



Interoception: The Eighth Sensory System

This often-overlooked mechanism helps us calm and self-regulate **By Kelly Mahler, MS, OTR/L**

Part 1 of a 2-part series.

Occupational therapists are highly trained to understand sensory processing and how each sensory system works individually as well as collectively to help us successfully engage in daily occupations.

Our field has made great strides in educating the population about sensory processing and increasing awareness of not only the five common senses of smell, sound, sight, touch, and taste, but also the two hidden or internal senses of proprioception and vestibular awareness.

There is also an additional sense — one that's much less talked about but that's no less important. This eighth sensory system is called interoception.

What is Interoception?

Sit back and close your eyes. What do you feel inside your body? Is your heart beating fast or slow? Are you breathing deeply or shallowly? Do you have to go to the bathroom? Are you hungry? Are your muscles tense?

We feel these sensations with the help of our interoceptive system. Interoception gives

us information regarding the internal condition of our body.¹

How does the interoceptive system work? Similar to other sensory systems, the interoceptive system has specialized cells (receptors) responsible for collecting important sensory information. In the case of interoception, receptors are located throughout most of the tissues in our bodies — in our organs, muscles, skin, bones, etc.

Information gathered by these receptors travels to the insular cortex (insula) in the brain. The insula translates incoming messages and enables us to identify hunger, fullness, itch, pain, coldness, nausea, need for the bathroom, tickle, physical exertion, sexual arousal, and emotional states such as anger, calmness, distraction, or fear. Interoception allows us to answer the question, "How do I feel?"^{1,2}

Over the past decade, interoception has been the focus of a great deal of research in a variety of fields. Difficulty with interoception has been correlated with anxiety disorders, post-traumatic stress disorder, obesity,

eating disorders, attention deficit hyperactivity disorder, major depressive disorder, Tourette syndrome, drug and alcohol addiction, pain syndromes, schizophrenia, and autism spectrum disorder, among other conditions.

Why is Interoception Important?

Research has found that people with a well-functioning insula are more aware of the feelings within their bodies.³ These individuals are described as having good interoceptive awareness (IA).

Interoceptive awareness is defined as our ability to notice interoceptive sensations and to give meaning to those sensations.⁴ For example, you may notice a dry feeling in your mouth and throat, and know that it means you are thirsty. Or you may notice shakiness in your muscles, a quivering stomach, and faster heartbeat, and know that it means you're nervous.

Healthy levels of IA are clearly linked to the development of many important skill areas, including self-awareness, self-regulation, problem solving, intuition, flexibility of thought, social awareness, and perspective-taking.⁴ On the contrary, individuals with reduced IA are found to have difficulty with the same skills, which can have a significant impact on health, well-being and successful participation in occupations.

Barbara, a mother of a 9-year-old, shared that "My son would never feel hunger. I would have to remind him to eat. And at meals, it was always a guessing game. I didn't know if I was giving him enough food or if I was giving him too much. As a mom, that is very stressful. We worked really hard on developing the awareness of his body signals. When my son now complains that he is 'starving' and asks maybe a few too many times 'when is dinner going to be ready?' I can't help to feel relieved."

Vicky, a young adult, reported that "When I was younger, I would have a general sense of 'ickiness.' It was a horrible feeling. I could

not tell if I was sick or if I was upset or if I was stressed. I would go to the doctor and he would ask me to describe my symptoms, and I could only tell him that I felt icky. So he did not know how to help me feel better either. It was a terrible way to live."

Linda, an autism consultant, reported that "My client had an ingrown pubic hair that was the size of a golf ball and was oozing pus from a serious infection. She did not feel any pain, so she was not urged to get help. Her parents had no idea until her mom happened to see it when she was getting dressed one morning."

Rick, a 17-year old, shared that "Developing better interoception has made my own emotions more clear. This has really helped me figure out the emotions of other people."

Influencing Self-regulation

Occupational therapists are often asked to support the development of an individual's self-regulation skills to foster successful occupational performance. Good IA is crucial for effective self-regulation and underlies many forms of self-regulation including body state regulation and emotional regulation.

Our interoceptive system drives the ongoing process of homeostasis. Changes in body tissues alert the brain to take action to achieve balance.⁵ Much of homeostasis occurs automatically, without conscious thought (e.g., glucose released into the bloodstream to increase blood sugar). However, there is also an important, conscious, purposeful aspect of homeostasis referred to as self-regulation. Interoception drives our self-regulation behaviors.

In the case of good IA, we clearly feel sensations that alert us that our internal balance is off, which then motivates us to take action to restore internal balance and help us feel more comfortable.⁶ If we feel thirsty, we get a drink. If we feel cold, we get a jacket. If we feel the need to urinate, we go to the bathroom. If we feel anxious, we seek comfort. If we feel frustrated, we seek help.

On the contrary, people with reduced IA might not always have a timely or clear urge for action. For example, Chloe, a 23-year-old with ASD, shared that "I did not realize I had trouble feeling my internal body signals, as I had never heard of interoception. But when I did, everything started to make sense. Difficulties

with interoception help explain why I have such a hard time pinpointing my symptoms when I am sick, why sometimes I seem to eat snack after snack without feeling full, and why I get upset so quickly, because I don't feel it until I'm already far into the storm of the discomfort and frustration."

Max, an 8-year-old boy with ADHD, reported a similar experience: "I do not realize that I am getting angry until I am exploding with anger. By then it is too late. The feelings are too much. I can't control it."

Janet, mother of an 11-year-old daughter with ASD, reported, "If an adult does not remind her, my daughter will go an entire day without drinking a single drop of liquid. She does not feel the need to drink."

Reaching Comfort and Balance

If we are not able to clearly notice the most relevant internal body signals and give them meaning, self-regulation can be very difficult. Interoception gives a name and a framework to what many OTs have suspected for a long time — that there is something more underlying the self-regulation needs of our clients.

Self-regulation is not just about memorizing a list of emotions and matching strategies. It's not about imposing a sensory diet or pre-fabricated list of calming strategies on a client.

It is about developing a clear and timely urge for action. It is about developing that intuitive understanding of what an internal signal means and what's causing it. It's about developing the innate ability to reach a level of comfort and balance. That's when true independence can occur.

Therefore, in many cases, it becomes imperative to consider an individual's level of IA as a part of the occupational therapy evaluation and treatment process. Part 2 of this article series will feature an in-depth look at improving IA in our clients. ■

References are available at www.advanceweb.com/otreferences

Kelly Mahler is a Pennsylvania-based occupational therapist, autism consultant, author and presenter. Her new book Interoception: The Eighth Sensory System delivers research, assessment and intervention tips related to interoception.



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