

## Ask a Lurie Center Researcher: Autism and Interoception: Understanding the Body's Hidden Signals

Interoception, sometimes called the body's eighth sensory system, is the ability to know the internal state of one's body. This sensory system enables us to recognize internal sensations such as hunger, thirst, and pain, guiding our responses and maintaining our well-being. Scientists have shown that the brain region responsible for interoception is the insular cortex, known as the insula. This is where incoming internal signals are translated, allowing us to answer the question, "How do I feel?" Although many of us take that ability for granted, people vary widely in their interoceptive awareness. Autistic individuals, in particular, may struggle with interoceptive awareness, and for some, identifying something as fundamental as hunger or pain can be challenging.

### How does interoception relate to emotional processing?

Interoception plays a crucial role in our emotional experience, as internal body signals are a key component to how we feel and process emotions. Interoceptive awareness allows us to clearly feel and understand emotions in the body, such as recognizing that an increased heart rate might signal feelings of anxiety or excitement, and tightness in the chest might be associated with stress or sadness.<sup>1</sup> Strong interoceptive awareness enables individuals to differentiate between emotions and, crucially, understand the physical sensations associated with them, which aids in accurately labeling and expressing emotions.<sup>2</sup>



What's more, emotional regulation strategies generally require an understanding of one's own current emotional state. People with weaker interoceptive awareness struggle with this insight, contributing to emotional regulation difficulties, anxiety, rigid thinking, overwhelming emotions, and poorer problem-solving. Being attuned to interoceptive signals allows us to better regulate our emotions by recognizing early signs of emotional arousal, which is when your body starts to react to strong emotions, and applying strategies to self-regulate. For example, noticing a rapid heartbeat can prompt someone to practice breathing techniques to calm themselves when feelings of anxiety or panic start to avoid further escalation.<sup>3</sup>

The ability to understand one's own internal state has also been shown to promote empathy and social interaction. When people are aware of their own body sensations and how they relate to emotions, they may better recognize and empathize with others' emotional states. Interoception also helps us to take the perspective of others by inferring the interoceptive signals and emotions they might experience based on our own past experiences with similar signals and emotions.<sup>1</sup>

**So how does interoception relate to autism?**

Sensory integration issues are common among individuals with autism spectrum disorder (ASD). This may look like sensitivity to sensations, such as noises or lights. It may also look like under-responsiveness to sensory input, such as not noticing when one's name is called or not reacting to extreme temperatures. Similarly, many autistic individuals struggle to interpret body signals, such as hunger or feelings of stress. This can make it particularly challenging to understand and respond to one's needs, regulate emotions, and optimally navigate daily life.<sup>1</sup>

More specifically, challenges with interoceptive awareness in autistic individuals fall into three main categories:

- **Interoceptive over-responsivity:** This is when people are very sensitive to their internal states. They may become easily distracted or highly anxious about internal sensations. For example, someone might feel a slight discomfort, such as mild indigestion, and interpret it as a major health issue, causing significant anxiety.
- **Interoceptive under-responsivity:** This is when someone does not notice internal signals until they are extremely intense. For example, someone might not feel hungry until they are very weak, or they might not notice pain until it becomes severe.
- **Interoceptive discrimination difficulty:** This is when an individual is unable to pinpoint internal feelings, leading to a vague understanding of sensations without identifying their meanings. For example, someone might feel generally uncomfortable but not be able to tell whether they are thirsty, anxious, hungry, upset, or tired.<sup>1</sup>

Research has shown that individuals with ASD often have lower levels of brain activity in the insula,<sup>4</sup> which is consistent with the finding that many individuals with autism have some level of difficulty with interoceptive awareness.

**What are some strategies and interventions to address reduced interoceptive awareness?**

The good news is that it is possible to build interoceptive awareness. Research shows that interoceptive awareness can be learned. There are two main types of interventions which can help individuals with lower levels of interoceptive awareness: 1) adopting strategies or adaptations to help manage it or 2) strengthening the sensory system.<sup>1</sup> Occupational therapists can teach adaptations and interventions and mental health counselors or psychologists can also help support the strengthening of interoceptive awareness.

Below are some examples of what these strategies look like:

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1. **Adaptations for reduced interoceptive awareness:** These involve strategies to compensate for reduced interoceptive awareness, such as using periodic alarms to remind individuals to use the bathroom, drink water, or eat at certain times. These adaptations aim to increase independence, health, and well-being. When creating adaptations, it is important to consider the specific behavior, the goal behavior, rules and guidelines to foster the goal behavior, how to make the support concrete and visual while respecting privacy, and what technology can complement the support. Visual supports, like a visual bathroom schedule, provide predictability and reduce anxiety, while social stories break down abstract concepts into clear, manageable parts.
2. **Interoceptive awareness “builders”:** These are designed to promote attention to interoceptive signals, based on the philosophy that learning to regulate attention in specific ways is key to improving interoceptive awareness. Many of these techniques, such as mindfulness meditation, involve intentionally paying attention to internal body sensations like breath, muscle tension, and heartbeat. Care should be taken to match the learning style of the person to the appropriate interoceptive awareness-building techniques.<sup>1</sup>

*Note: This article includes the use of both person-first (individual with autism) and identity-first (autistic individual) language to honor the diversity of preferences when discussing autism in the community.*

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### **Resources and Further Reading**

#### **Books for Children and Teens:**

- *Listening to My Body* by Gabi Garcia
- *Interoception How I Feel* by Cara N Koscinski
- *My Interoception Workbook: A Guide for Adolescents, Teens and Adults* by Kelly Maher, Chloe Rothschild, & Jarvis Alma

#### **Books for Parents:**

- *Interoception the Eighth Sensory System* by Kelly Mahler
- *Interoception and Regulation: Teaching Skills of Body Awareness and Supporting Connection with Others* by Emma Goodall & Charlotte Brownlow

## References

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