

# Nervous System Regulation with Neurodiverse Clients: Sensory-Affirming Neurodivergent Care at the Intersection of ADHD, Autism, Trauma and Sensory Processing

Techniques for stabilization through coregulation,  
upregulation, downregulation, via sensory grounding.

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# Overview

- **The impact of trauma upon pediatric neurodevelopment, the sensory systems and the nervous system.**
  - What is Sensory Processing Disorder (SPD)?
  - The overlap between SPD, ADHD, and trauma
  - Areas for clinical discernment
  - The impact on trauma and SPD on pediatric neurodevelopment
  - Common post-traumatic sequelae: Most frequent difficulties
- **Window of Tolerance / Window of Capacity as a psycho-ed tool**
- The 5 main sensory systems and the 3 hidden sensory systems.
- Sensory processing differences: What is it and how does it present?
- Sensory processing differences: Strategies for grounding and resourcing.

# What is SPD (Sensory Processing Disorder)?



SPD (Sensory Processing Disorder / Differences) is a **condition that affects how your brain processes sensory information (stimuli).**



Sensory information includes things you **see, hear, smell, taste, or touch.**



SPD can affect **all** of your senses, or **just one.**



SPD usually means you're **overly** sensitive or **underly** sensitive to stimuli that other people are not.

# The overlap between SPD, ADHD, and trauma

Between 5-15% of people have a sensory processing disorder, and this rate is higher among ADHDers (50%) and Autistic people (75%).

(Miller et al., 2017. STAR Institute for Sensory Processing.)

There is a high correlation between Sensory Processing Disorder (SPD) and Anxiety Disorder (AD), given that sensory sensitivities put a child/adult at higher risk of experiencing anxiety.

There is a high correlation between primary Post Traumatic Stress Disorder (PTSD) and secondary Sensory Processing Disorder (SPD), meaning that trauma-related #sensorystress increases the likelihood of experiencing sensory over-responsivity, sensory-avoiding, and sensory anxiety.

Please find a qualified and experienced Occupational Therapist.

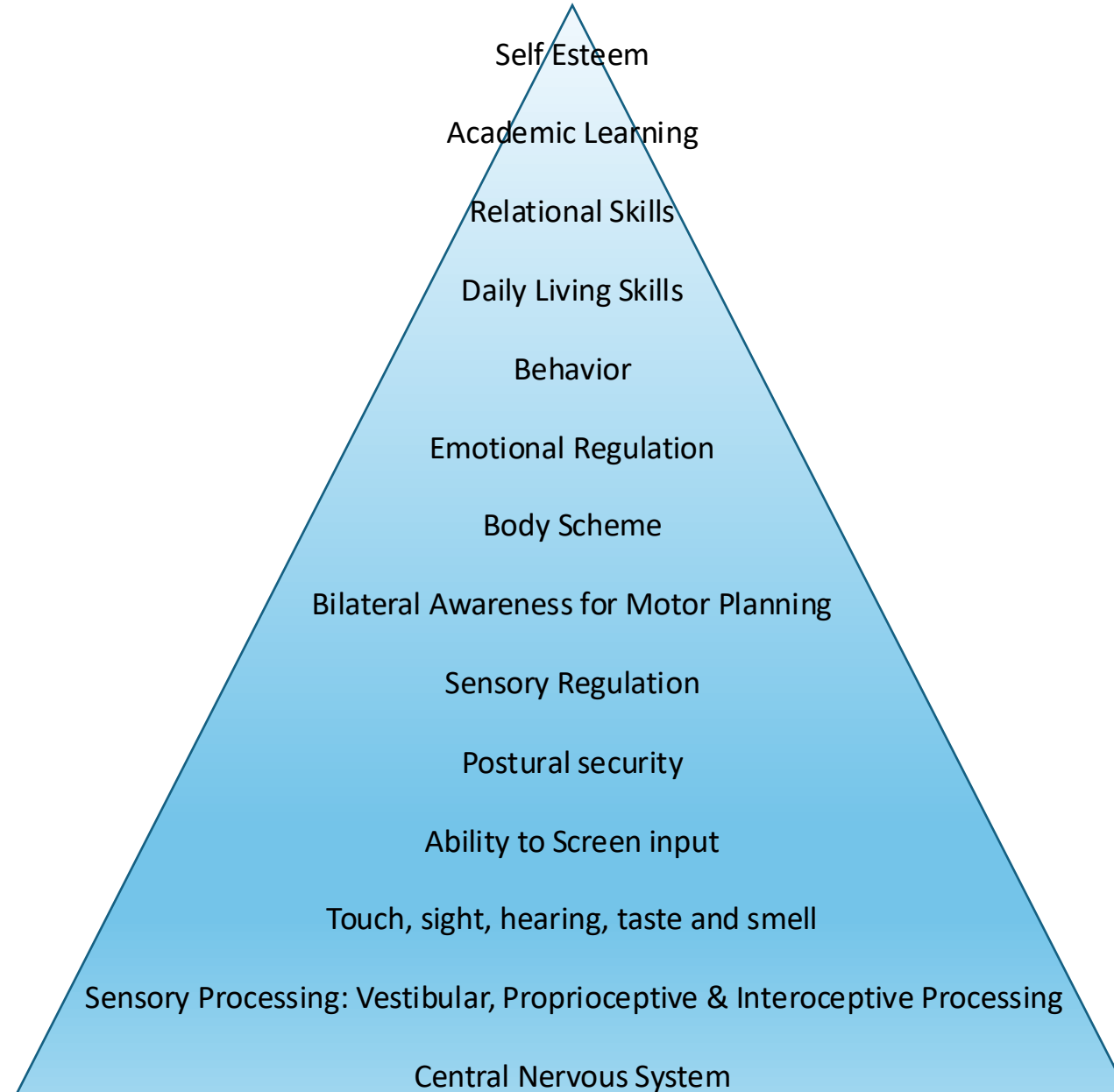
Ask for a sensory processing evaluation.

To understand if/how sensory processing struggles impact overall functioning.

# Areas for clinical discernment

- Is it a sensory meltdown or a trauma reaction?
- Is it sensory burnout (Autistic burnout) or depression or collapse?
- Is it ADHD daydreaming, time-blindness or understimulation, or is it dissociation?
- Is it ADHD impulsivity or PTSD narrow window of capacity + a trauma response?
- Is it ADHD hyperactivity or PTSD hyperarousal?
- Is it ADHD rejection sensitivity or is it an C-PTSD abandonment wound?
- Is it ADHD executive function, emotional regulation and attention issues....or is it PTSD hyper/hypo arousal?
- Is the object impermanence ADHD or avoidant attachment?
- Am I an extrovert or am I a sensory-seeker or am I ADHD (likes novelty) or am I living in avoidance (PTSD)?
- Is the alexithymia trauma-related, a skill not taught, a trait not valued within a family system or cultural system, or a personality trait due to overwhelming emotions (due to underlying hypersensitivity)?
- Is it concrete thinking (an autistic trait) or is it rigid thinking (a PTSD trait) or is it both?

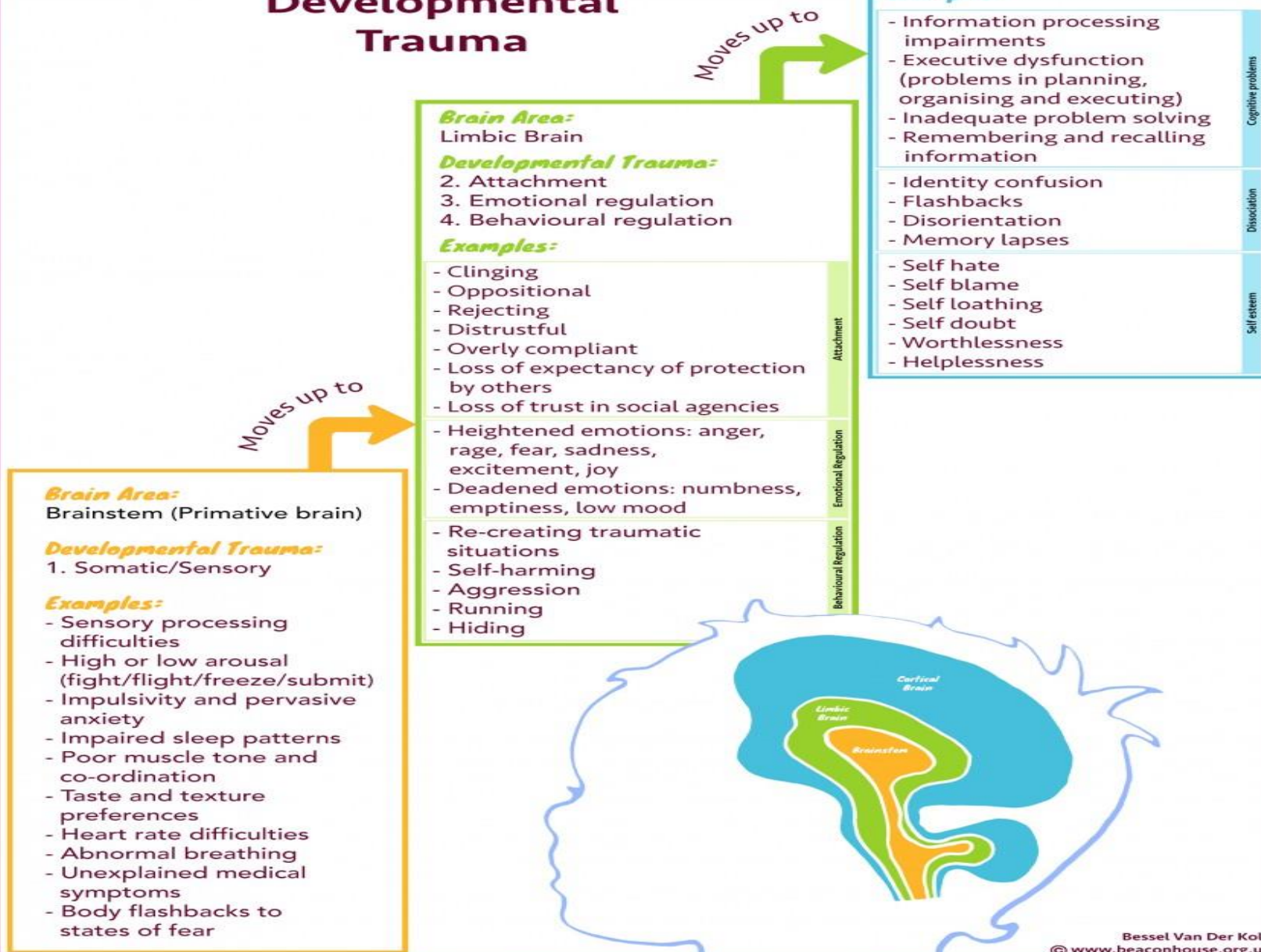
# SPD: Impact on Development



Galiana-Simal, A.,  
et al. (2020).  
Sensory processing  
disorder: Key  
points of a frequent  
alteration in  
neurodevelopmental  
disorders. *Cogent  
Medicine*, 7(1),  
1736829.

**Beacon House**  
Therapeutic Services and Trauma Team

# Developmental Trauma



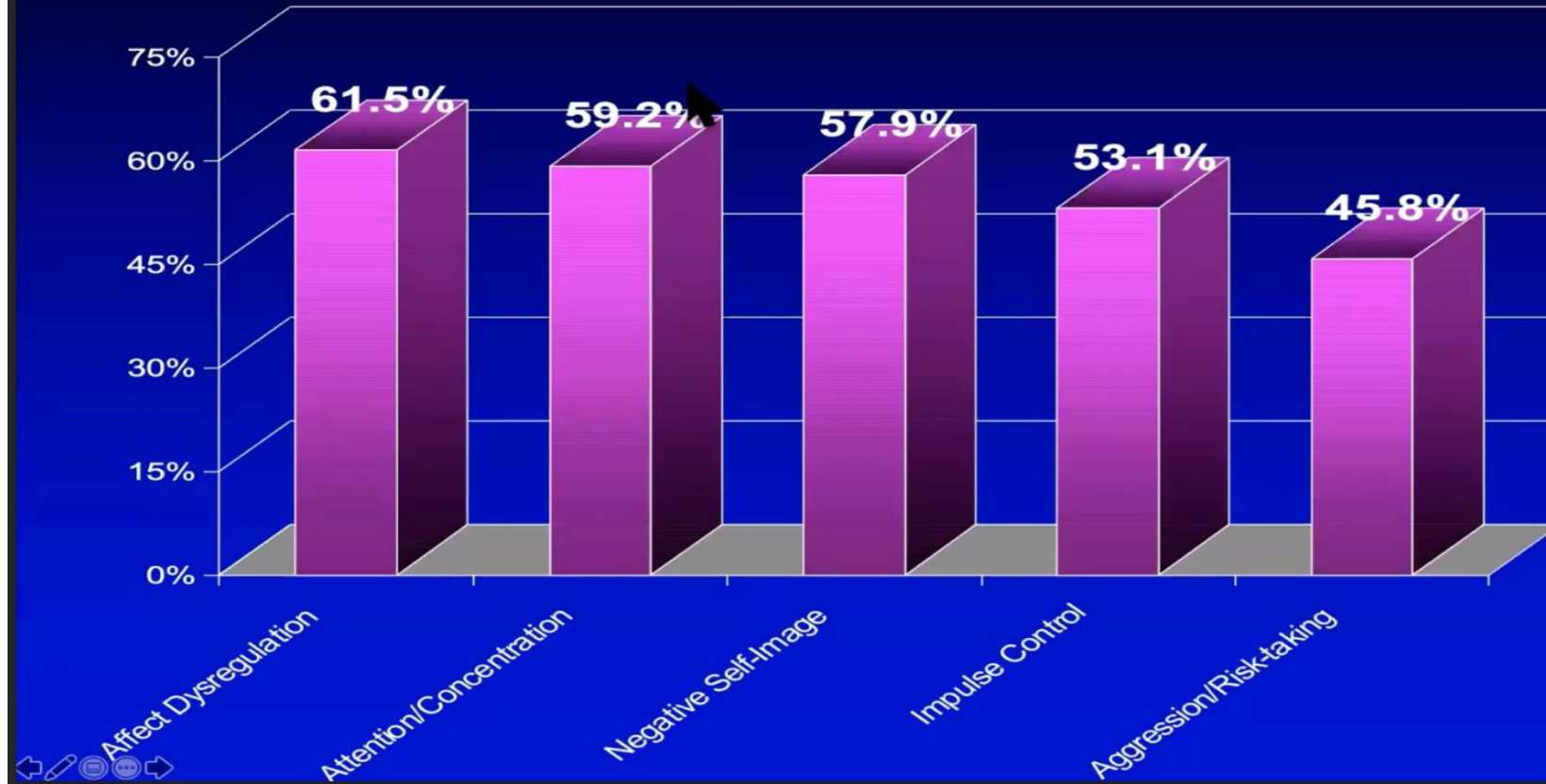


# Domains of Impairment in Children Exposed to Complex Trauma

I. Attachment	IV. Dissociation	VI. Cognition
<ul style="list-style-type: none"> <li>Problems with boundaries</li> <li>Distrust and suspiciousness</li> <li>Social isolation</li> <li>Interpersonal difficulties</li> <li>Difficulty attuning to other people's emotional states</li> <li>Difficulty with perspective taking</li> </ul>	<ul style="list-style-type: none"> <li>Distinct alterations in states of consciousness</li> <li>Amnesia</li> <li>Depersonalization and derealization</li> <li>Two or more distinct states of consciousness</li> <li>Impaired memory for state-based events</li> </ul>	<ul style="list-style-type: none"> <li>Difficulties in attention regulation and executive functioning</li> <li>Lack of sustained curiosity</li> <li>Problems with processing novel information</li> <li>Problems focusing on and completing tasks</li> <li>Problems with object constancy</li> <li>Difficulty planning and anticipating</li> <li>Problems understanding responsibility</li> <li>Learning difficulties</li> <li>Problems with language development</li> <li>Problems with orientation in time and space</li> </ul>
II. Biology	V. Behavioral control	VII. Self-concept
<ul style="list-style-type: none"> <li>Sensorimotor developmental problems</li> <li>Analgesia</li> <li>Problems with coordination, balance, body tone</li> <li>Somatization</li> <li>Increased medical problems across a wide span (eg, pelvic pain, asthma, skin problems, autoimmune disorders, pseudoseizures)</li> </ul>	<ul style="list-style-type: none"> <li>Poor modulation of impulses</li> <li>Self-destructive behavior</li> <li>Aggression toward others</li> <li>Pathological self-soothing behaviors</li> <li>Sleep disturbances</li> <li>Eating disorders</li> <li>Substance abuse</li> <li>Excessive compliance</li> <li>Oppositional behavior</li> <li>Difficulty understanding and complying with rules</li> <li>Reenactment of trauma in behavior or play (eg, sexual, aggressive)</li> </ul>	<ul style="list-style-type: none"> <li>Lack of a continuous, predictable sense of self</li> <li>Poor sense of separateness</li> <li>Disturbances of body image</li> <li>Low self-esteem</li> <li>Shame and guilt</li> </ul>
III. Affect regulation	<p>Blaustein, M., Cloitre, M., Cook, A., DeRosa, R., Ford, J., Hubbard, R., Kagan, R., Lanktree, C., Liautaud, J., Mallah, K., Olafson, E., Spinazzola, J., van der Kolk, B. (2005). Complex trauma in children and adolescents. <i>Psychiatric Annals</i>. 35(5), 390-398</p>	
<ul style="list-style-type: none"> <li>Difficulty with emotional self-regulation</li> <li>Difficulty labeling and expressing feelings</li> <li>Problems knowing and describing internal states</li> <li>Difficulty communicating wishes and needs</li> </ul>		



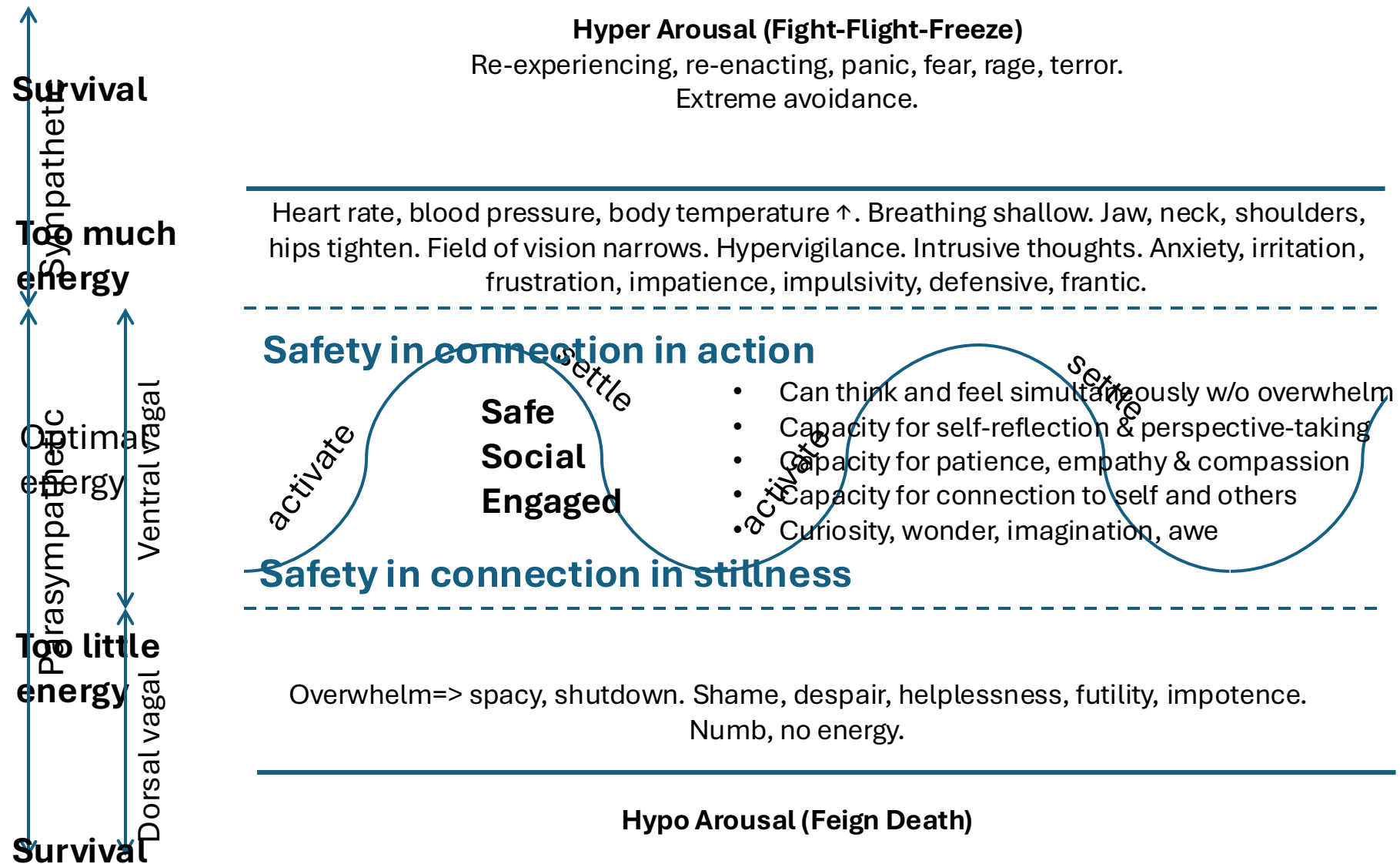
## Complex Posttraumatic Sequelae: Most Frequent Difficulties



Van der Kolk, B.A., Pynoos, R.S., Cicchetti, D., Cloitre, M., Ford, J.D., Lieberman, A.F., Putnam, F.W., Stolbach, B.C., Teicher, M. (2009). Proposal to Include a Developmental Trauma Disorder Diagnosis for Children and Adolescents in Dsm-V.

# Window of Capacity

(Window of Tolerance or Window of Arousal)



# Window of Capacity

**Survival**

## **Hyper Arousal (Fight-Flight-Freeze)**

Re-experiencing, re-enacting, panic, fear, rage, terror.  
Extreme avoidance.

**Too much  
energy**

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Heart rate, blood pressure, body temperature ↑. Breathing shallow. Jaw, neck, shoulders, hips tighten. Field of vision narrows. Hypervigilance. Intrusive thoughts. Anxiety, irritation, frustration, impatience, impulsivity, defensive, frantic.

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## **Safety in connection in action**

**Optimal  
energy**

**Safe  
Social  
Engaged**

- Can think and feel simultaneously w/o overwhelm
- Capacity for self-reflection & perspective-taking
- Capacity for patience, empathy & compassion
- Capacity for connection to self and others
- Curiosity, wonder, imagination, awe

## **Safety in connection in stillness**

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**Too little  
energy**

Overwhelm=> spacy, shutdown. Shame, despair, helplessness, futility, impotence.  
Numb, no energy.

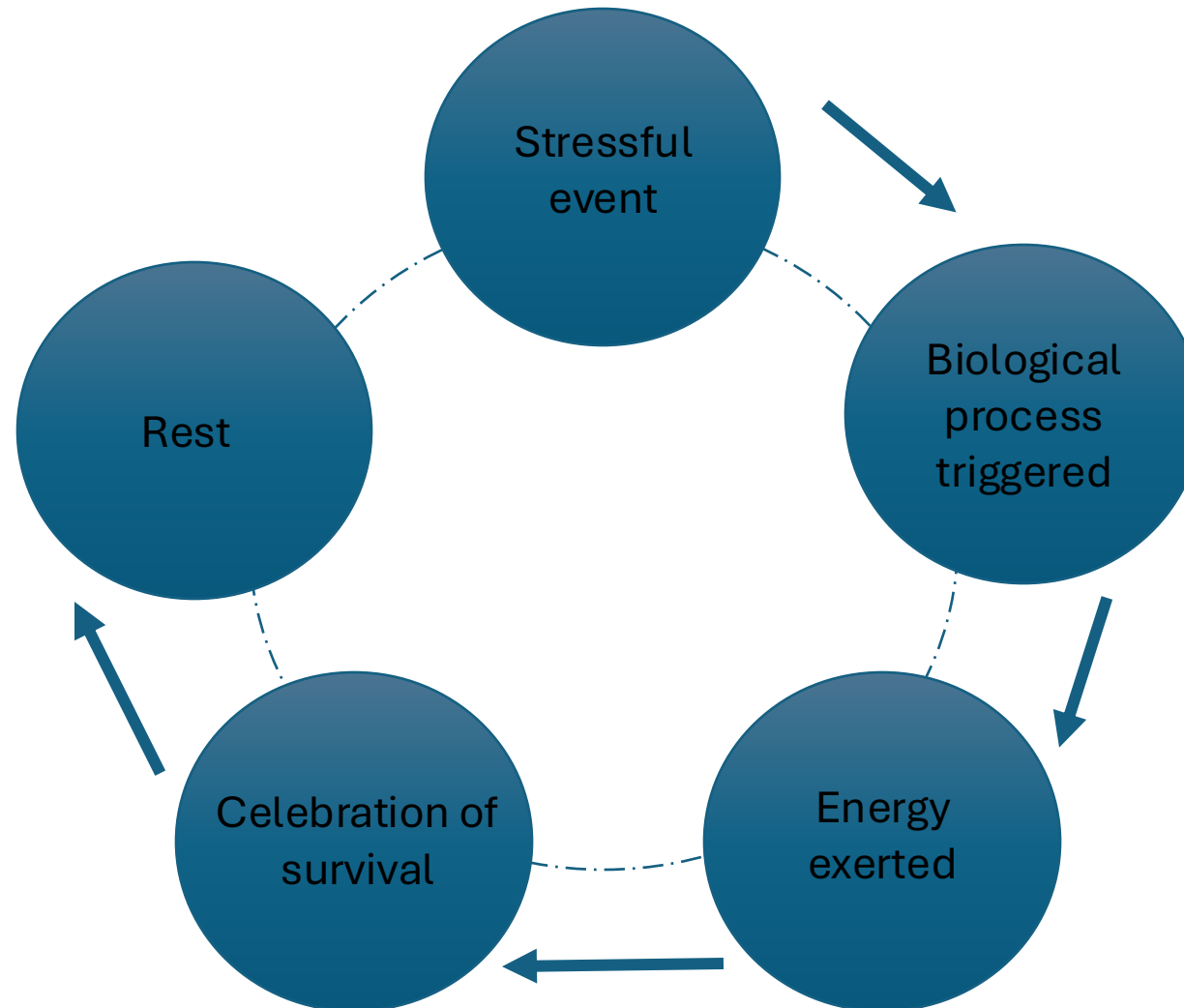
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**Survival**

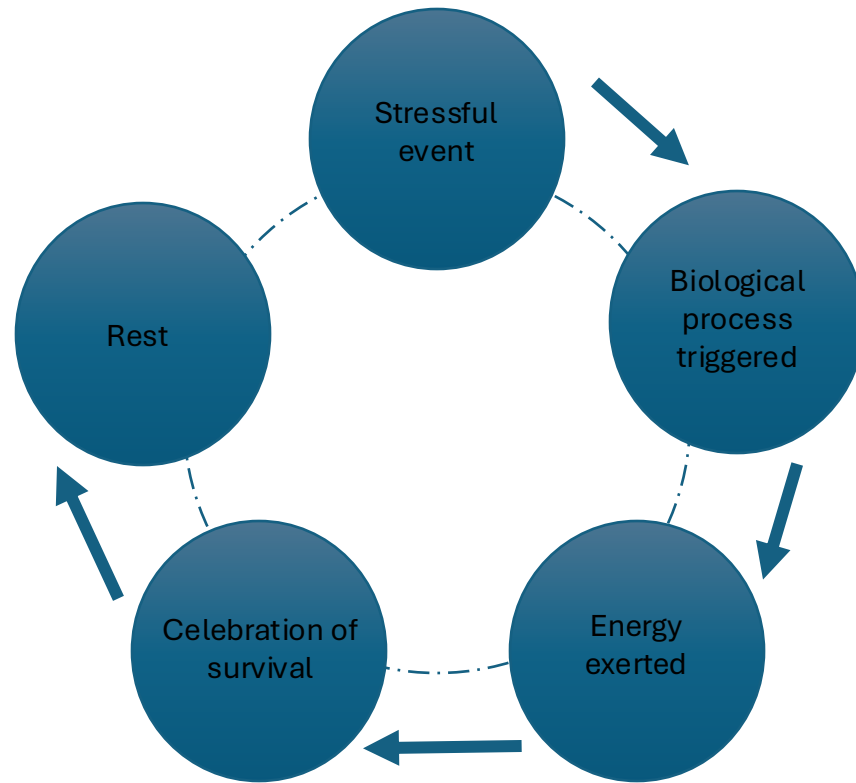
## **Hypo Arousal (Feign Death)**



# An alternative for hyper-arousal: Completing the stress response cycle



# Ideas to complete the stress response cycle



- Tense every muscle in your body and let go
- Dance and shake your body
- Flappy hands!!!!
- High intensity physical activity
- Watch funny videos and laugh
- A good cry
- A 20-second hug

**An alternative for  
hypo-arousal:**

**Resourcing +  
compassionate self-  
acceptance**

- Take into consideration sensory / input overwhelm
- Permission to stop / withdraw / reset
- Stillness in safety....in connection
- Some movement in safety
- Assess for: burnout, sensory burnout, ADHD, autism, PTSD, C-PTSD, environment supports and environmental risk factors
- Empowerment through advocacy. ND-affirming approach. NVC. Systems approach.





Self-holding, self-swaddling,  
self-containment

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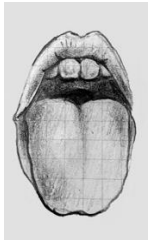


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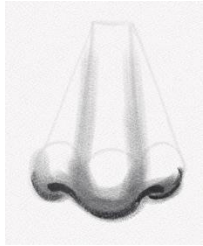




Sight

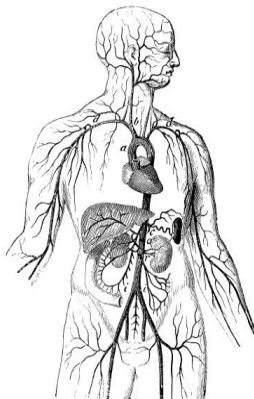
Taste

Hearing



Smell

Touch



Proprioception

Vestibular

Interoception

## Sensory Seekers

Under-responders / hypo-sensitive.

Needs more input in order to feel the sensations.

Seeks input in order to experience sensory satiation.

May not be aware that they are over-stimulated until they crash – sensory burnout.

## Sensory Avoiders

Over-responders / hyper-sensitive.

Takes less sensory input for them to feel overwhelmed or satisfied.

Needs the removal of sensory input for a prolonged period in order to recover from sensory burnout.

May be perceived as defensive, hyper-vigilant, anxious, fearful or withdrawn.

Kranowitz, C. S. (2022). *The out-of-sync child: Recognizing and coping with sensory processing differences*. TarcherPerigee.



	Sensory Seeker / Under-responder / Hypo-sensitive	Sensory Avoider / Over-responder / Hyper-sensitive / Defensiveness
Sight		
Tactile		
Auditory		
Taste / Gustatory		
Smell		

Visual Avoider / Over-responder / Hyper-sensitive / Visual Defensiveness	
Indicators	Strategies
Extremely sensitive – even reactive – to light, brightness, fluorescent lights	Reduce external visual “clutter”. Normalize the need to close eyes. Hats.
Aversive to direct eye contact (over-stimulation).	Notice and allow for visual preferences.
May experience headaches or nausea.	Use of floor lamps, dimmer switches, natural light.
May function poorly / experience anxiety in situations that require the visual processing of stimulus / information.	Provide spaciousness around the need for visual down time, and notice the indicators of the need for down time.
<b>Notice the individual’s situational preferences and accommodate them where possible.</b>	

Visual Seeker / Under-responder / Hypo-sensitive	
Indicators	Strategies
Under-registers colors, contrast / brightness, shapes, forms, speed and proximity	Provide visual stimulation: patterns, symmetry, movement.
Enjoys following lights and objects with their eyes.	Laser tag, lava lamps, disco balls increase focus and engagement!
May look around the room a lot and appear distracted	Know that they are not “disrespecting you” but need more visual stimulation.
May function poorly / experience anxiety in situations where words / objects are stationary.	Provide opportunities for visual engagement – orienting, expanding field of vision and depth of vision.
<b>Notice the individual’s situational preferences and accommodate them where possible.</b>	



Tactile Avoider / Over-responder / Hyper-sensitive / Tactile Defensiveness	
Indicators	Strategies
Extremely sensitive – even reactive – to touch.	Encourage individual to communicate body boundaries.
Aversive to tags, seams on clothing, fabrics, clothing designs.	Sensory-friendly clothing.
May preference certain clothing items, fabrics.	Buy multiple of the same clothing.
Aversive to certain textures, sensations, temperatures, humidities. Can be water averse. Can look like anxiety.	Provide spaciousness around the need for sensory down time, and notice the indicators of the need for down time.
Can be localized to certain areas or may include the entire body.	
<b>Notice the individual’s situational preferences and accommodate them where possible.</b>	

Tactile Seeker / Under-responder / Hypo-sensitive	
Indicators	Strategies
Under-registers touch, temperature, textures.	Sensory-friendly clothing.
Can bump into things, furniture, people <i>intentionally</i> .	Provide opportunities for sensory-seeking play and sensory-satiation.
Wants to touch <i>everything</i> .	Teach consent.
May prefer rough play, and may engage in inappropriately rough play.	Advocate for the body boundaries of others.
May be dirty and happy.	
Can be localized to certain areas or may include the entire body.	
<b>Notice the individual’s situational preferences and accommodate them where possible.</b>	

### Auditory Avoider / Over-responder / Hyper-sensitive / Auditory Defensiveness

Indicators	Strategies
Extremely sensitive – even reactive – to sound. Super-hearers!	Calmer ear plugs, over-the-ear ear muffs. The need for distance in order to manage volume levels.
Aversive to certain sounds, pitches, volumes, or layering of sounds. Can have strong emotions or may hide or shutdown.	Door stoppers and sound absorbers.
Aversive to situations where soundscapes are overwhelming that can lead to sensory burnout.	Provide spaciousness around the need for silent down time, and notice the indicators of the need for down time.

**Notice the individual's situational preferences and accommodate them where possible.**

### Auditory Seeker / Under-responder / Hypo-sensitive

Indicators	Strategies
Under-registers volume, pitch, proximity, rhythms, layers of sound.	Use visual cues, proximity or touch to get attention.
Can fail to notice sounds or integrate verbal instructions.	Encourage note-taking and recording verbal instructions.  Support visual aids, learning through visual and movement channels.
Enjoys loudness, craves a soundscape, making sounds.	Provide opportunities for outside voices and making big sounds.

**Notice the individual's situational preferences and accommodate them where possible.**

Gustatory Avoider / Over-responder / Hyper-sensitive / Gustatory Defensiveness	
Indicators	Strategies
Extremely sensitive – even reactive – to sweet, sour, salty, bitter, spicy, acid.	Normalize preferences.
Avoids or rejects certain foods, food temperatures, textures, may gag on certain foods.	Make mealtimes as stress-free as possible. Introduce new foods outside of mealtimes in a playful way.
Avoids trying new foods or situations with no food agency.	Offer spaciousness around food agency.
May have poor dental hygiene.	Experiment!
<p><b>Notice the individual’s situational preferences and accommodate them where possible.</b></p>	

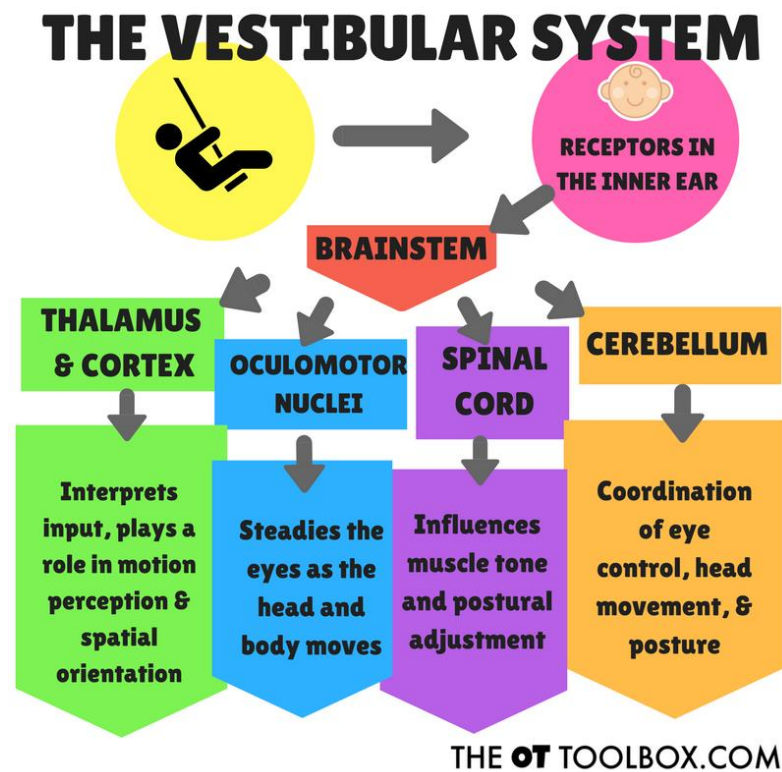
Gustatory Seeker / Under-responder / Hypo-sensitive	
Indicators	Strategies
Under-registers tastes, and may seek out intense, strong or unusual flavors, flavor profiles, texture profiles or oral stimulation.	Help set limits – limit “grazing”.
May look like emotional eating.	<p>Help discern between the need for oral stimulation and disordered eating / emotional eating.</p> <p>Chewellery.</p>
<p><b>Notice the individual’s situational preferences and accommodate them where possible.</b></p>	

Olfactory Avoider / Over-responder / Hyper-sensitive / Olfactory Defensiveness	
Indicators	Strategies
Extremely sensitive – even reactive – to certain smells or smell intensities. May gag at certain smells (foods).	Normalize preferences and smell as one’s superpower.
May get irritable – even aggressive - around the potential for certain smells.	Fresh air. Remove unpleasant smells. Bring in pleasant smells in a localized way – essential oil on the top of my teddy bear.
May inadvertently offend people.	Teach <i>kind</i> self-advocacy skills.
May avoid certain situations that are olfactorily overwhelming. May struggle with housework / food preparation due to the smells involved.	Fragrance-free cleaners.
Notice the individual’s situational preferences and accommodate them where possible.	

Olfactory Seeker / Under-responder / Hypo-sensitive	
Indicators	Strategies
Under-registers smells.	<p>Increase olfactory processing capacity, through offering intense and intentional olfactory input.</p> <p>Scented playdough. scented stickers, guess that smell.</p>
Notice the individual’s situational preferences and accommodate them where possible.	



# The Vestibular System



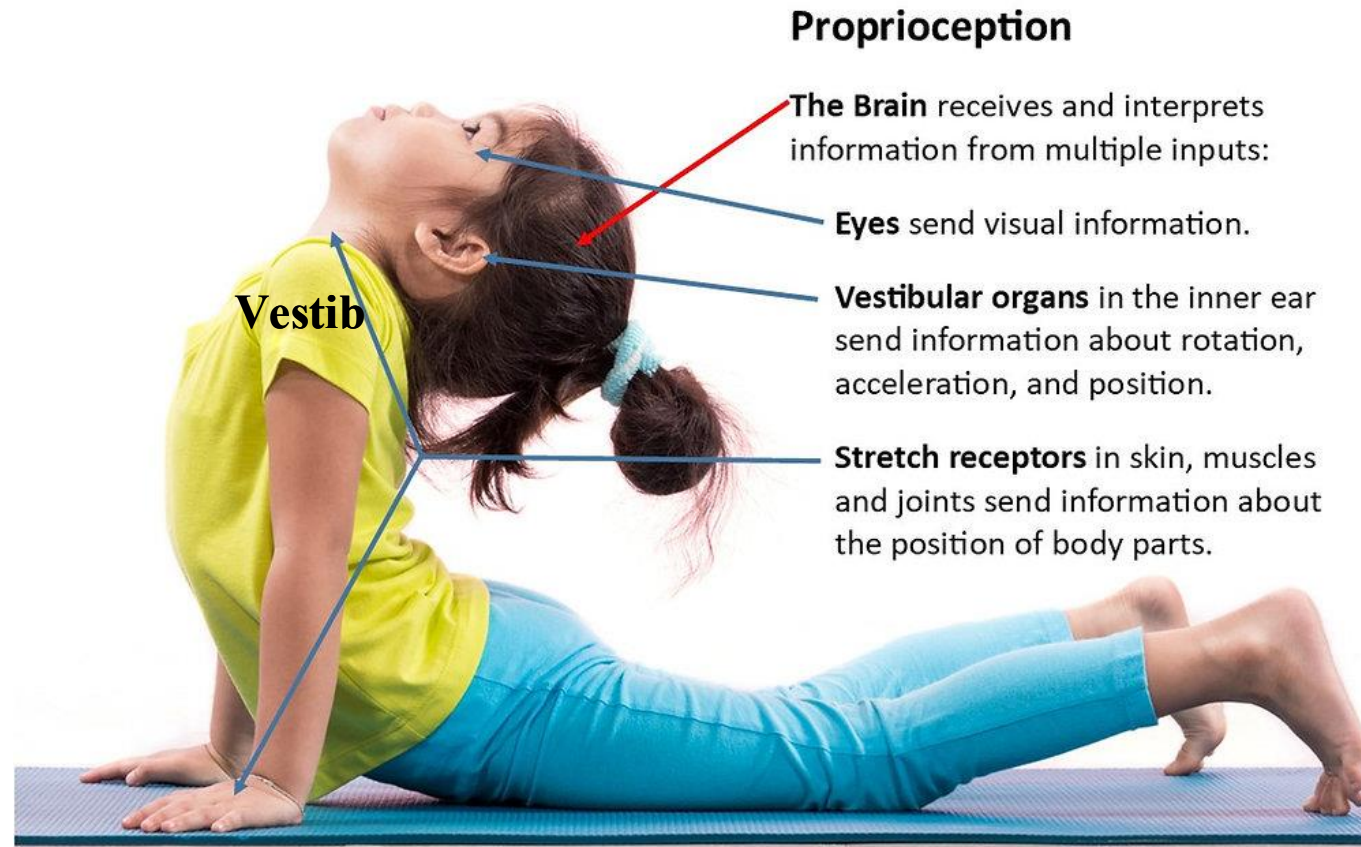
- Poor visual processing
- Poor spatial awareness
- Poor balance and equilibrium
- Difficulty with bilateral integration sequencing
- Poor visual-motor skills
- Poor construction abilities
- Poor discrimination of body position
- Poor discrimination of movement
- Trouble negotiating action sequences

<https://www.theottoolbox.com/vestibular-activities/>

# Vestibular / Balance System

Avoider/ Over-responder / Hyper-sensitive / Defensiveness	Seeker / Under-responder / Hypo-sensitive
Fear of movement, vehicles, play, playgrounds	Constant needs for movement, motion and spinning (we *must* limit their spinning), prefers to run than walk
Appears clumsy / unbalanced	Takes unsafe risks when playing, impulsive
Motion sickness, easily dizzy, fear of heights	Enjoys being upside down
<b>Strategy:</b> Permission to take things slowly and to go at your own pace.	<b>Strategy:</b> Rhythm, rocking and swinging helps to self-soothe, so provide opportunities for trampolines, rocking chairs, bouncy balls to sit on, swings.
<b>Notice the individual's situational preferences and accommodate them where possible.</b>	

# The Proprioceptive System



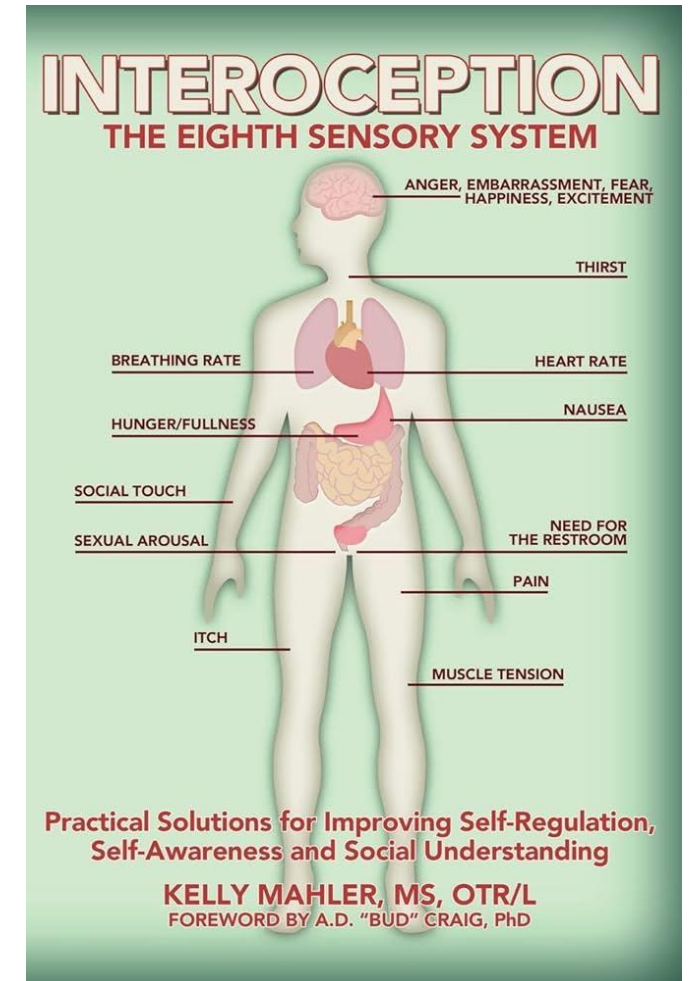
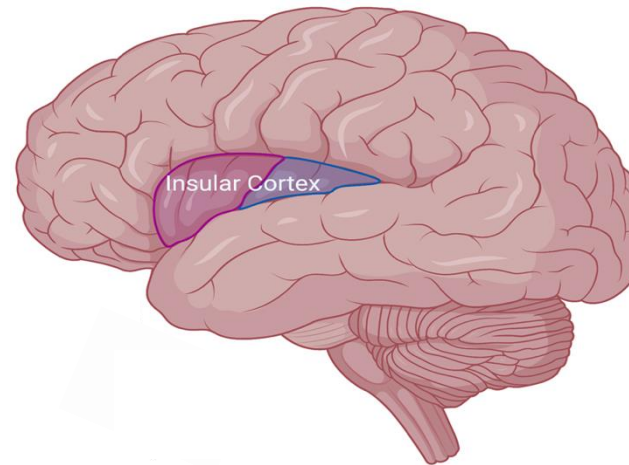
Proprioceptive Avoider / Over-responder / Hyper-sensitive / Proprioceptive Defensiveness	
Indicators	Strategies
Extremely sensitive and aversive to touch / physical contact / hugs. Cautious, anxious or avoidant around playing.	Talk them through the movement and what to expect. Offer choice.
May be clingy towards parents, isolate, or withdraw.	Advocate for body boundaries and teach agency / consent.
Seems un-coordinated, low muscle tone, appears lethargic. Difficulties with stairs.	Weighted vests and blankets may offset the distress of unexpected touch.
Dislikes tight clothing.	
Notice the individual’s situational preferences and accommodate them where possible.	

Proprioceptive Seeker / Under-responder / Hypo-sensitive	
Indicators	Strategies
Plays too rough, often hurting self / others. Under-registers touch / pain - and therefore seeks extremes in play. Enjoys stomping, jumping, and being squished.	Encourage <b>safe</b> climbing, jumping, physical contact games / activities.  Heavy work and chores - push, pull, lift, carry.
Prefers tight clothing.	Compression clothing. Weighted vests, weighted blankets. Ample hugs + deep pressure (bear hugs).
Touches everyone and everything with extreme pressure.	Teach consent. Provide opportunities for proprioceptive satiation, such as wrestling.
Poor personal space.	Advocate for others' boundaries.
<b>Notice the individual's situational preferences and accommodate them where possible.</b>	



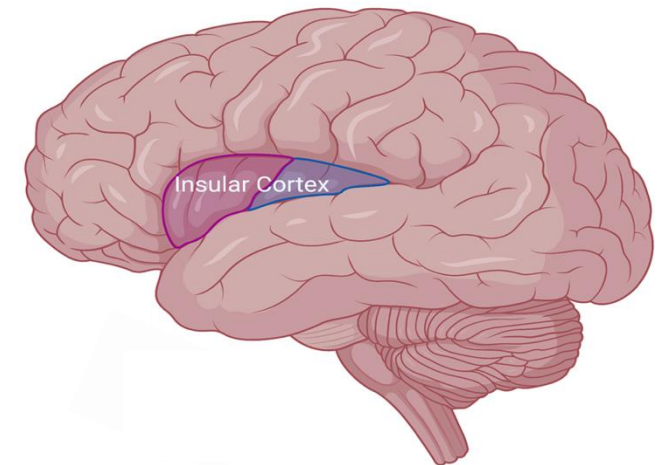
# The Interoceptive System

Receptors on our internal organs are responsible for interoception signals that provide information on our internal body and emotional states.



# The Role of the Insular Cortex

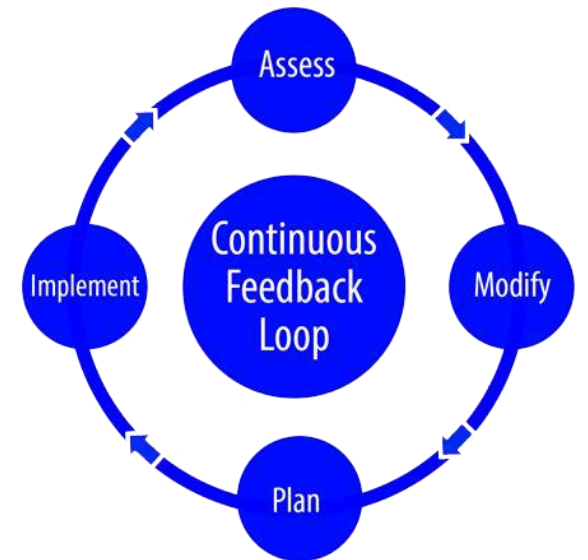
- The insular cortex plays a key role in **how the body registers interoceptive awareness**. It is the "interoception center of the brain" (Mahler, 2017).
- Brain studies have found that people with high interoception awareness tend to have thicker insulas. Poor interoception awareness is linked with less gray matter in the insula and less activity in the insula (Critchley, Wiens, Rotshtein, Ohman & Dolan, 2004).
- Decreased functioning in the insula is associated with several psychological conditions and forms of neurodivergence, including:
  - Autism (Ebisch et al., 2011).
  - ADHD (Lopez-Larson, King, Terry, McGlade & Yurgelun-Todd, 2012).
  - OCD (Ravindran et al., 2020).
  - Schizophrenia (Sheffield, Rogers, Blackford, Heckers & Woodward, 2020).
  - Depression (Avery et al., 2014).
  - Anxiety (Paulus & Stein, 2006).
  - Substance abuse (Droutman, Read & Bechara, 2015).
  - Bipolar (Ellard et al., 2019).
  - PTSD (Kunimatsu, Yasaka, Akai, Kunimatsu & Abe, 2020).
  - Disordered Eating (Martin, Dourish, Rotshtein, Spetter & Higgs, 2019).



# The Impact of Interoceptive Difficulties

(Biel, Peske & Grandin, 2018; Kranowitz, 2022; Voss, 2011)

- Interoception is essential for several key psychological and physical health principles. Because the feedback loop is sub-optimal, implications of poor interoception awareness include challenges with:
  - Self-awareness
  - Self-Regulation
  - Emotional Regulation Challenges
  - A Diffuse Sense of Self and Other
  - Perspective-taking
  - Relationship struggles
  - Problem-solving
  - Difficulty with maintaining homeostasis



Interoceptive Avoider / Over-responder / Hyper-sensitive / Interoceptive Defensiveness	
Indicators	Strategies
Heightened awareness of hunger, pain, thirst, discomfort	<b>Work with an Occupational Therapist who is familiar with interoception differences.</b>  Mindfulness practices to increase discernment and body awareness.  Engage the vestibular and proprioceptive systems.
Often has pain, headaches, digestive discomfort, muscle aches	
Frequently distracted by internal pain sensations	
Frequent need to urinate	
Feels emotions and pain more intensely	
<b>Notice the individual’s situational preferences and accommodate them where possible.</b>	

Interoceptive Seeker / Under-responder / Hypo-sensitive	
Indicators	Strategies
Unaware of any pain, discomfort or signals from the body: nausea, hunger, thirst, need to urinate or for bowel movements, need to put on / take off clothing.	<b>Work with an Occupational Therapist who is familiar with interoception differences.</b>
Alexithymia: unable to register emotions as sensations.	
Challenges around knowing what they need or what they like: food, hydration, warmth, elimination.	
<b>Notice the individual’s situational preferences and accommodate them where possible.</b>	



# Fidgeting

- Four main reasons for fidgeting were identified (Nygqvist, 2016).
  - Relax, when fidgeting is done to decrease stress and anxiety;
  - Focus, when increased attention and focus is desired;
  - Explore, to facilitate mind wandering and enhance incubation; and
  - Active, if bored or understimulated.
- In our autonomic nervous system language:
  - For downregulation
  - To get the frontal lobe online
  - To get the frontal lobe online
  - For upregulation

# Fidget spinners



# Sensory squishy









# Sensory spiky



# Sensory sequin cushions



# Sensory soothing





# Channeling the fidget-fight energy



# Feet fidgets





# Body fidgets



# Flexible Seating

## Options for the Classroom

{ONE}

### Wobble Stools

Allows students to lean, tilt, rock  
Allows students to move legs  
Use with table or desk  
Cost: \$50-\$100



{SIX}

### Yoga Mats

Allows students to lay or sit  
Individual work spaces  
Use on floor  
Cost: \$5 and up



{TWO}

### Stability Balls

With or without legs  
With or without base  
Many different sizes  
Use with table or desk  
Cost: \$5-\$100+



{SEVEN}

### Discs and Wedges

Inflatable to different difficulties  
Use on floor or chair  
With or without raised dots  
Dots provide sensory input  
Cost: \$10 and up



{THREE}

### Lowered Tables

Allows children to sit on the floor  
Group work spaces  
You may be able to adjust the height of your existing tables  
Cost: Free!



{EIGHT}

### Floor Rockers

Floor seating  
With or without back support  
Allows students to rock  
Cost: \$10-\$30+



{FOUR}

### Standing Stations

Many variations  
You may be able to adjust the height of your existing desks  
Risers under standard desk legs  
Platforms on top of standard desks  
Cost: \$30-\$700+



{NINE}

### Rugs and Squares

Many shapes and sizes  
Whole class, small group, or individual work spaces  
Carpet Square Cost: \$1+  
Rug cost: \$5-\$500+



{FIVE}

### Fidget Bands

Attach to legs of desks, tables, or chairs  
Allows students to move feet and legs  
Cost: \$3-\$15+



{TEN}

### Padded Seating

Comfortable  
Examples: pillows, cushions, couches, butterfly chairs, bean bags chair, ottomans, etc.  
Cost: \$5-\$500+





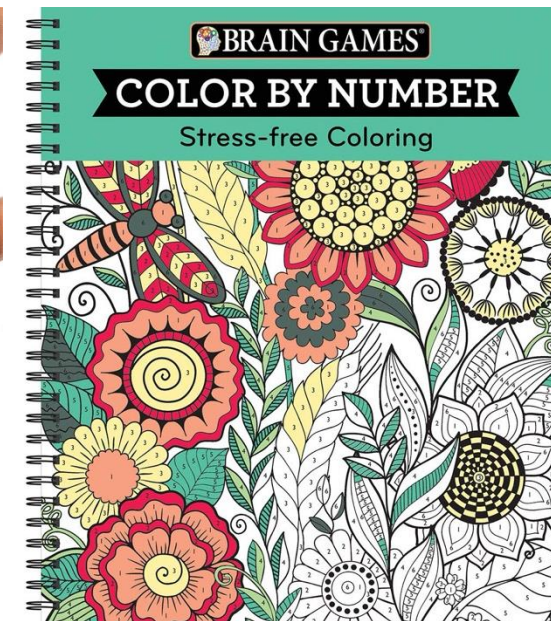
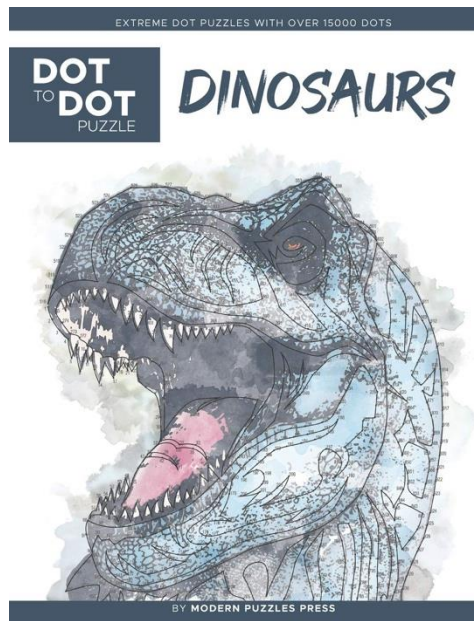
# Frontal lobe engagement fidgets



HOBBIES CAN BE A  
GREAT WAY TO  
KEEP YOUR MIND AND  
HANDS OCCUPIED



# Find-fidgets







Linda Thai













+ADD TO CART 