

# ADHD and Self-Regulation

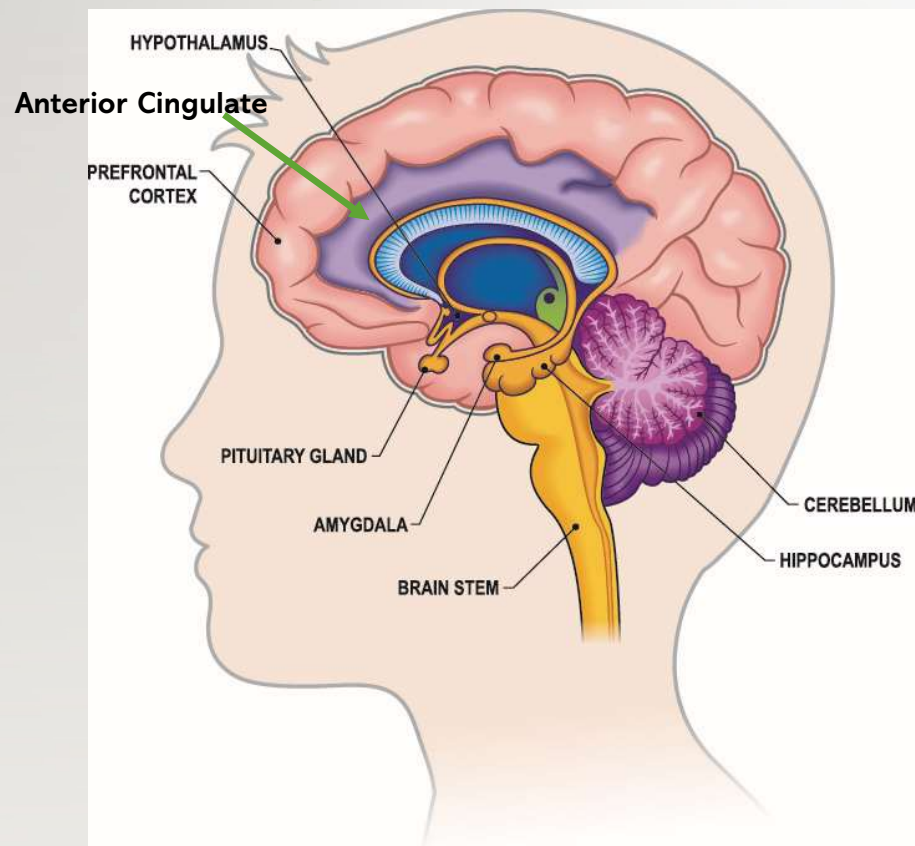


PRESENTED BY MIRANDA DOHERTY, OT  
B.C. PROVINCIAL ADHD CLINIC AT B.C. CHILDREN'S HOSPITAL  
ADHD PARENT EDUCATION DAY – NOVEMBER 5, 2025

# Learning Objectives

- ✓ To understand the science behind self regulation and ADHD
- ✓ To define self-regulation
- ✓ To learn some sensory and motor self-regulation strategies

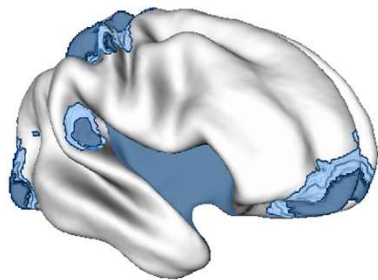
# Neuroscience of Self-Regulation



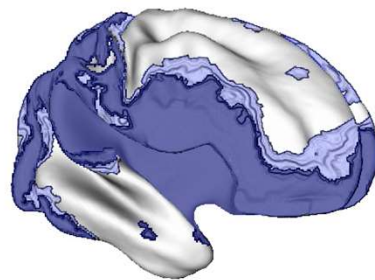
- **Prefrontal cortex** – Executive Functioning
  - Dorsolateral PFC working memory, cognitive flexibility, motor planning
  - Inferior PFC- inhibitory control, suppress distractions and irrelevant thoughts
- **Limbic System** - Emotions/feelings
  - Anterior cingulate recognizes temptation and need for self-control
  - Amygdala – processes emotions, fear, anxiety, identifies stressor
- **Brain Stem** - Reptilian brain - for survival

# The ADHD Brain

AGE: 6



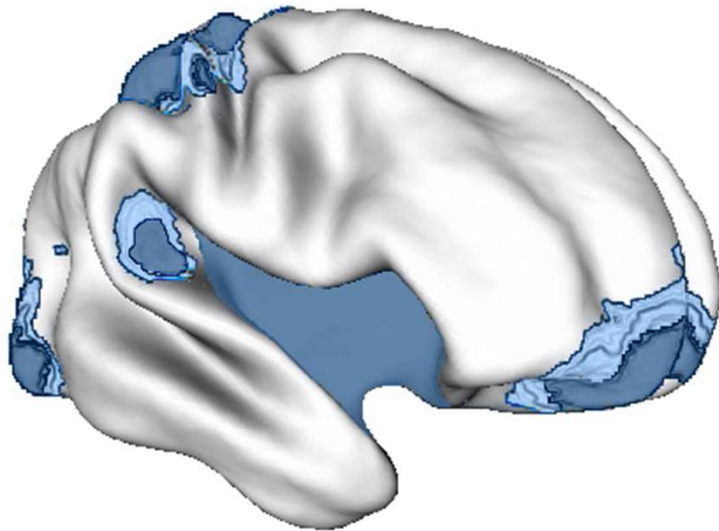
ADHD



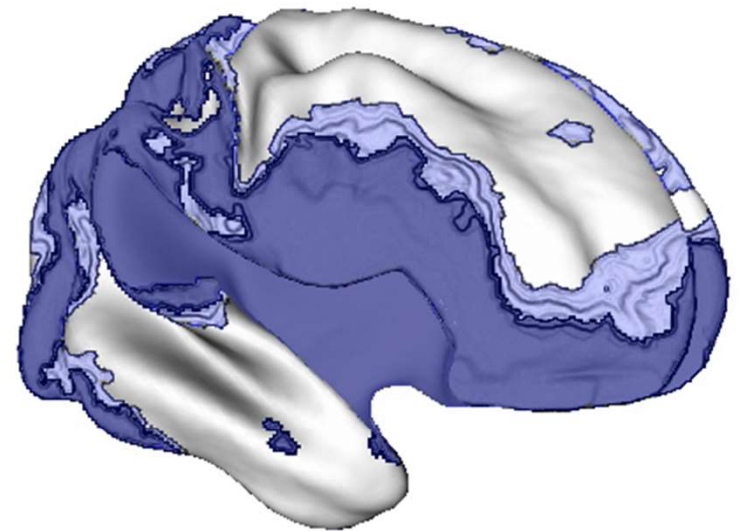
TYPICALLY DEVELOPING  
CONTROLS

- 2-5 year delayed cortical maturation
- Most prominent delay in **lateral prefrontal cortex**
- Ability to suppress inappropriate responses and thoughts
- Executive control of attention
- Evaluation of reward contingencies
- Working memory

**AGE: 6**

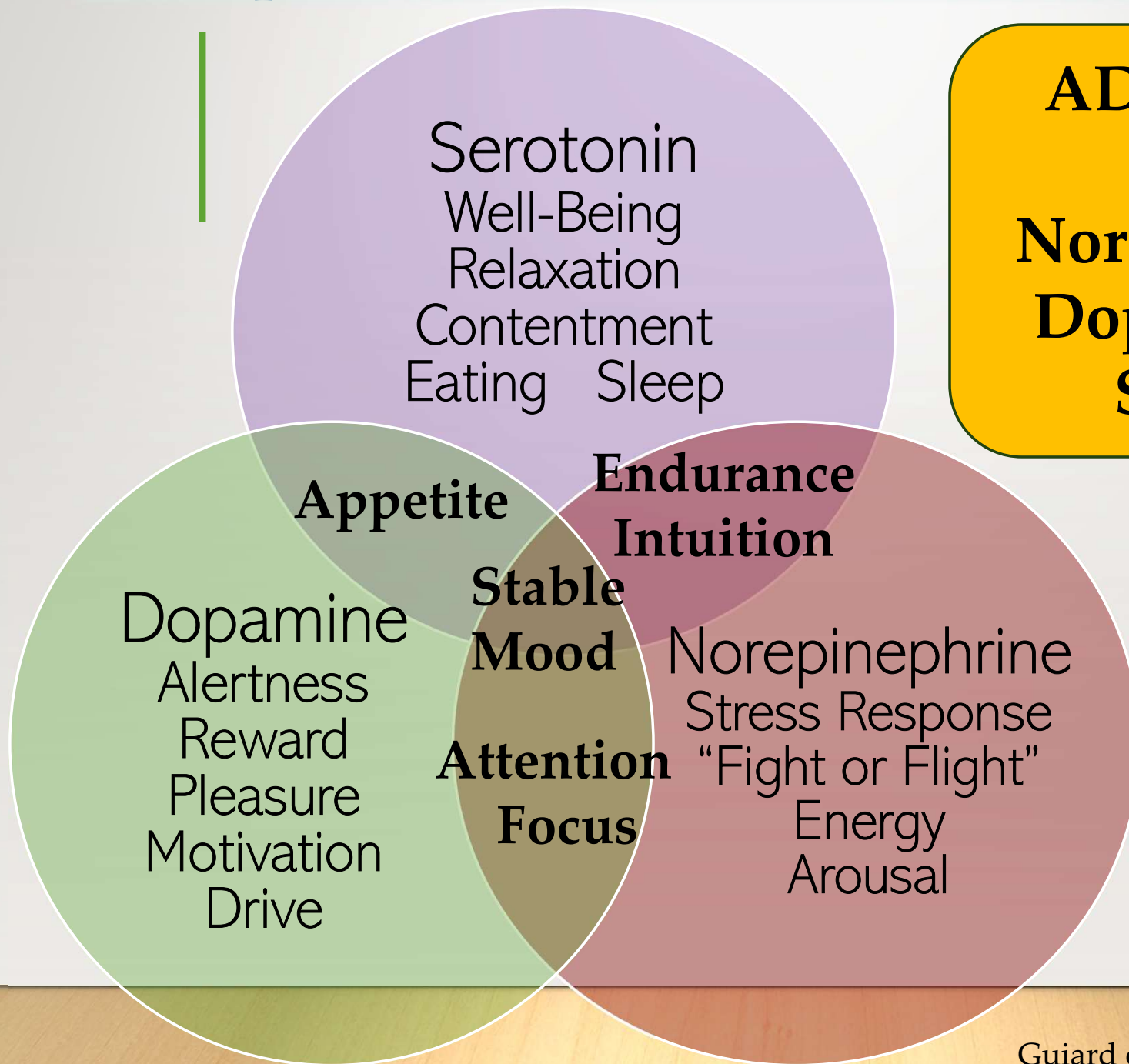


**ADHD**



**TYPICALLY DEVELOPING  
CONTROLS**

# Important Neurotransmitters in Regulation



**ADHD - lower levels of Norepinephrine, Dopamine, and Serotonin**

# Self-Regulation Defined



**SELF-REGULATION** = the ability to attain, maintain, and change arousal appropriately for a task or situation. (Williams & Shellenberger, 1996)

**AROUSAL** = a state of the nervous system, how alert one feels

How people manage stressors, how much energy we expend and how well we recover (Shanker, 2013)

To be able to understand and respond to others and ourselves

# Domains of Self-Regulation

Empathy,  
moral  
behaviour

prosocial



biological  
Body,  
physiological

emotion  
Emotions,  
respond to  
feelings

social  
Appropriate  
interactions,  
reading cues

cognitive  
Thinking,  
processing,  
attention

# Biological Domain

Physiological regulation

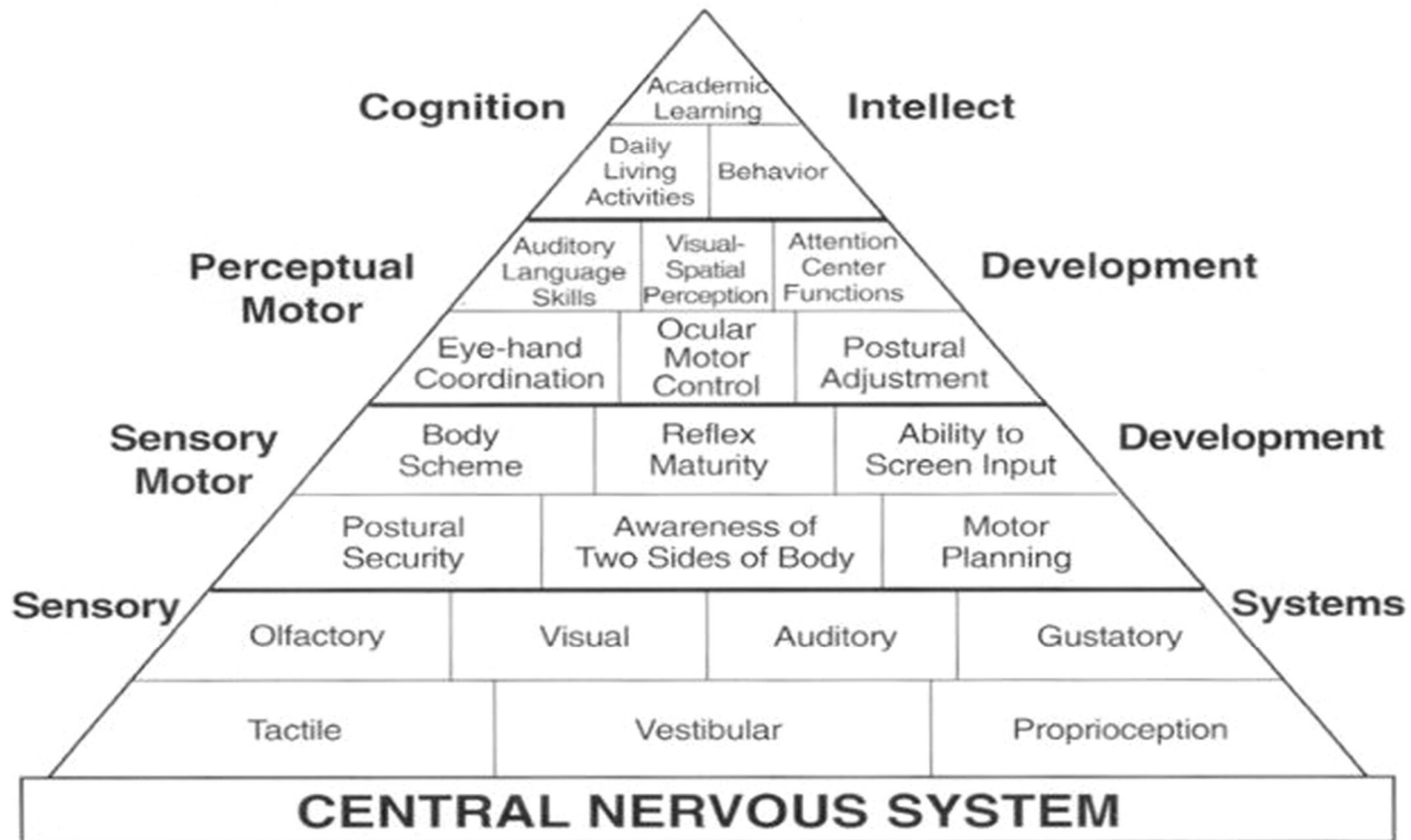
Body systems – motor, sensory, digestive, cardiac, respiratory, etc.

All individuals have sensory and motor preferences

No Right or Wrong

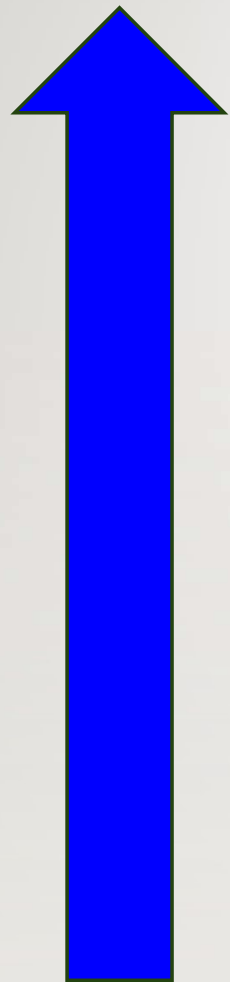
Our preferences influence the strategies we choose to help us regulate our biological domain

# Pyramid of Learning



© Taylor/Trott 1991

Pyramid of Learning (Taylor/Trott, 1991)



**Prosocial  
Social**

**Prosocial** = Connect with and care about what others are thinking and feeling, to empathize and act accordingly

**Social** = Understand both the meaning of a variety of social interactions

**Cognitive**

**Cognitive** = Sustain and shift one's attention and ignore distractions

**Emotional**

**Emotional**  
Monitor, evaluate, and modify one's emotions

**Sensory Motor Self-Regulation**

**Biological** = Attain, maintain, and change one's level of energy to match the demands of a task or situation

# The Foundation of Self-Regulation

Social Emotional Learning (SEL) is built on the foundation of Biological Self-Regulation (Williams & Shellenberger, 2025)

Many SEL programs assume that a child has already *achieved these biological (Sensory Motor) self-regulation skills.* (O'Grady, 2024)

**Emotional regulation relies on the ability to recognize internal states and adjust. Recognition is impossible if a child cannot reliably interpret the signals within their body.** (Ng, 2024)





# Eight Senses



MOUTH –  
GUSTATORY  
(TASTE) AND  
ORAL  
TACTILE  
(TEXTURE)



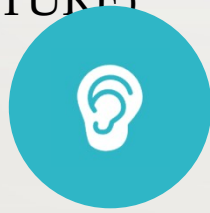
MOVE –  
PROPRIOCEPT  
ION AND  
VESTIBULAR



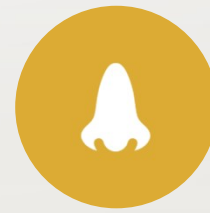
TOUCH –  
TACTILE



VISUAL –  
SIGHT



AUDITORY –  
HEARING



OLFACTORY –  
SMELL



INTEROCEPTION –  
INTERNAL SIGNALS,  
HUNGER, THIRST, OR  
A RACING HEART

# Sensory Motor Tools



Interoception

MOUTH

MOVE

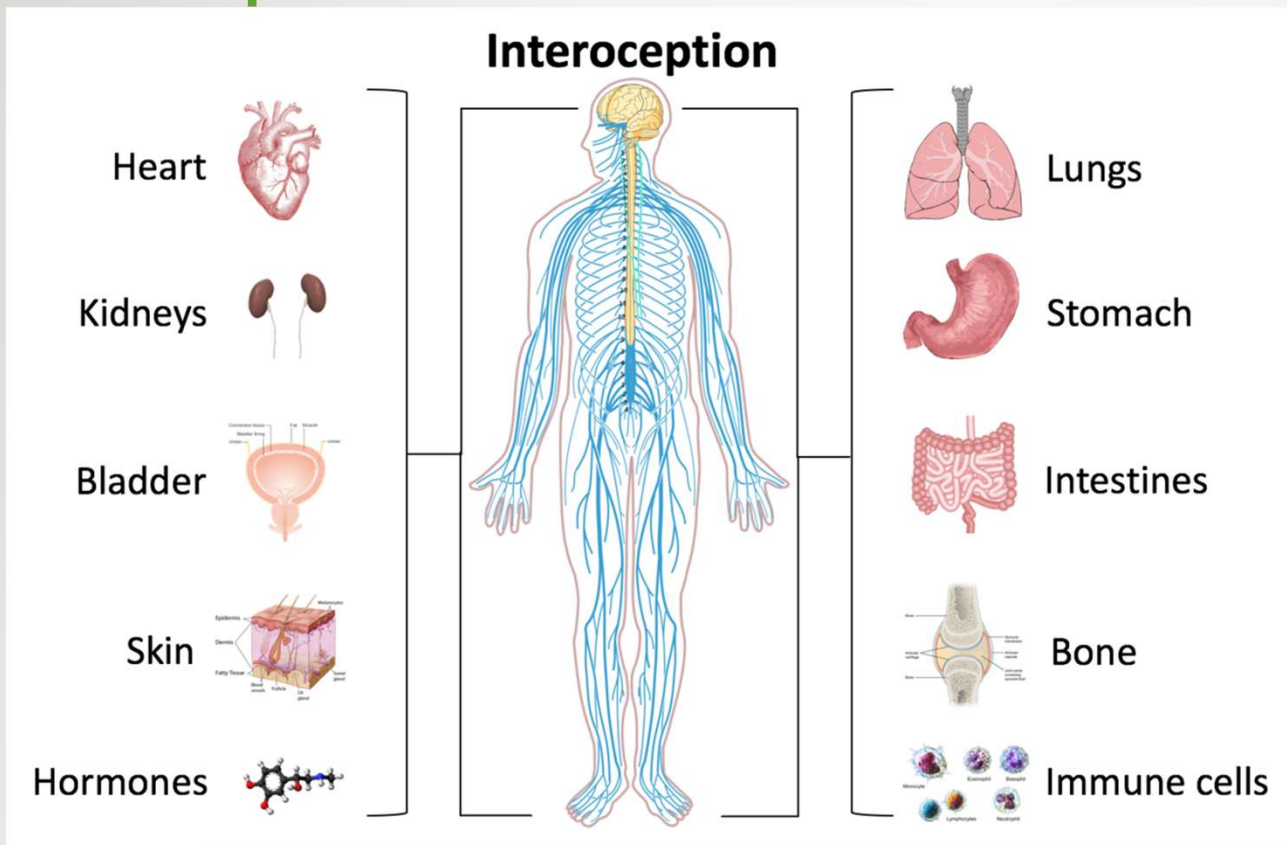
TOUCH

LOOK

LISTEN

# Interoception

= awareness of internal sensations



## Three Dimensions of Interoception:

1. Interoceptive accuracy - performance
2. Interoceptive sensibility - self-report
3. Interoceptive awareness - metacognitive

# Interoception and ADHD

- Interoception is reduced in individuals with ADHD (**systematic review, Burton et al, 2025**).
- Children with ADHD may experience **interoception accuracy and awareness difficulties** such as:
  - Poor accuracy – have trouble recognizing when they are hungry, thirsty, tired, bathroom break, or need a break
  - leads to challenges in managing their emotions and bodily needs.

Evidence of self-regulation programs for ADHD

Self-Regulation Programs for Children with ADHD

Best Evidence identified for children with ADHD:

Better home-based outcomes, parent engagement and scaffolding

Alert Program<sup>®</sup> for Self Regulation

The Incredible Years<sup>®</sup>

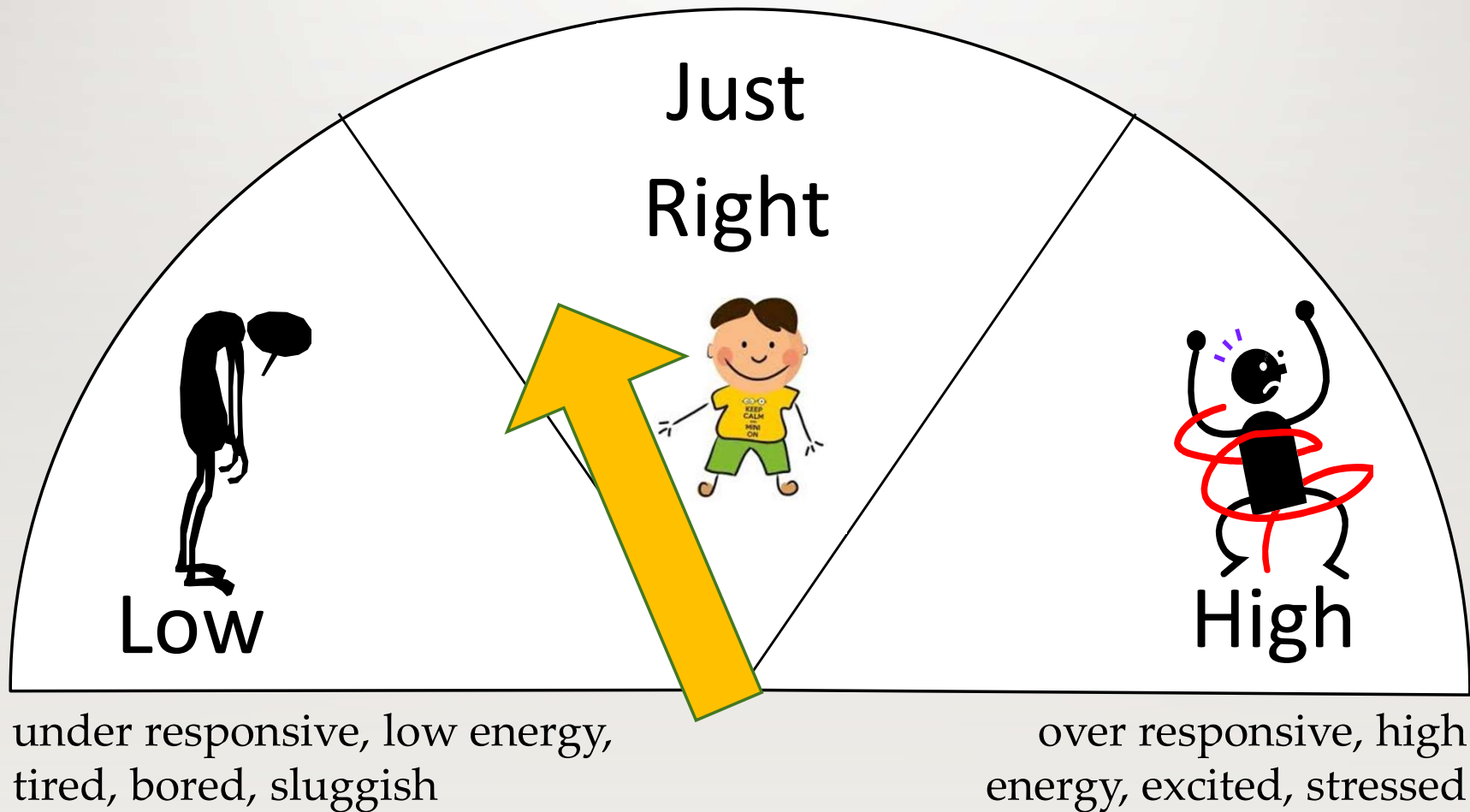
(Prosperi, 2025)

# Alert Program for Self-Regulation<sup>®</sup>

(Williams & Shellenberger, 1996, 2025)



## *"How Does Your Engine Run?"*



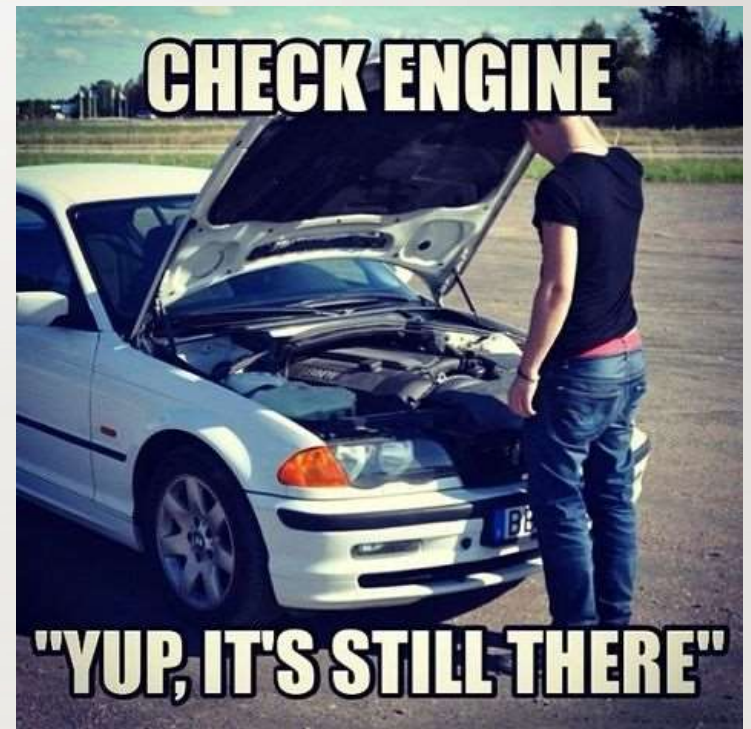
# Co-Regulation



- “Back and forth exchanges with each person adjusting their response based on the response of the other”
- Parent engagement and scaffolding
- Parent Modeling
- Body Doubling

# Self-Regulation Process

1. Check Engines (interoception)
2. Recognize that Engine not Just Right
3. Determine Right tools to get to “Just Right” for the situation
4. Choose and Use to Regulate
5. Re-Check Engines



# Chewing Gum Helps Attention

- Systematic review of 22 studies (Hirano & Onozuka, 2015)
- Positive effects of chewing on attention, especially sustained attention
- Helps increase alertness
- Helps improve mood
- Helps relieve stress
- Effects for 15-30 minutes or longer



# Relaxation effect of Breathing

Slowing breathing to 8 breaths/minute activates the parasympathetic nervous system, suppresses the sympathetic nervous system (Komori, 2018)

Prolonged expiratory breathing activates the parasympathetic nervous system, calming

**Breathe in 4 steps**  
**Breathe out 6 steps**

# Movement Tools

- Dynamic Seating (Disc O Sit, Movin' Sit, ¼ inflate a beach ball, therapy ball, Kore stool)
- Movement Breaks
- Classroom Helper Jobs
- Hallway Wall activities
- Heavy Work
- Theraband across chair legs
- STAND UP



# Physical Activity Evidence

Physical activity  
before school, 30  
minutes

Parent and teacher  
reports improved  
ADHD symptoms,  
moodiness, and peer  
functioning

Easily accessible, low  
risk, low cost, and has  
potential health  
benefits

Regular exercise  
increases dopamine,  
serotonin, and  
norepinephrine

Moderate to vigorous  
intensity

Chronic moderate  
exercise can enhance  
brain plasticity.

# Heavy Work



- Walk or Run
- Climbing, Hiking, Biking
- Sports
- **Heavy work = Push, Pull, Lift, Carry**
- longer lasting effect with dopamine, norepinephrine, and serotonin

# Touch Tools

- Deep Pressure tools: Hugs, Massage, Leaning, Blankets
- Warm, Cold
- Something in your hands, Fidget tools
- Lap weights – Manimos, Hugimals, weighted blanket



# Fidgets



Tangles



Needs to be small, quiet,  
and have a moving part.

**ARE THEY TOYS OR TOOLS?**



Fidget Newton



Calm Strips



# More Fidget Tools



Speks



Lifelines Grounding Stones



- Needoh Cubes, Slime
- Doodling, Colouring
- Fidget Cubes, Infinity Cubes, Rubiks cubes
- Picking and tearing at objects
- Fidget rings, Spin rings, bracelets



Stimagz



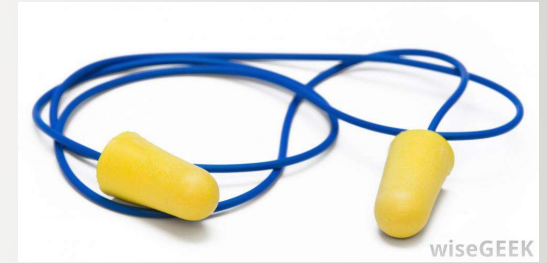
# Eye Tools

- Lamps
- Blinds
- Hoodies and Hats
- Sunglasses
- Reduce visual
- Close eyes
- Leave room
- Sensory Safe space



# Ear Tools

- Music
- Silence - Ear plugs, noise cancelling
- Leave room, quiet space
- White noise, radio, fan, waves, wind



## Noise filtering:



Loop



Flare Calmer



Vibes



Hoodies

# Natural boosters

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Physical activity

Hugs, physical  
connection

Social  
Connection

Laughter

Breathing

Getting enough  
sleep

Eating enough  
protein and food

Listening to  
music or doing  
something that  
brings you joy

Spending time  
Outdoors

# Key Points



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Co-Regulation is key

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Biological Domain is the Foundation of Self-Regulation

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Sensory Motor Tools are just “things”, until you learn to use them

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Engine Speeds Analogy for Internal Awareness

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Biological Self-Regulation is a process of Interoception and Mindful awareness

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Mouth, Move, Touch, Look, Listen, and Interoception together



THANK YOU!

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