

The Neurobiology of Sensory Processing and Trauma

...

Viewing Behavior Through the Lens of the Nervous System

Who we are...

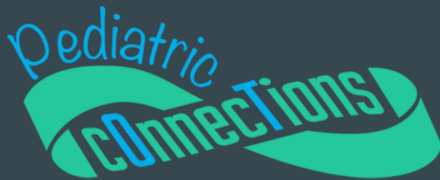


Deana Lesher OTR/L
Owner of Pediatric Connections OT



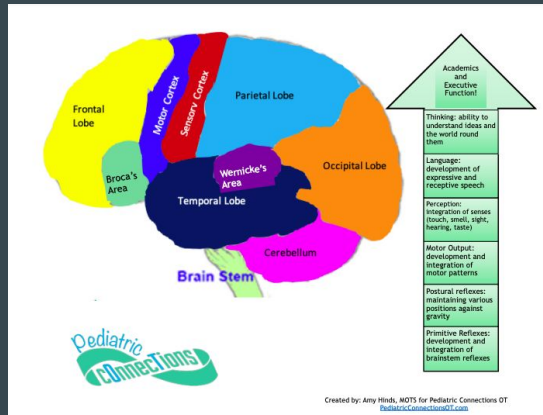
Jen Vennart OTR/L

What we do...



OBJECTIVES:

1. Discuss neurobiology and brain function
2. Gain an understanding of how the survival responses impact behavior
3. Understand the concepts of neuroception and co-regulation
4. Understand how "felt safety" and autonomic state impact sensory processing



Everything is under the umbrella of...



Connection & Safety



MNRI® Program

- **M:** Masgutova
Program Founder : Dr. Svetlana Masgutova
- **N:** Neurosensorimotor
- **R :** Reflex
- **I :** Integration



A Reflex is

... a genetic pattern of physiological function created by nature as a code and structure insuring neurosensorimotor development.



Working with reflexes, you touch the underlying net – a net that serves like the infrastructure of a leaf or a building. A reflex is the informational unit for positive survival and gradual physical, emotional and cognitive development.

... S. Masgutova, 2012



www.MasgutovaMethod.com

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The Process of Myelination

BIRTH

15 Months



x

Metaphorically Speaking:

Myelination of Neural Connections



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Metaphorically Speaking:

Further Development



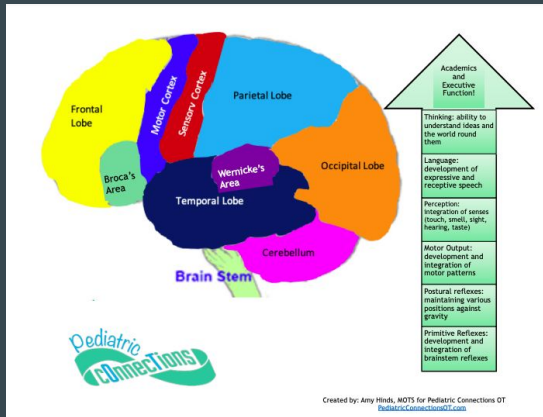
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Metaphorically Speaking:

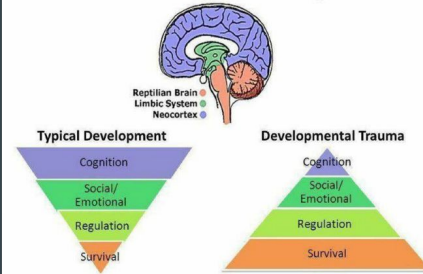
Further Development



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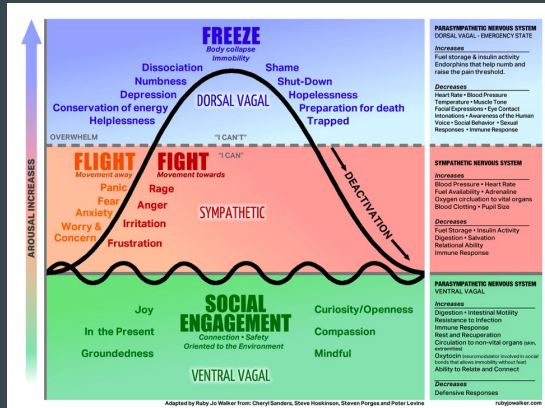
Trauma & Brain Development



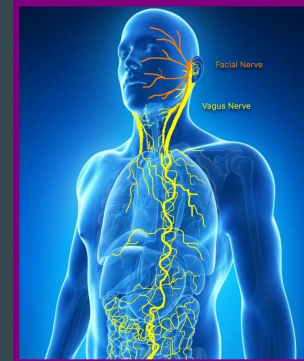
Polyvagal Theory Dr. Stephen Porges

Three Key Principles

1. Hierarchy
2. Neuroception
3. Co-regulation



The Amazing Vagus Nerve



NEUROCEPTION: the ability of the nervous system to unconsciously evaluate a situation

1. We are created for CONNECTION
2. The nervous system is continuously evaluating risk using sensory processing
3. If it achieves “felt safety,” it will inhibit fight, flight, or freeze in order to socially engage



Two Types of Faulty Neuroception

1. Brain and body detects threat when it is actually safe
2. Detects safety when it is actually at risk
3. “Felt Safety”



CO-REGULATION

Starts as “external regulation”

Experienced through “caring, attuned relationship with adults”

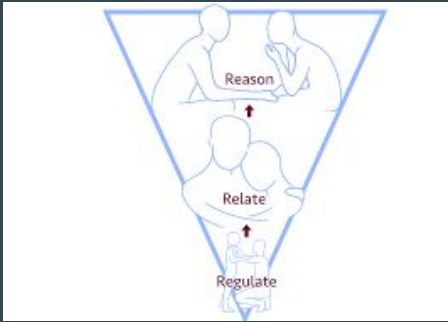
Self-regulation cannot happen without first experiencing co-regulation



Why do kids with a trauma background struggle more with sensory processing?

- You CANNOT develop self regulation without first having co-regulation
- Co-regulation may be unsafe for them (abuse, neglect)
- They have biological differences in the brain’s ability to process sensory information because of how the nervous system was shaped in the womb
- Their bodies internal signaling (interoception) is off and they need more (or less) input to feel the same things we do
- Our senses are heightened when we don’t feel safe and we live in fight/flight

Regulate, Relate, then Reason



Adapted from Dr. Bruce Perry Neurosequential Model

Timing of Early-Life Stress and Development of Brain Related Capacities

Recent 2019 study by E. P. Hambrick, T. W. Brawner, and B. D. Perry *Timing of Early-Life Stress and Development of Brain Related Capacities*

- Suggests early life stress (within the first two months of life) is most detrimental to self-regulation and sensory integration when it comes from negative relational experiences
- A child's relational health was a strong predictor of almost every neurodevelopmental function except cognitive function

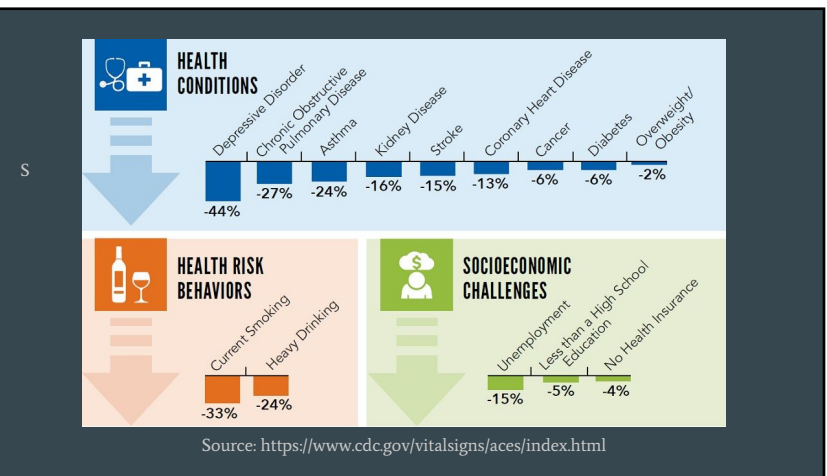


Adverse Childhood Experiences Study (ACES)

- Study done by Kaiser Insurance Company/CDC on Obesity with over 17,000 participants
- Over 20% had three or more ACEs
- If participants had 4 or more ACEs, the risk of chronic, long term illness increased exponentially (heart disease, cancer, stroke, diabetes, drug abuse, suicide attempts, depression)
- If participants had 6 or more ACEs, life expectancy decreases by almost 20 years

Updated ACE Scores as of 2019

- 61% of adults in 2019 have at least 1 ACE score
- 16% of adults in 2019 have at least 4 ACE scores



COST OF DOING BUSINESS for DEVELOPMENTAL TRAUMA



Feeling safe, calm and connected

DEVELOPMENTAL TRAUMA IS EXPENSIVE

COST OF DOING BUSINESS

- Each day our NERVOUS SYSTEM bank account has \$5



- How are you going to spend your resources?
- What is your priority in the budget?
- What if you go into debt?
- WHAT ARE YOUR EXPENSES FOR THE DAY?

COST OF DOING BUSINESS



What happens to your own sensory systems when you are in these modes?

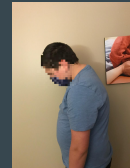
Stand up and Move with Us!

- Avoidance State (Freeze/Shut Down): Hypo-auditory processing (tune out), convergence (central vision)
 - System is disengaging/tuning out what is going on in environment
- Defensive State (Fight/Flight): Hyper-auditory processing (hear everything), peripheral vision
 - System is "ready to move/take action"

Posture as an indicator of Nervous System State

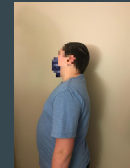


Posture as an indicator of Nervous System State



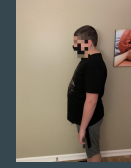
11/2/2020

(Before Session)

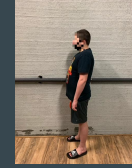


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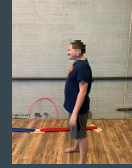
(After Session)



11/16/2020



1/4/2021



5/24/2021





What does this mean for us as OT's?

It is in our scope of practice to...

- **Create a neuroception of safety in your treatment sessions and practice settings**
- **Prevent the generational pattern of continued ACE scores**
 - Prenatal care/support for expectant mothers to reduce stress during pregnancy
 - Child and adult mental health preventative programs
 - Community parenting support
- **Mitigate (Treat) Individuals with ACE scores**
 - Understand the nervous system and the impact on the ability to self regulate
 - Educate and inform other health care providers on the impact of trauma on the nervous system

How can we help?...Learn to be the co-regulator!

"Connectedness has the power to counterbalance adversity."

Dr. Bruce Perry



Recommended Community Resources

- Trust Based Relational Intervention TBRI
- child.tcu.edu
- Joy Meadows (community support)
- <https://www.joymeadows.org/>
- Fostering Joy (community care groups)
- Trauma Play Counselors
- Neurosequential Network Dr. Bruce Perry
- <https://www.neurosequential.com/>
- Mona Delahooke Training Module
- <https://monadelahooke.com>



You are the best tool you have!



References

Porges S. W. (2009). The polyvagal theory: new insights into adaptive reactions of the autonomic nervous system. *Cleveland Clinic journal of medicine*, 76 Suppl 2(Suppl 2), S86–S90. <https://doi.org/10.3949/ccim.76.s2.7>

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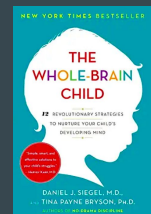
<https://www.cdc.gov/vitalsigns/aces/index.html>

<https://www.cdc.gov/violenceprevention/pdf/preventingACES.pdf>

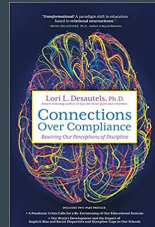
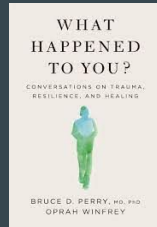
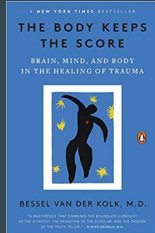
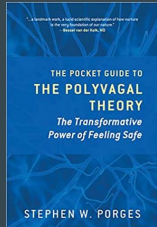
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Delahooke, M. (2019). *Beyond behaviors: Using brain science and compassion to understand and solve children's behavioral challenges*.

Recommended Reading



Recommended Reading



Thank You!



Pediatric Connections OT
www.pediatricconnectionsot.com