Interoception: How I Feel - Sensing My World From the Inside Out
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The Pocket Occupational Therapist

Career Highlights
- Earned Master's Degree in 1997
- Founded large private practice specializing in pediatrics
- OTD in 2019
- Former pediatrics professor at USAHS
- Advisory board for multiple organizations
- Internationally Certified Autism Specialist
- Parent to two sons with special needs
Today's Course Objectives

1. Describe key concepts related to the interoception.
2. Recognize the function-dysfunction continuum within the interoceptive system.
3. Articulate treatment strategies for integration of the interoceptive system.

Key Concepts

What is interoception and how does it impact occupational performance?
Johann Riel (1759-1813)

- German physician who wanted moral treatment of patients with MH conditions
- First coined term ‘psychiatry’
- Described the insula

**Interoception Pioneer**

**Latin for ‘Island’**

- Tucked away deeply in lateral sulcus
- Self-awareness of body & emotions
- Next to the thalamus (limbic system – memory and learning)
Insula

Maps somatic states
Latin word for body

- Somatic symptoms focus on physical symptoms that cause emotional distress
- Insular cortex provides emotional context!
  - Pain is not pleasant
  - Gut feelings
- Helps to separate our own body from other ‘things’

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Joke Break

Where do hippos go to college?

What did the hippocampus say when it retired?

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Body & Emotional Connections to Limbic System

- Connects to amygdala (fear center)
- To hippocampus (memories)
- Allows us to connect body feelings/maps to our emotional state at the time

Safety!

Lower-level brain = survival
Consciousness = rational choices
Antonio Damasio in the 1990s

Discussed the somatic marker hypothesis

- people use bodily signals to help them make decisions (e.g., a queasiness in your stomach about walking down a dark side street at night might cause you to stick to the well-lit main street)
- suggested that the insula plays an important role in the processing of these bodily sensations so they may be used to influence decision making

AD (Bud) Craig

- the insula is the cornerstone of our overall awareness
- the insula constantly receives a heaping of information about the location and condition of our bodies, our subjective emotions, and the key features of our environment
- incorporates the salient, or important, information into what Craig calls a "global emotional moment"
Antonio Damasio - neurologist (2011 TED Talk)

- We generate brain maps of our interior
- Use the maps to reference other maps

Insular Dysfunction

- Addiction
- Delusions
- Schizophrenia
- Bipolar Disorder
Brain's Attempt to Protect
We learn to connect fast heart rate with excitement or stress

Subjective
Depends on YOUR experiences, genetics, nature vs. nurture

Function-Dysfunction Continuum
The interdependent relationship within the human body
Function-Dysfunction

A change in one component results in change in ALL dimensions.

Interdependent relation

A disruption in one can result in occupational dysfunction.

Connections

Determine your body's response:

- Pleasant touch = releases endorphins and activates pleasure centers
- Unpleasant = activates the fear centers for ultimate goal of safety
  - Fight, flight, flee, or feigned death

Connections

- Sensory processing
- Body regulation processes
- Feelings and emotions
- Calculate and predict risks
- Decision making
- Body and self-awareness
Trauma

A subjective memory

1995 Keiser Study
Surveyed over 17,000 adults

ACEs (Adverse Childhood Experiences)

Toxic stress
2/3 reported one ACE

Outcomes
ACEs can lead to poorer outcomes later in life

ACEs Types

• Physical and emotional abuse
• Neglect
• Household dysfunction

Outcomes: dramatically increased risk of heart disease, diabetes, obesity, depression, substance abuse, smoking, poor academic achievement, time out of work, and early death
Toxic Stress

- Early 2000s, the National Scientific Council on the Developing Child coined the term “toxic stress”

- Effects of excessive activation of stress response systems on a child’s developing brain, as well as the immune system, metabolic regulatory systems, and cardiovascular system

- Experiencing ACEs triggers interacting stress response systems.

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SOR – Repeated, elevated stress

- Highly anxious, controlling, withdrawing, or acting out

- Sweating, disorganization, wide eyes, heavy breathing, irritability, uncontrollable laughter, poor frustration tolerance, and aggressiveness

- Excessive exposure to stress hormones cause permanent changes
  - Amygdala gets larger
  - Connections become wired to form stress response

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Toxic Stress

Vagus nerve connects not only to the heart and lungs but also to the digestive system.

It is not surprising, therefore, that many children with SOR experience problems with their gastrointestinal systems, such as constipation, nausea, diarrhea, and bloating. Their bodies are crying out for relief.

Body’s stress response does not distinguish between overt threats from inside or outside the home environment, it just recognizes when there is a threat, and goes on high alert.

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Role of OT

- Can take time—usually 6-12 months of ongoing therapy
- Teach clients to recognize that acting out behaviors may be a sensory-related stress response
- Encourage support and soothing through co-regulation
- Avoid behavioral interventions or punitive responses

Role of OT

- Regulate the child if he/she is dysregulated
- Maintain an optimal state of regulation throughout the session (increasing vagal tone)
- Present “just right” sensorimotor challenges to the regulated child
- OT intervention allows the child to expand what their nervous systems can tolerate, changing previously “threatening” stimuli into tolerable stress

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Vagus Nerve

- Responsible for regulation of internal organ functions, such as digestion, heart rate, and respiratory rate, as well as vasomotor activity, and certain reflex actions, such as coughing, sneezing, swallowing, and vomiting
- Main component of the parasympathetic nervous system, which oversees a vast array of crucial bodily functions:
  - Control of mood
  - Immune response
  - Digestion
  - Heart rate
  - Coughing, sneezing, vomiting (reflexive actions)

How does the Vagus Nerve Work?

- Establishes one of the connections between the brain and the gastrointestinal tract
- Sends information about the state of the inner organs to the brain via afferent fibers
- Leads to the release of acetylcholine (ACh) at the synaptic junction with secreting cells, intrinsic nervous fibers, and smooth muscles
- ACh binds to nicotinic and muscarinic receptors and stimulates muscle contractions in the parasympathetic nervous system
Vagus = Brain Within the GUT

Main contributor of the autonomic NS

Brings info. from organs to brain

ENS contains about 100–500 million neurons. This is the largest accumulation of nerve cells in the human body.

Gut has largest surface

Since the ENS is similar to the brain regarding structure, function, and chemical coding, it has been described as "the second brain" or "the brain within the gut."

Treatment Strategies for Interoception

What can you do TODAY?
Vagus Nerve Stimulation

One of the main ways that you can stimulate the healthy function of the vagus nerve is through deep, slow belly breathing

- You can learn to use breathing exercises to shift your focus away from stress or pain.
- The moment we anticipate stress in any form, most of us tend to stop breathing and hold our breath.
- Breath holding activates the fight/flight/freeze response; it tends to increase the sensation of pain, stiffness, anxiety, or fear.

Breathe
Focus on breathing vs. stressor

Exhale Longer
Exhale twice as long

Expand
Expand and widen rib cage

Six Belly
Use Visuals

Goal is six breaths per minute
Put hand on your belly and feel it expand
Hoberman sphere

Loud gargling with water or loud singing activates our vocal cords which in turn stimulates the vagus nerve.

Foot massage: gentle or firm touch can assist in stimulation the vagus nerve.

Cold water face immersion: immerse your forehead eyes and at least 2/3 of both cheeks into cold water. This elicits the vagus nerve, decreasing heart rate, stimulating the intestines and turns on the immune system.

Laughter: having a good laugh lifts your mood, boosts your immune system and stimulates the vagus nerve.
Stages of Interoceptive Awareness

**Noticing**

'Something' is going on. I feel 'strange.'

**Naming**

My tummy feels sore or like butterflies.

**Linking**

When my tummy hurts I feel worried.

**Understand/Natural Consequence**

If I ignore the first three, I will have a potty accident.

**Managing**

Highest level. Stop what I'm doing and take care of issue.

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**Bowels**

- Eating fiber stimulates vagus impulses to the brain slowing the gut movements and making us feel fuller after meals.
- Toilet training is one of the biggest concerns in children with poor interoceptive awareness.
- **DO NOT** use motivators such as food and sticker charts.
- External rewards do not improve interoceptive awareness.
Toilet Training

• Focus on helping children to 'feel' their inner sensations with body scans

• Use play-based activities such as chicken and egg

• Most likely child does not feel urge OR does not want to separate with stool

• Put children on schedule

Bowels

• Use Bristol stool chart

• Urine color indicators

• Give more control of body by using a squatty potty and be SURE feet are on the floor

Begin with Body Scans

In quiet setting OR if child mentions a 'feeling' in any way, draw it on the body chart

Discuss the feeling and what related to other body parts

*Connection of body signals!
Stop at various body parts during scan

- **Eyes**: Blurry, scratchy, like sand in them
- **Lung**: Tight, fast, slow, panting
- **Muscles**: Wiggly, jumpy, sore, burning
- **Hands & Feet**: Sweating, flappy, wiggly, jumpy, hot, cold
- **GI Tract**: Gurgling, butterflies, hot, tight, nauseaus
- **Brain**: Heavy, stuck, dizzy, sore

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Complete a 'Chain' of interoceptive awareness

Based on Vagus N.

- Palms sweaty ➔ Butterflies in tummy ➔ Head sore ➔ Test time ➔ Feel jumpy
PMR

Quiet or calming music
Slowly tighten muscles and hold for count of 5
Gradually relax and let go of stress.

‘Cat’estrophic Thinking

Learn to foster positive feelings BUT need to learn to identify them IN the moment and practice.
## Interoceptive Exercises

<table>
<thead>
<tr>
<th>Twist</th>
<th>Follow</th>
<th>Heart Rate</th>
<th>ADLs</th>
<th>Smell</th>
<th>Taste</th>
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<tr>
<td>Sit in chair and twist to one side then the other.</td>
<td>Follow the leader games — try with fingers.</td>
<td>Pulse Ox Exercises, BP, etc.</td>
<td>Add interoceptive language into everyday tasks.</td>
<td>Easter eggs or cotton balls with various smells.</td>
<td>Incorporate into meals, feeding therapy sessions.</td>
</tr>
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To close your eyes and listen to the sounds of the birds, listen for 30 seconds.

- Can you hear the birds?
- What can you feel inside your body?

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On a cold day, stand still inside the house. Put your hands on your arms. How does it feel?

- Hot
- Cold
- Freezing
- Warm
Describe key concepts related to the interoception.

Recognize the function-dysfunction continuum within the interoceptive system.

Articulate treatment strategies for integration of the interoceptive system.

YOU have all the skills!
OTs are the perfect professionals for interoceptive training.
Thank You!
Til next time.

Resources:
https://www.pocketot.com/interoception/