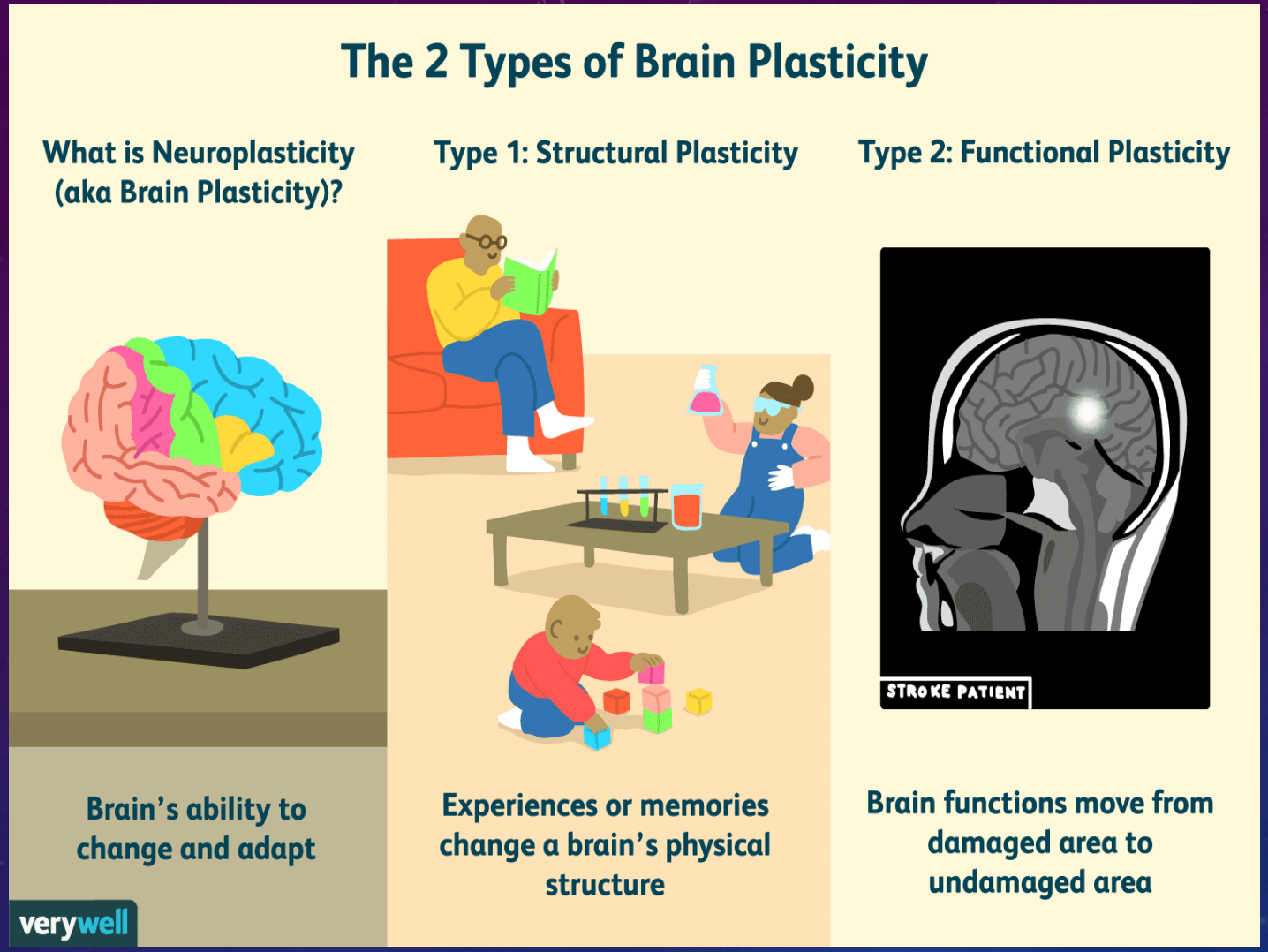
Sensation-seeking or Impulsivity (Duell et al., 2020)

- Risk taking both (positive and negative) are the same REWARD circuitry. They SHARE neural pathways.
    - Adolescents NEED experiences through risk-taking behaviors to build memories, improve memory, learning, adaptation and optimize goal-oriented behavior (Romer et al., 2017)

- PROSOCIAL versus DETRIMENTAL RISK-TAKING---
    - Example: 14 y/o shoplifting



https://www.researchgate.net/figure/Constructs-implicated-in-the-dual-systems-model-of-adolescent-risk-taking-arranged-by_fig2_289998413 [accessed 2 Jun 2025]

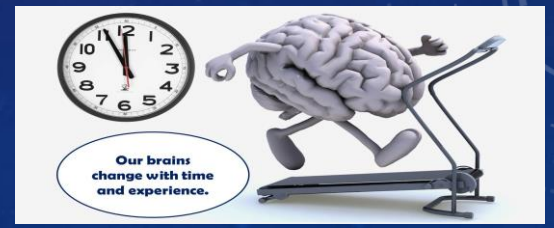


- **NEUROPLASTICITY: ABILITY OF THE BRAIN TO CHANGE AND ADAPT**
(BAKER ET AL., 2025)

- Plasticity of the brain adapts to changes while also "streamlining" processes with executive functioning and decision-making.

  Hormones: bind to key brain regions responsible for reward, motivation, social cognition, and the dopamine system.

  They support both immediate and long-term organizational changes in the brain (subcortical structures) and increase and strengthen communication with the Prefrontal Cortex as it increases in mass (size).



The brain reshapes its connections and strengths of those connections based on learning and experiences.

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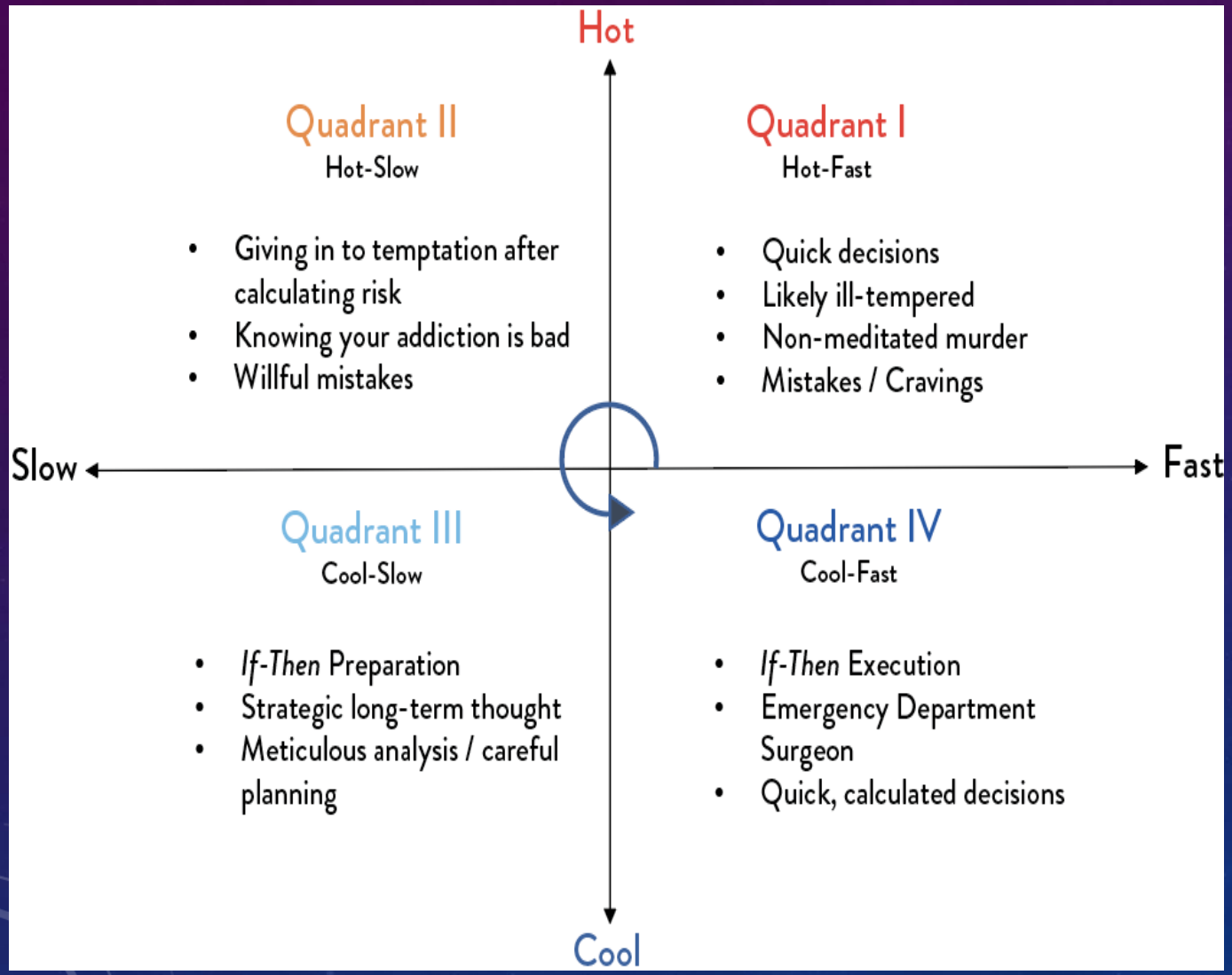
ADOLESCENT BRAIN DEVELOPMENT (COGNITIVE) (CASEY ET AL., 2025)



- Thinking shifts to include abstract, self-reflective and moral
  - BUT.....there is also egocentrism, imaginary audience and personal fables
- Logical/Deductive Reasoning
- More Verbal Problem Solving
- Lots of variation and potential

ADOLESCENT BRAIN DEVELOPMENT (COGNITIVE)

(NAGEL ET AL., 2006)

With increased Prefrontal Cortex (PFC) development comes abstract thinking, and reflective thinking.

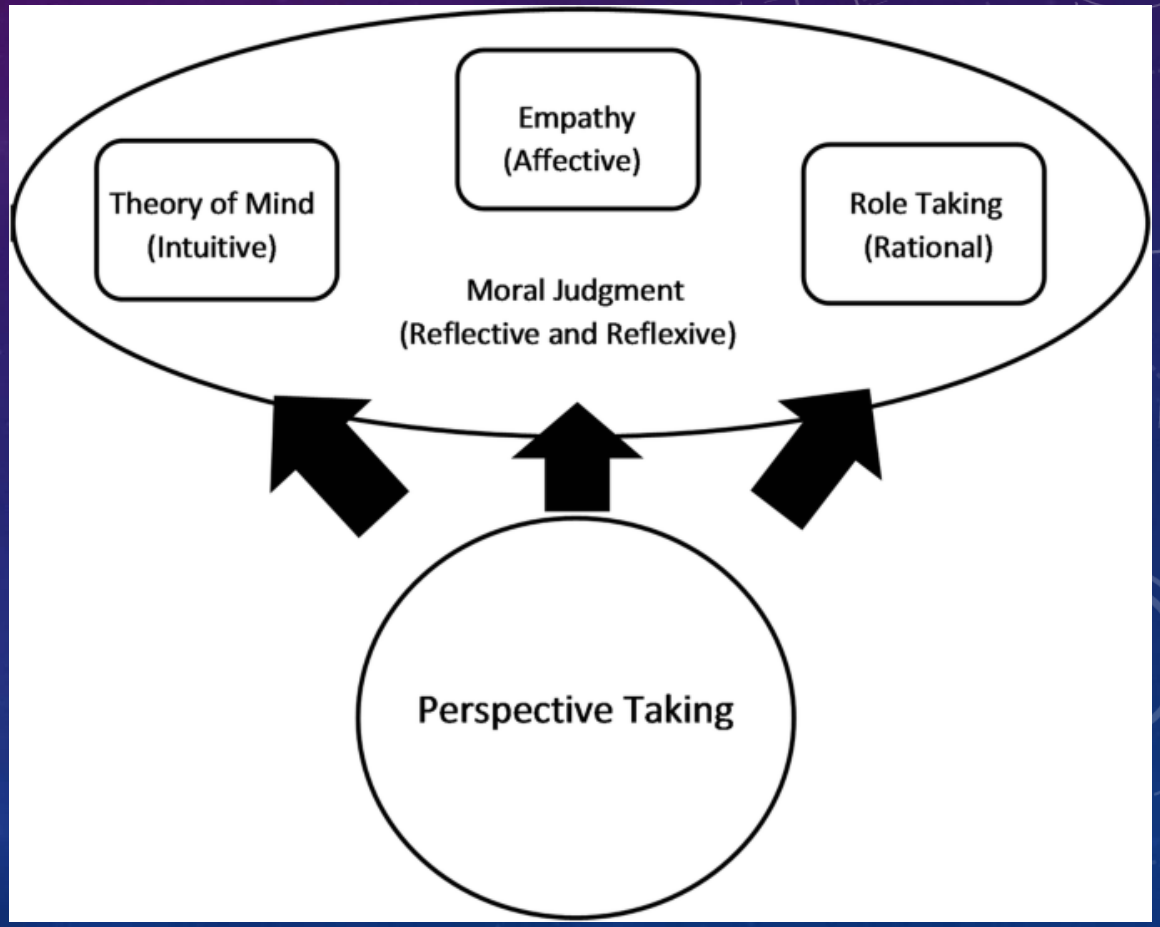
Moral judgement begins to develop.

More rational decision-making

Increased communication between the PFC and the emotional brain (limbic system)

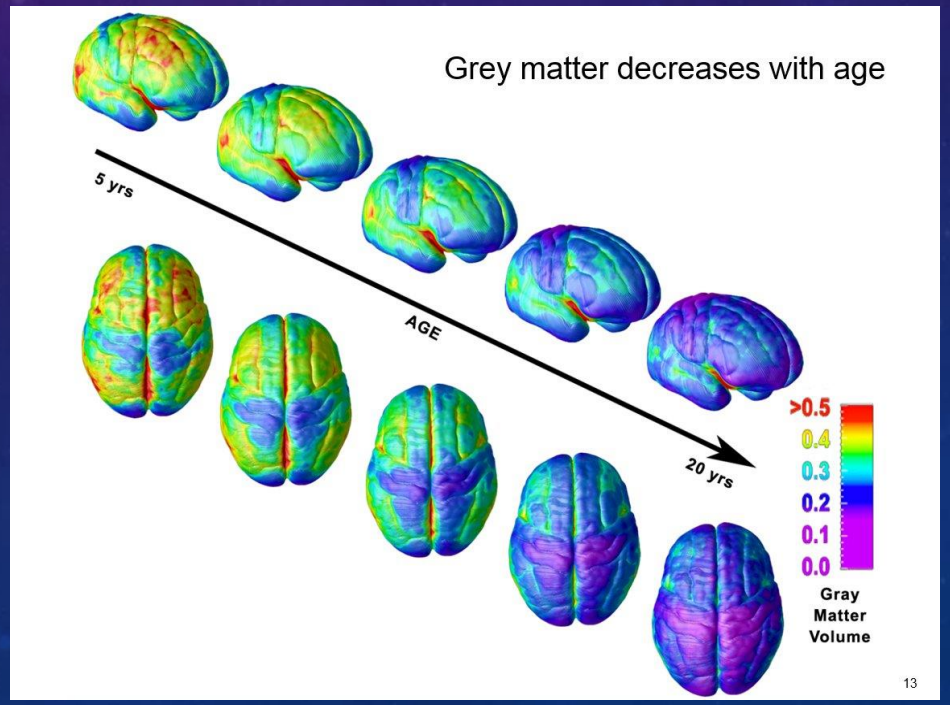
Leading to perspective taking which directly leads to "giving" behavior.

"Giving" behavior linked to reward circuitry



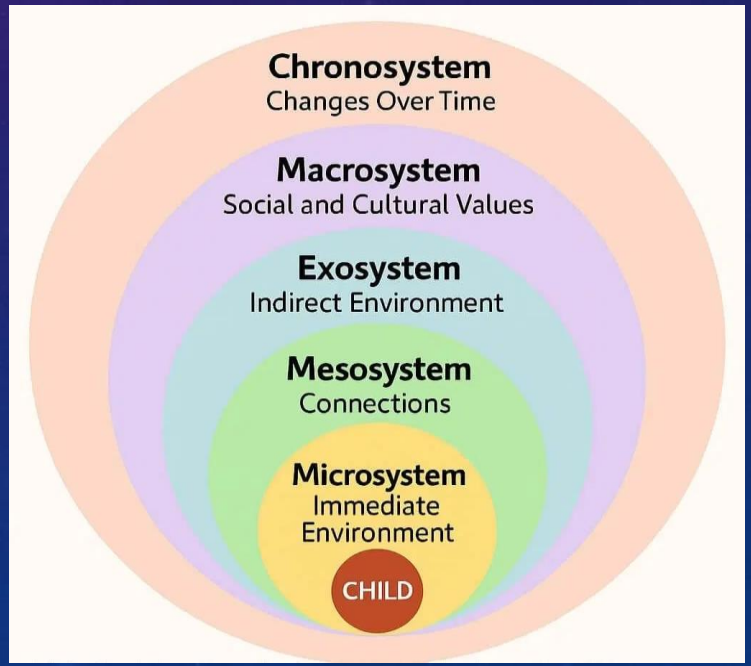
COGNITIVE BRAIN DEVELOP CONTINUED…

- Gray matter is responsible for processing information.
- White matter is responsible for transmitting information.
- Pruning is the process of strengthening specific neural pathways
- LESS gray matter as they age across brain regions (frontal, parietal, and temporal cortices) is linked to more efficient organization, working memory, and processing speeds and positively to other cognitive abilities (Scholz et al.,2023)
- Down side of less gray matter?



INFLUENCES ON ADOLESCENT BRAIN DEVELOPMENT (SOCIO-EMOTIONAL)

- Erikson's theory (1950)--Identity versus Role Confusion
- Bronfenbrenner's theory (1979)-- person, processes, context and time
- Bandura's theory (1971)--Building self-efficacy



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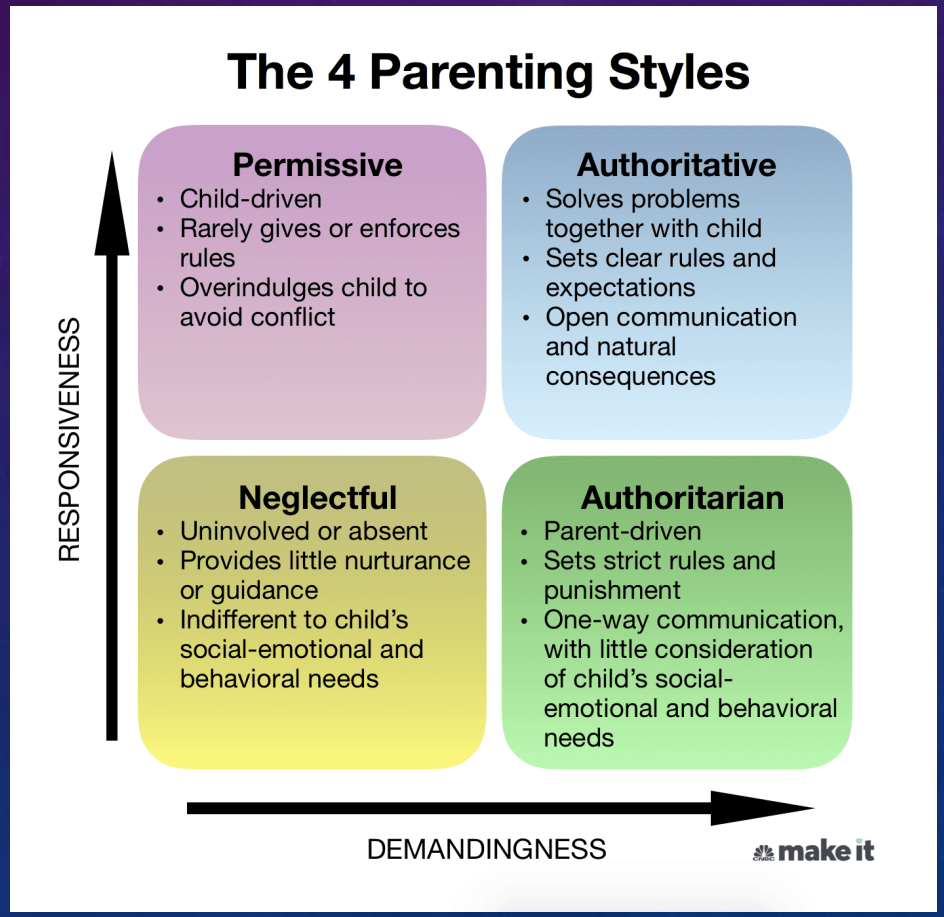
AND MORE…INFLUENCES ON ADOLESCENT BRAIN DEVELOPMENT (SOCIO-EMOTIONAL)

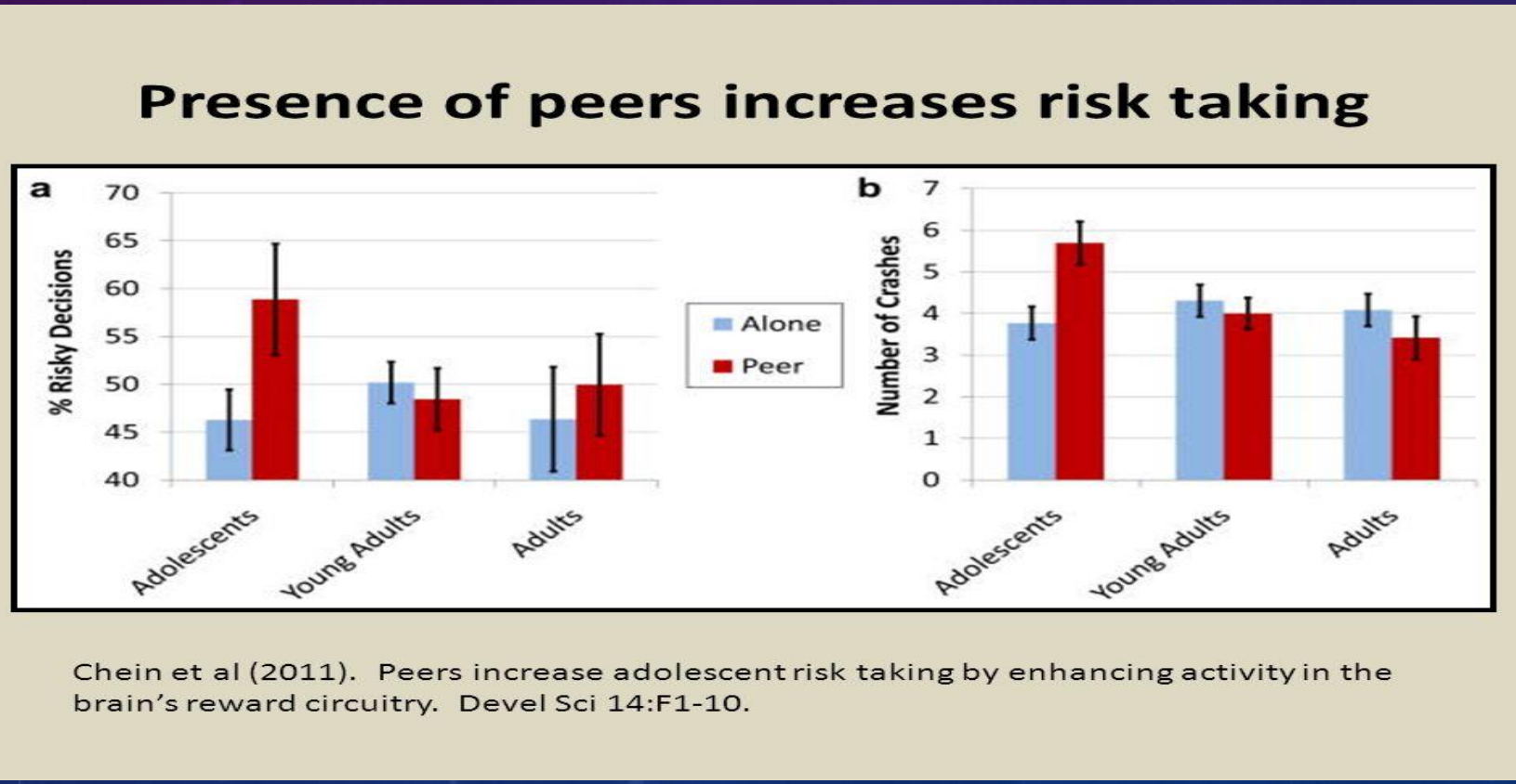
- Parenting styles: Baumrind (1971) and attachment: Bowlby (1958)
  - Authoritative, Authoritarian, Permissive, Neglectful



RESEARCH SUPPORTING SOCIO-EMOTIONAL GROWTH:

- Guroglu (2021) positive peer influence/friends reduce cortisol during stress, and same reward path highlighted for best friends as winning money.

- Insel et al. (2022) reports that adolescents are less likely to participate in risk-taking behaviors in an adult's presence, compared to peer presence.



Chein et al (2011). Peers increase adolescent risk taking by enhancing activity in the brain's reward circuitry. Devel Sci 14:F1-10.

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RESEARCH ON ADOLESCENT BRAIN DEVELOPMENT (SOCIO-EMOTIONAL)

- Prowell (2022) examines the outcomes of supportive adult relationships with youth to reduce cumulative risk and build resilience.
  - Explores the role adults and the greater society have on development.
  - Support Adults tend to be informal mentorships, w/25% being community members that are not school personnel or family.
  - Builds social capital, cultural capital, and emotional capital
  - Adolescents look for nonparental adults to support and build their capital (no different than Bandura (1971)

DAILY LIVING SKILLS (WWW.LIFESKILLSADVOCATE.COM)

	Communication	Executive functioning	Primary Needs	Secondary Needs	Advanced Skills	Advanced Skills +
Teen (13-18)	Understands and responds non-verbal, beginning communication w/partners, negotiate/effective conflict resolution/communicate empathy and grief	Plans out steps for a project, able to collect inf and apply to new settings, beginning to avoid distractions, works to avoid poor time-management	Advanced household tasks, shop for groceries, prepare basic meals, maintains exercise/routines/healthy living concepts, understands safe over the counter medication (older)	Creates & follows a budget, responsibility for finances, navigate transportation , actively working towards goals for adulthood, job skills, career planning	Develops pros & cons of decision making, participates in leisure activities, balances work/play, engages in stress reduction activies, understands mental health	Participates in citizenship activities, understands relevant laws, can respond to basic emergencies, understands consent and assent

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NOW...what about TRAUMA and finally, WHAT DO WE DO?

SO FAR...

- We understand the "biology" of the brain and adolescents: amgydala, hormones, dopamine, reward system, limbic/mesolimbic--the effects of learning, new experiences, pleasure-processing and strengthening those pathways.
- We understand "cognitive" development of the brain centered around the Prefrontal Cortex and thinking, decision-making, hormones "stressing" out the emotional brain affecting the thinking brain.
- We understand through the "biology" and the "cognitive", the SOCIO-EMOTIONAL experiences are influencing the other two!
- **BOTTOM TO THE TOP!**

The Pair of ACEs

Adverse Childhood Experiences

Maternal Depression

Emotional & Sexual Abuse

Substance Abuse

Domestic Violence

Physical & Emotional Neglect

Divorce

Mental Illness

Incarceration

Homelessness

Adverse Community Environments

Poverty

Discrimination

Community Disruption

Violence

Poor Housing Quality & Affordability

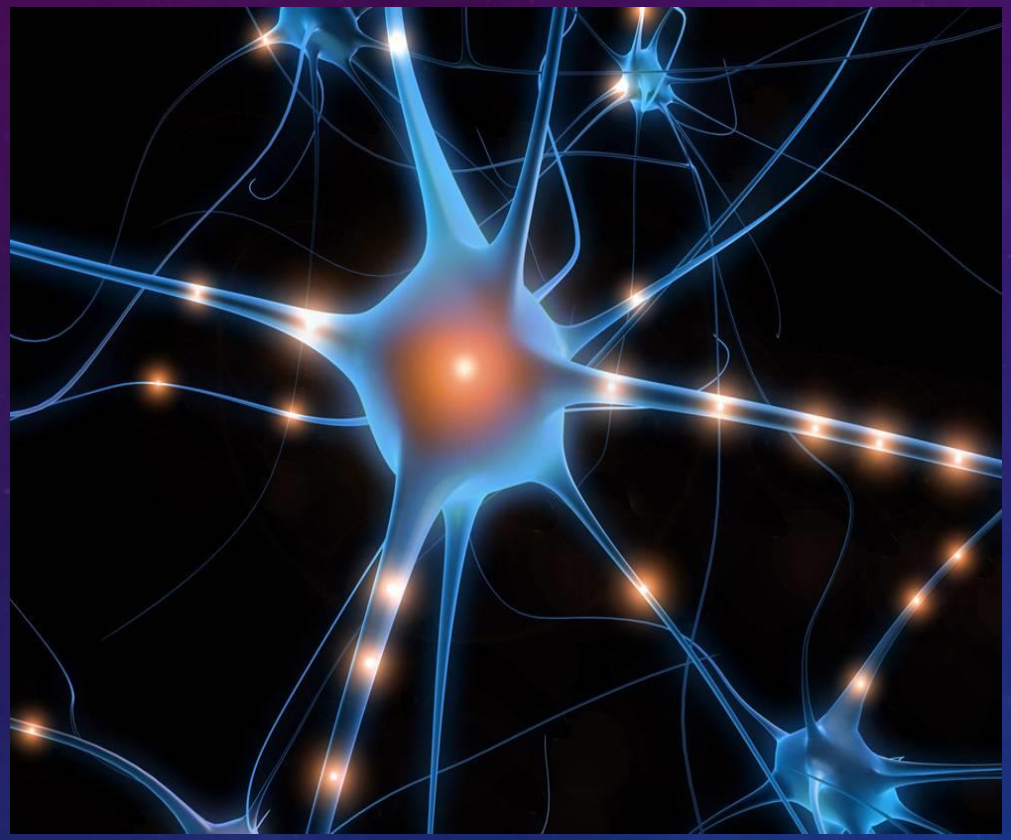
Lack of Opportunity, Economic Mobility & Social Capital

Ellis and Dietz (2017)

Adolescence

	Piaget's Cognitive Stages[62]	Erickson's Psychosocial Stages[63]	Relationship with Caregiver[64]	Pertinent Trauma Symptoms[65]*	Trauma-Informed Responses[48]
Early (10-13 yo)	*Concrete Operational* (7-11 yo) - Can think logically about objects and events	*Task: Industry vs. Inferiority* (5-13 yo) Associated virtue: Competency "How can I be good?"	Begins a period of separation and detachment from caregiver Adolescents begin to ask for more autonomy and independence	Worries/fears of specific situations Change in continence (ex. new bedwetting) Over/under reliance on caregiver Nightmares or sleep problems Perfectionism Risk taking in excess of peers Self-destructive behaviors Academic performance changes Difficulty maintaining friendships Change in eating habits Abrupt change in interests/activities Conflict/difficulty in romantic relationships Unexplained chronic pain Legal system involvement High risk sexual activity	Hold conversations about diagnosis and treatment as a group with medical team, adolescent, and their chosen caregiver(s). Encourage adolescent-driven supported decision making when choices available Promote psychological safety by reassuring adolescents that they are not being assessed as "right" or "wrong". Communicate directly with adolescent rather than through a caregiver. Engage adolescents in making plans and setting goals. Inquire about important peer relationships and how adolescents would like them involved; consider how they can provide support in person or virtually. Assist adolescents in communicating with school, work, and/or family as desired. Plan for safe discharges when adolescents have less caregiver supports
Middle (14-16 yo)	*Formal Operational* (11+ yo) - Can think logically about abstract propositions - Can test hypotheses systematically - Becomes concerned about the hypothetical, future, and ideological problems	*Task: Identity vs. Role Confusion* (13-19 yo) Associated virtue: Fidelity "How can I fit into the adult world?" *Task: Intimacy vs. Isolation* (19-35 yo) Associated virtue: Love "How can I love?"	Parents/caregivers often begin to relax control Adolescents strive for a satisfying relationship with caregivers and increased connectedness Often considered a "recovery process" after earlier struggles for autonomy		
Late (17-20 yo)					

THE BRAIN ON STRESS



http://www.timothyhallinan.com/blog/wp-content/uploads/2011/03/NeuralPathways.jpg

When the amygdala is activated by signals of threat and danger, the body is flooded with stress hormones, such as adrenaline and cortisol preparing the body for survival actions – with light surge of cortisol, many "non-essential" functions, including digestion, creative thinking and social engagement, promptly shutdown.

Without positive support. the stress may intensify and begin to create neural pathways that connect the experience with the physiological response. With each recall of the experience these neural pathways strengthen for easy access to future similar experiences causing the hijacking of the body by the stress response

Our brains have evolved such that negative experiences out way positive experiences. This negative bias sets default to *over*estimate threat and *under*estimate opportunities and resources for coping.

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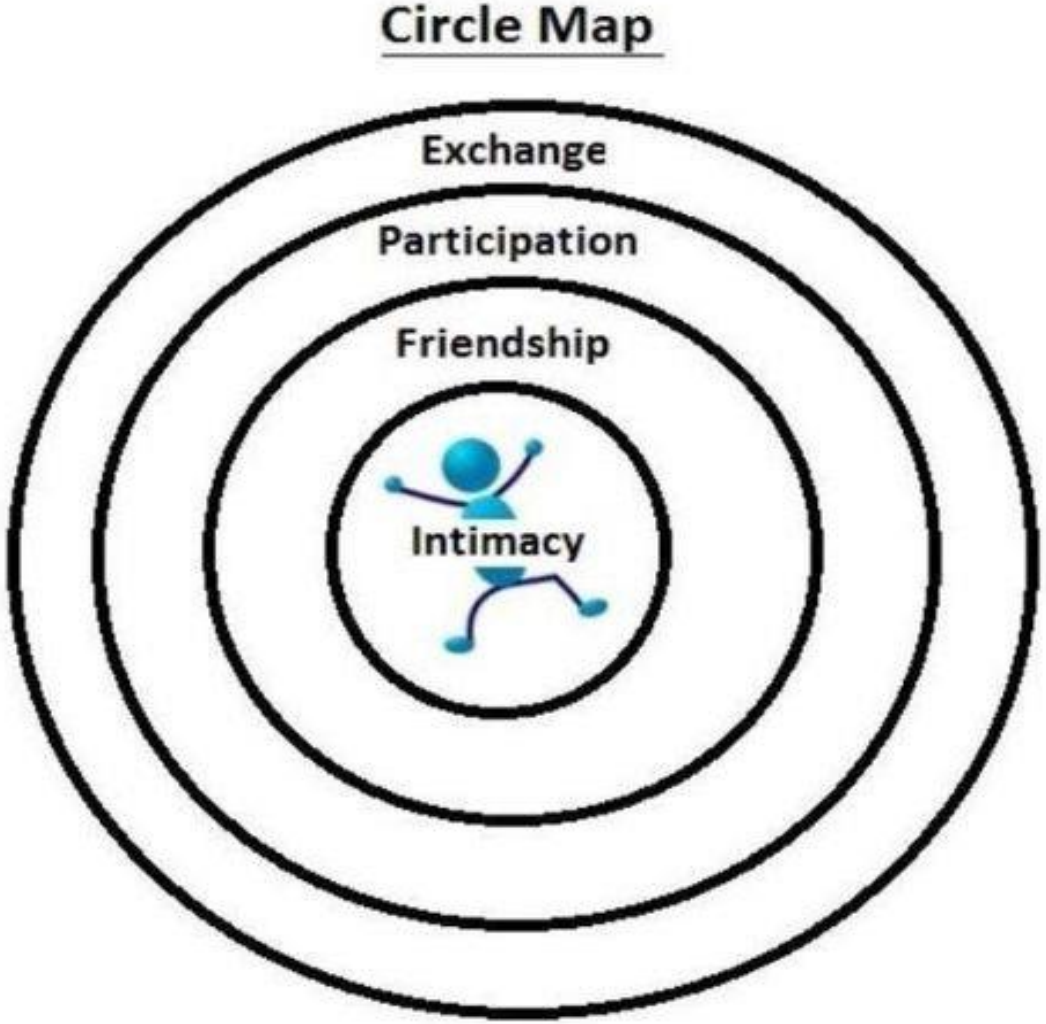
INTERVENTIONS (WHAT DO WE DO?)



Intimacy
Who we confide in, share secrets and emotions

Friendship
Friends and relatives that we must see regularly

Participation
People or organisations you particiapte with in life (school, clubs, work)

Exchange
People paid to be in our lives (teachers, social workers, doctors, even hairdressers!!)

Jeder Institute 2016

Adolescence

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AS ADULTS AND COMMUNITY MEMBERS:

- Encourage risk-taking: builds autonomy,
  - Blue hair and ripped jeans versus binge-drinking and sexting
- Behaviors and consequences:
  - agree on rules, values, stay connected
- Support developing “help-seeking” behaviors (Szwedo et al. 2017)
  - Respect THEIR privacy.
  - Give them control over some decision-making.
  - Allow them to push the limit, and explain why **you can not**
  - Validate: in a non-judgmental stance.
  - Do not correct their behaviors
- Acknowledge independence from family and roots.

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Mirror Neurons

Relationship, relationship, relationship

In the context of a loving relationship with a caring adult, children have the opportunity to develop vital coping skills. The presence of a responsive adult can also help to reverse physiological Changes.

Express unconditional love, not undeserved praise

It is important for children to believe that you value them no matter what.

Tell children exactly what you love about them that doesn't have to be earned.

Model Self-acceptance -

Letting your kids see the real you, flaws and all, will help them accept themselves and their own imperfections.

Nurture optimism – Optimism is a key characteristic of resilient people. The brain can be rewired to be optimistic through the experiences it is exposed to. Model optimistic view points;

Adapted from: How to build a child's self-esteem. Hint: It doesn't involve praise.
By Heidi Lynn Borst, July 26, 2021 at 9:00 a.m. EDT https://www.spokesman.com/stories/2021/aug/08/how-to-build-a-childs-self-esteem-and-hint-it-does/

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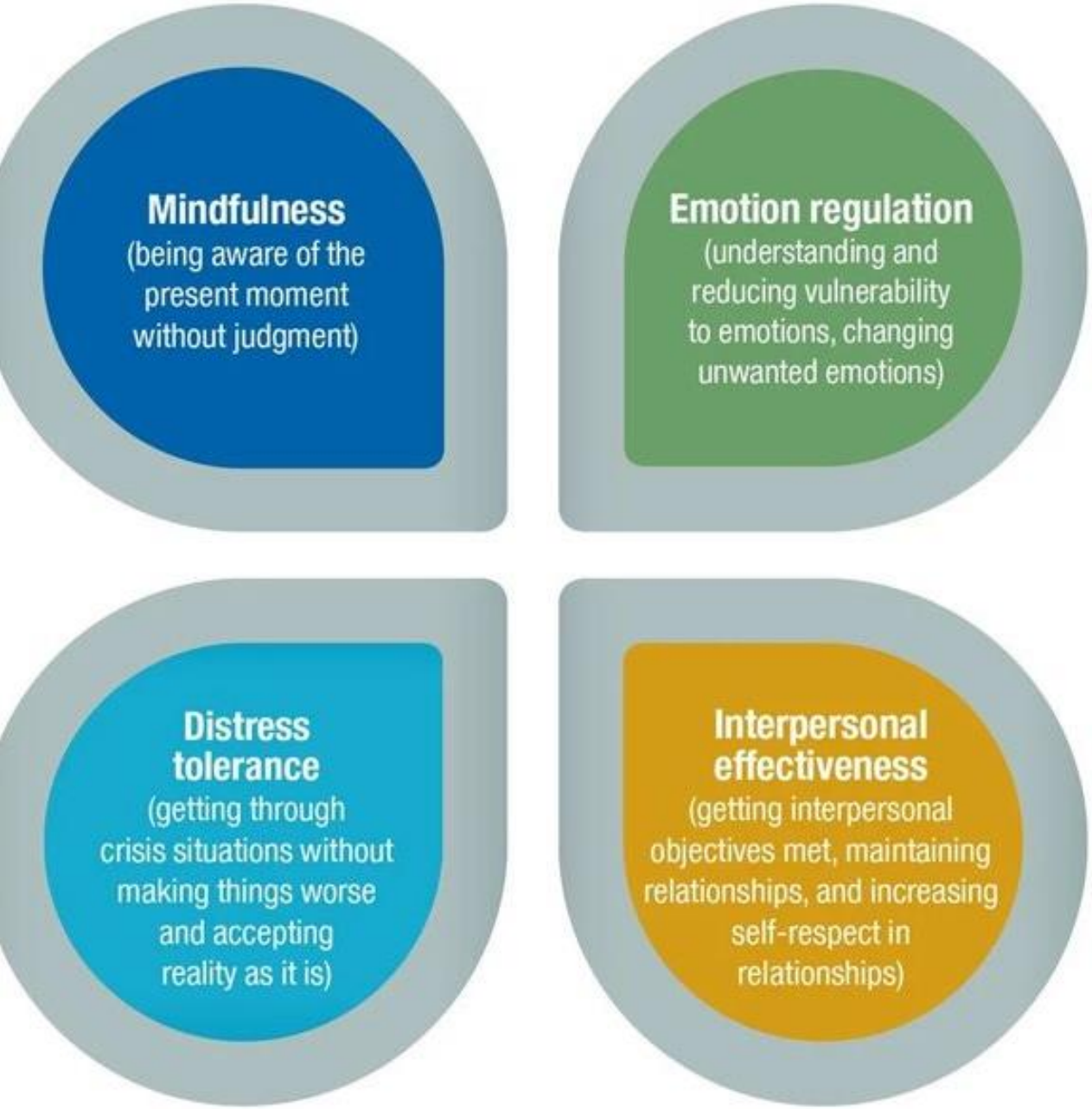

Image from psychiatrictimes.com

DIACTICAL BEHAVIORAL THERAPY (DBT) (LINEHAN, 1993)

VALIDATION (A NECESSARY SKILL)

BUT versus AND

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COMMUNICATION

- **HUMOR**
- Open posture, sounds, gestures, and eye contact.
- Demonstrate GENUINE interest in what they like EVEN if it does not align with what you think is good or like.
- Use the language they use, do not correct.
- Do NOT:
  - debate,
  - critique,
  - divert (their concerns to yours),
  - moralize “should”,
  - advise (if I were you…),
  - sarcastic (Did you get up on the wrong side of the bed?’,
  - analyze (you don’t really meant that….JUST VALIDATE and listen.
- Give time for a response, they might be thinking—be socratic
- Be transparent
- Respond with Logic and not emotion, co-regulate.
- They will be distracted, we just covered why…redirect with kindness,
- Find the good/creative in what they are doing

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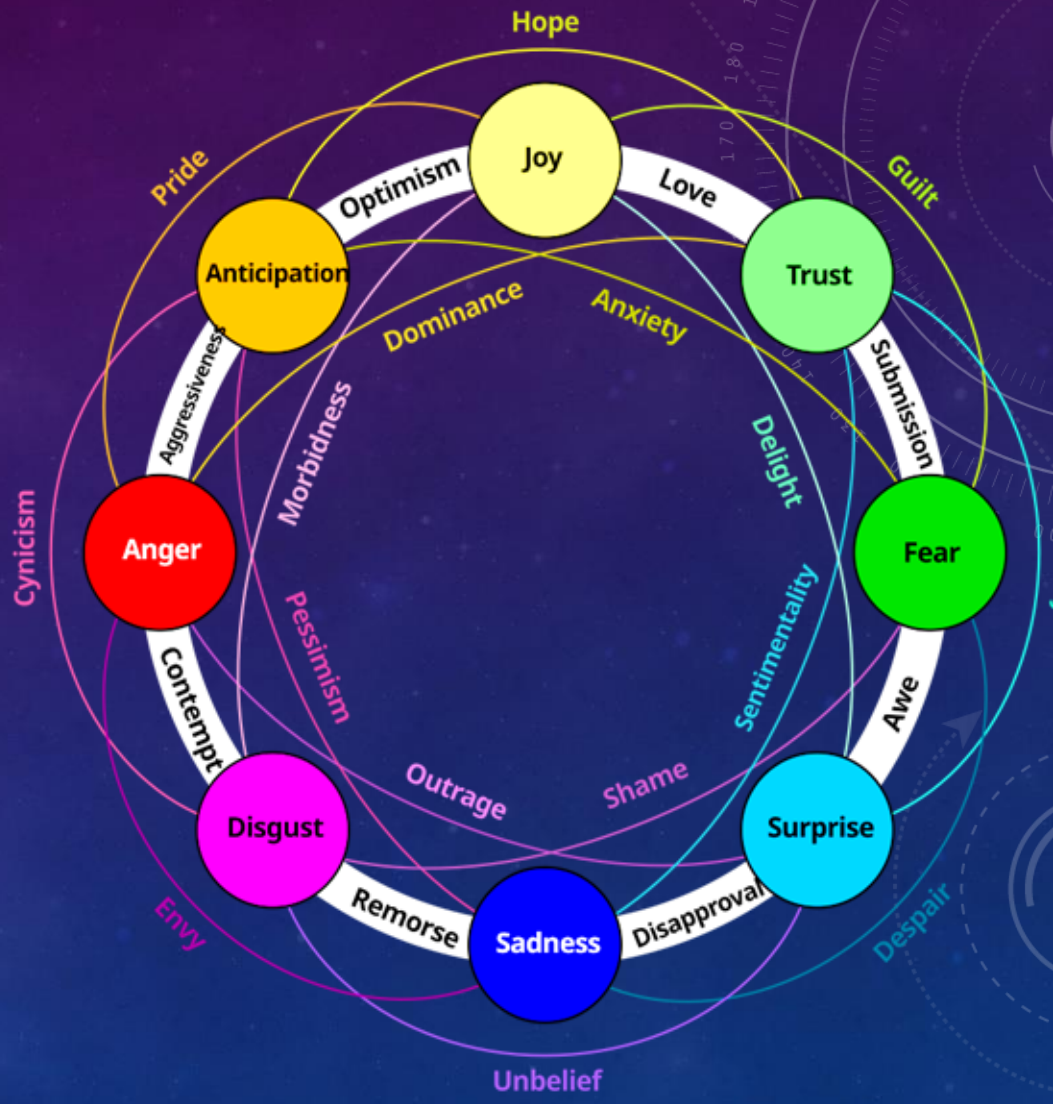
GET COMFORTABLE WITH THE AND….

- Closeness and Conflict
- Hierarchy and Shared Responsibilities
- Parents and Other Adults
- Autonomy and Connection
- Individual identity and Social identity



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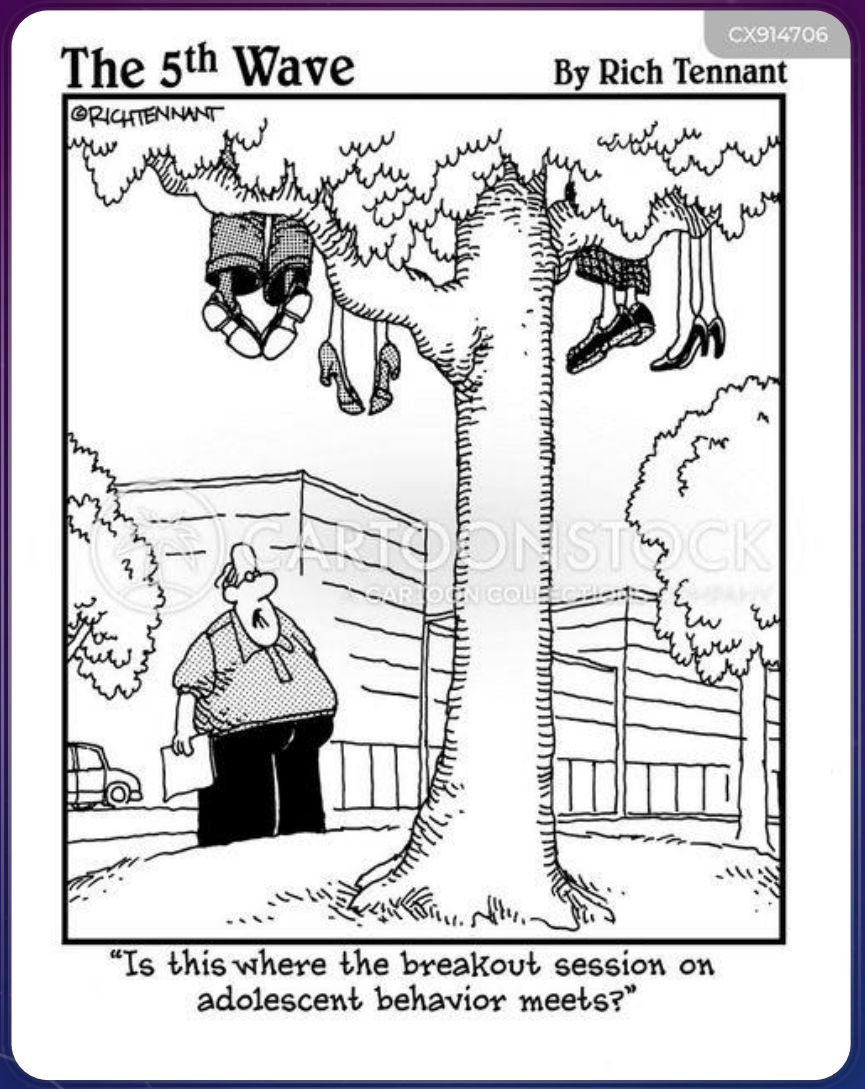
CONCLUSION

- Much of the research on the adolescent brain is centered on limbic system, the reward circuitry and the connections to the prefrontal cortex (PFC) when explaining various behaviors (sensation-seeking, perspective-taking, decision-making)
    - The brain has the ability to generate new neural pathways and improve/change over time
    - Hormones affect communication and functioning of systems across the brain
    - Reward Circuitry is a complex network that reinforces behavior
- Physiological and Cognitive development is influenced by socio-emotional factors (parenting, environment, etc)
- Trauma affects the development of the brain across the biopsychosocial spectrum



CONCLUSION---WHAT TO DO!

- Supportive adults play a key role in developing new neural pathways through creating new positive memories, reducing the release of cortisol, stimulating the growth of new reward pathways.
- Dialectical Behavior Therapy (DBT) offers different skills that support communication between the limbic system and the prefrontal cortex.
- Adolescent development is a series of dichotomous relationships.
- Relationship and communication are key to prosocial adolescent behaviors that include positive risk-taking/sensation seeking, perspective-taking skills, emotional regulation, and autonomy that stength the building of neural pathways throughout the brain (white matter)
- Work together!

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