
SENSORY SYSTEMS *info-guide*

a closer look at
commonly
impacted sensory
systems and best
ways to support:

**VESTIBULAR
AUDITORY
TACTILE
PROPRIOCEPTION
INTEROCEPTION**



LAURA PETIX, MS OTR/L | THE OT BUTTERFLY, LLC

PLEASE READ

This informational handout is meant to be used as a basic introduction to four (vestibular, auditory, proprioception, tactile) commonly impacted sensory systems in children intended for parents to refer to when learning about their child's needs.

This resource does not provide in depth education or discussion on all the sensory systems nor all the sensory profiles that may be present. It also does not include an exhaustive list of particular behaviors that might be indicative of a particular sensory profile. It does not replace OT assessment or intervention.

Parents, please note: every child, regardless of sensory profile has several strengths and positive attributes. Children should never be reduced to a checklist of negative "symptoms". However, the intent of this resource is to bring to light some common occurrences and challenges that may be indicative of a sensory processing difficulty, and thus highlights more of the concerning behaviors.

The strategies provided are meant to help parents support their child's participation in the home/community settings. These are not intervention/remediation strategies.

THIS LIST DOES NOT DIAGNOSE SENSORY PROCESSING DISORDER OR ANY OTHER DEVELOPMENTAL DELAY.

If you feel that your child exhibits a majority of the signs listed, seek out an OT evaluation.

BY CONTINUING, YOU ARE AGREEING TO THESE [DISCLOSURES AND DISCLAIMERS](#)

HELPFUL TERMS



Please refer to the terms below when using the sensory processing parent cheat sheet.

Fight/fright/flight: Refers to an involuntary, automatic response that occurs when the nervous system perceives a threat (even subconsciously).

Low Threshold: Hypersensitive

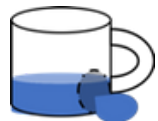


Other words often used: sensory sensitive, over responder, avoider. Refers to children who have a low threshold for sensory input. They are hyper-sensitive to input and it takes less frequency/intensity of input to register than it would for others. Think of these kids of having a “small sensory cup” that overflows with any added input.



High Threshold: Low Registration

Other words often used: under responsive, hypo- sensitive, bystander. Refers to children who have a high threshold for sensory input. They are hypo-sensitive to input and it takes more frequency/intensity/duration of input to register it than it would for others. Think of these kids of having a “big sensory cup” that needs more input for it to be full.



High Threshold: Craver/ Seeker

These kids have a “big sensory cup” and high threshold much like an under-responder. However, a craver’s cup has a hole in it- meaning, they are just insatiable and are constantly trying to fill up their sensory cup. However, the more input they get, they become more dysregulated. The same strategies are beneficial for cravers and under responders, except with sensory cravers, strategies need to be structured and goal oriented (e.g. not just “go run around the back yard”).

VESTIBULAR system

Vestibular receptors are housed in the inner ear, and provide information on the position of the head in relation to gravity: **upside-down, sideways, spinning, or linear movement.**

It also provides the brain with information on where the body is in space and how fast it's moving.

Because of its location in the inner ear, the vestibular system is functionally linked with the visual and auditory systems. Many children who have a history of chronic ear infections often experience vestibular dysfunction.

Higher level skills that develop with refinement of the vestibular system include bilateral coordination, balance and postural stability.

Sensitive to vestibular input

- Extreme fear and avoidance of feet leaving ground such as using stairs, tipping head back, walking on curbs, or going on a swing
- Getting car sick easily
- Poor balance
- Avoiding play structures, swings, slides
- Avoiding carnival rides or roller coasters
- Fear/hesitancy to learn to ride a bike or scooter
- Getting dizzy easily

Seeks/ craves vestibular input

- Need for movement intensifies even as they get more movement (becomes more dysregulated)
- Becoming more clumsy, giggly, excited with more movement
- Seeming to be constantly "on the move"
- Seeming to move fast, with no regard for other people or objects or safety
- Sometimes described as "hyperactive"

Under-responsive to vestibular input

- Seeming to have slow reactions to falling; does not catch themselves
- Poor balance
- Not recognizing when posture is leaning over
- Moving slowly throughout their environments
- Lack of response to movement until it's too late (getting dizzy all of a sudden)

Difficulty with vestibular discrimination

- Hard time adjusting their movements for a just-right speed or intensity
- Moving too fast or too slow for a particular activity.
- Difficulty coordinating his/her movements.
- Poor balance

VESTIBULAR

sensory supports

A child can show signs related to one particular sensory profile (e.g. under-responsive), OR they may also be considered to have a mixed threshold in which they respond with different behaviors towards different kinds of movement.

For example, a child might love swinging high and fast on a playground swing, but get carsick easily or hate to spin.

Below are some sensory strategies and activities that are helpful in enhancing the vestibular system and/or provide coping strategies to improve participation in meaningful activities.

Sensitive to vestibular input

- Allow the child to keep their feet on the ground when using a swing
- Let the child swing with their belly on the seat of the swing and their feet on the ground to self-propel
- Whenever possible, add options for the child to self-propel (or control) their swinging movements by pulling on a rope, self-pumping with their legs or arms
- Have the child push down on top of their head if they feel too dizzy
- Practice grounded movement activities like log rolling or somersaults
- Practice moving head out of upright positions while standing in place: standing windmills or passing a ball underneath through their legs

Under-responsive to vestibular input

- Use alerting, jerky, fast movements
- Play upbeat music while doing swinging or other movement activities
- Play trampoline games like jumping and crashing into pillows
- Use a hippity hop or yoga ball to bounce on
- Provide opportunities for inversion or being upside down

Seeks/ craves vestibular input

- Keep movement structured and goal directed. ([Click here for example](#))
- Do start-and-stop movements like red light, green light, freeze dance
- When possible, combine heavy work with movement, such as self-propelling on a swing, or carrying a weighted object
- Use a metronome counter to encourage slow pace and timing to the rhythm of beats
- Enroll in high intensity activities such as: soccer, gymnastics, basketball, swimming
- Find alternative seating arrangements for the classroom (sitting on a yoga ball, using a balance stool)
- Integrate intermittent movement breaks during the day

Difficulty with vestibular discrimination

- Practice slow, medium, or fast movements
- Play Simon Says with different head and body positions

TACTILE system

This system informs us about what our skin comes into contact with in the environment.

It includes wet, dry, rough, bumpy, textured stimuli in addition to temperature and pain. It's the first to develop in utero.

There are tactile receptors on the surface level of your skin that inform you of light touch, which is typically alerting (e.g. someone grazing against your arm, or wind blowing); there are also tactile receptors on the level beneath your skin that inform you of deep touch, which is typically less alerting and less aversive (e.g. firm pressure, massage, squeeze).

Sensitive to tactile input

- Responding to touch stimuli with aggression (fight), avoidance (flight), or an inability to move or respond at all (fright)
- Being sensitive to clothes, including seams of socks or tags on clothes
- Fear/avoidance of grooming activities (brushing/washing hair, cutting nails, applying sunblock, washing face)
- Dislike of messy art crafts with glue or finger paint, sand, shaving cream, putty or slime
- Being bumped or unexpectedly tapped by someone can trigger fight/flight/fright
- Feelings of pain or itch, when in contact with some touch stimuli
- Displays of oral overflow (drooling, or involuntary mouthing movements) when in contact with a particular texture

Seeks/ craves tactile input

- Seeming to have poor impulse control over their need to touch objects in the environment
- Tendencies to rub or touch a particular object or texture often
- Seeking out cuddles and hugs often

Under-responsive to tactile input

- Slow reactions to touch stimuli, or may not react at all (such as being tapped on the shoulder)
- Decreased registration of hot or cold temperatures or changes in temperature of water
- Seeming to have a high pain tolerance
- Difficulty recognizing food or other mess on their hands or face

Difficulty with tactile discrimination

- Displays of defensive behavior to imposed touch or touch that's out of their control or is unidentified to them. E.g. being bumped by a classmate, or water dripping down their skin.
- Difficulty knowing where to wipe on face if you tell them there's food on their face.
- Difficulty identifying objects by touch (e.g. reaching in backpack to grab a pencil without visually looking for it).

TACTILE

sensory supports

A child can show signs related to one particular sensory profile(e.g. under-responsive), OR they may also be considered to have a mixed threshold in which they respond with different behaviors towards different stimuli. For example, a child might seek calming touch like massage, yet is sensitive to other touch, like the feel of jeans on their skin.

Below are some sensory strategies and activities that are helpful in enhancing the tactile system and/or provide coping strategies to improve participation in meaningful activities.

Sensitive to tactile input

- Keep a wipe nearby for quick wiping during messy crafts/messy eating.
- Prepare child for touch activities by engaging them in heavy work (moving desks/chairs/sorting books) beforehand.
- Avoid touching child unexpectedly or outside of his or her vision (e.g. tapping on shoulder from behind)
- Cut tags off clothing, or purchase [sensory friendly](#) brands
- Pair tactile input with visual input, such as completing grooming activities in front of a mirror
- Prepare them for the feel of objects before touching it. "The cup is cold."

Under-responsive to tactile input

- Wash face or mouth with ice cold water to wake up skin receptors before an activity like eating
- Exfoliate the skin with a scrub or brush
- Pair tactile input with visual input, such as completing activities in front of a mirror
- Talk about and label the feel of objects. "this is spiky"

Seeks/ craves tactile input

- Allow use of thera-putty or playdough, kinetic sand with hidden jewels/coins/beads as a regulating activity/free time activity
- Cut small piece of fabric (suede, corduroy, velvet) texture and have place in pocket to fidget (you can get some swatches from a fabric store for free!)
- Use flip sequin fidgets
- Create a tactile board or tactile corner and provide opportunity for child to be able to play/fidget as they choose
- Provide "transitional object" to hold on to when walking in line or waiting in lines

Difficulty with tactile discrimination

- Practice touching a variety of textures and have a discussion about it. Label the feelings, such as: "dry", "creamy", "bumpy"
- Compare textures that are similar, but have slight differences (e.g. different grades of sand paper)
- Practice playing "I spy" by describing how things feel. E.g. "I spy something smooth and cold."

AUDITORY system

The auditory system is responsible for taking in sounds from the environment.

Auditory information can alert us of danger and also gives us information on the location of our body in time and space based on the 360° auditory input we are receiving from the environment.

Unrefined auditory processing systems could impact daily functioning in social contexts, learning environments and in community participation. The auditory system is linked and influenced by the vestibular system.

Sensitive to auditory input

- Extreme responses (fight or flight) to seemingly innocuous everyday sounds, like: phones ringing, toilets, vacuums, blenders.
- Noticing very faint sounds
- Being easily distracted by background noises (air vents, copying machines)
- Covering ears and complaining that voices, sounds, TV, music is too loud
- Difficulty filtering out irrelevant sounds to focus on important information (e.g. in the classroom)

Seeks/ craves auditory input

- Enjoying particular sounds and creating them repetitively (pushing buttons, switches, slamming doors, humming, singing)
- Enjoying listening to the TV or music loudly
- Gravitating towards loud, musical toys or objects

Under-responsive to auditory input

- Seeming not to respond to alerts or bells, or name being called
- Missing multistep verbal instructions
- Slow responses in conversations or verbal instructions
- Lack of registration of sounds that others notice in the environment
- Speaking in a loud voice

Difficulty with auditory discrimination

- Need to look around to find the source of a sound
- Slow responses to name or instructions in a busy room
- Often mixing up letter sounds and mishears instructions/information
- Potential difficulty using an appropriate volume of voice

AUDITORY

sensory supports

A child can show signs related to one particular sensory profile (e.g. under-responsive), OR they may also be considered to have a mixed threshold in which they respond with different behaviors towards different kinds of sounds. For example, they might be able to tolerate music at high volumes, but are fearful of low frequency sounds, such as a lawn mower or the vacuum. The auditory system is linked with the vestibular system. Often, children who have a history of ear infections have vestibular system dysfunction in addition to auditory system challenges. It's possible that some auditory seeking behaviors may have a link to the vestibular system.

Below are some sensory strategies and activities that are helpful in enhancing the auditory system and/or provide coping strategies to improve participation in meaningful activities.

Sensitive to auditory input

- Provide noise cancelling headphones to allow child to continue participating in meaningful activities
- When possible, allow child to be in control of the stimulus (e.g. allow them to turn on the blender)
- Allow them to visually monitor the sound stimulus
- Talk about or prepare the child before the auditory stimulus (e.g. "I'm going to turn on the vacuum now.")
- Identify or create a safe space or "cozy corner" where they can go during times of stress. Find or create a safe space at family parties or other activities outside of the home
- Consider only attending birthday parties or events at the beginning or end, when there are less people attending

Seeks/ craves auditory input

- Set aside structured, expected times for "loud play"
- Explore musical instruments
- Provide headphones for listening to music

Under-responsive to auditory input

- Pair auditory instructions with visual cues or written notes
- Give loud, clear, concise verbal instructions
- Sit closest to teacher in the classroom

Difficulty with auditory discrimination

- Play games with multistep instructions
- Allow pairing of visual input with auditory input
- Practice identifying sounds in nature ("I hear a leaf crunching")
- Give loud, clear, concise verbal instructions
- Compare different sounds and talk about their differences and similarities

PROPRIOCEPTION

system

Proprioceptive receptors are located in all of the tendons, muscles and joints in the body. The jaw houses the highest proportion of proprioceptive receptors in the entire body, which is why chewing and sucking is so regulating.

Higher level skills that develop with refinement of this system include: body awareness, motor planning, and gross motor coordination.

There is little to no documentation on isolated proprioception sensitivity (sensitivity to this kind of input is usually integrated with vestibular or tactile input) , and thus that profile is not discussed here.

Seeks/ craves proprioceptive input

- Giving or asking for extra tight hugs
- Stomping feet
- Enjoyment of “rough housing” with wrestling, bumping or crashing into other people or objects
- Preference for chewy, crunchy foods or chewing on non food objects (sleeves, collar of sweatshirt, pencil top)
- Enjoyment of lifting, pulling, or pushing heavy objects
- Loving to climb and jump
- Seeming to have awkward body movements
- Poor body awareness and motor planning (always bumping into objects or people)

Under-responsive to proprioceptive input

- Seeming to move slowly and sluggishly (may be described as “always tired”)
- Weaker muscles or less endurance compared to same aged children
- Lack of recognition when his/her posture is leaning
- Seeming to have awkward body movements
- Difficulty learning exercises or dances
- Poor body awareness and motor planning (always bumping into objects or people)

Difficulty with proprioceptive discrimination

- Clumsy appearance
- Use of excess force on objects or when giving hugs/touching people
- Difficult time getting dressed
- Weak posture
- Poor body awareness and motor planning (always bumping into objects or people)

PROPRIOCEPTION

sensory supports

Heavy work is inherently calming and regulating to the nervous system.

Proprioceptive input is provided to help children focus and regulate emotions and sensory regulation.

Below are some sensory strategies and activities that are helpful in enhancing the proprioceptive system and/or provide coping strategies to improve participation in meaningful activities.

*Note: the suggestions for under-responsive and proprioceptive seekers are the same. The underlying difference between the 2 profiles are that: under-responsive children will not actively seek out heavy work; they tend to prefer sedentary positions that don't require a lot of energy. They may need extra incentive and motivation to engage in these activities. Seekers actively seek out the input on their own, but may need some help in structuring the activities and providing a function/meaning/purpose to them.

Under-responsive/ seeker

- Provide crunchy, chewy snacks like popcorn, jerky, gum, fruit leather.
- Conduct direct joint compressions (ask an OT for specific protocol)
- Try jumping jacks/hopping
- Jump on the trampoline
- Try out some yoga positions
- Enroll in activities such as: basketball, martial arts, gymnastics, rock climbing
- Find alternative seating arrangements for the classroom (allow laying on tummy on the ground for reading or writing; offer weighted blankets/lap pads)
- Integrate intermittent heavy work breaks during the day (animal walks during transitions, yoga poses, pushing furniture or other house chores)
- Use steam rollers (child lays on the ground with arms by their side, and adult rolls exercise ball over their body with firm pressure)
- Play with firm resistive thera-putty

Difficulty with proprioceptive discrimination

- Identify a "force scale" soft, medium, hard and talk about what kind of force is needed for each activity. E.g. throwing a balloon vs a basketball.
- Practice Simon says with different body positions
- Play Twister
- Use mechanical pencils for the feedback of lead breaking to adjust pressure
- Color different shades of the same colored pencil or crayon (e.g. light blue, blue, dark blue with different forces of pressure)
- Practice exercises or motor actions in front of a mirror for visual feedback

INTEROCEPTION

system

Interoception is a less-talked-about but very impactful sensory system. Interoception receptors are located in bones, organs, muscles and skin. Interoceptive input informs the brain of internal sensations such as: feeling hungry, needing to use the bathroom, heart rate, arousal, fatigue, and emotional states.

The interoception system helps keep the body and brain connected and in homeostasis. Children with interoception challenges have a difficult time reading their internal body signals. There are a few universal ways to improve interoception awareness.

Sensitive to interoception

- Noticing changes in body temperature or complaining of heat or cold often
- Noticing every twinge and pain internally
- Having to go to the bathroom often
- Intense reactions to feeling hungry or full

Under-responsive to interoception

- Difficulty with potty training or has accidents often because they can't read their internal cues
- Not noticing when they're hungry or full and either eat too much or forget to eat
- Difficulty noticing internal pain or body cues related to illness

Difficulty with interoceptive discrimination

- Misinterpreting or misunderstanding sensations linked to emotions (and thus has a hard time regulating emotions)
- Noticing sensations internally but difficulty identifying what they mean or where in the body they feel it

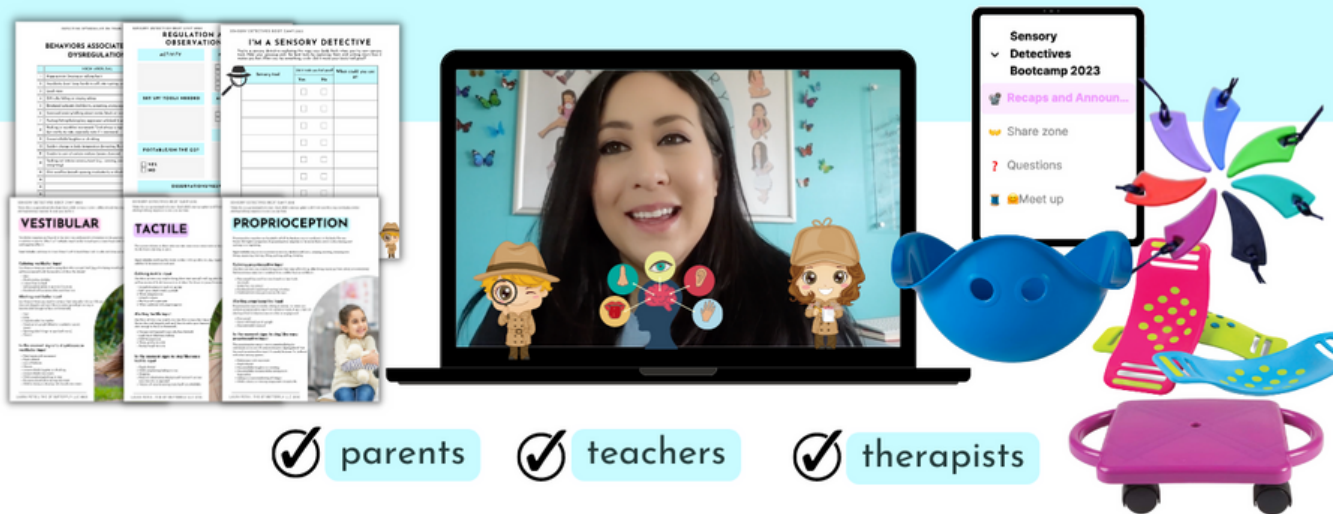
Ways to support interoception

- Yoga
- Practice mindfulness activities
- Link internal sensations (heart rate, temperature, muscle tension, knots in stomach, breath rate) related to emotions (e.g. when you're angry, your heart pounds really fast)
- Use an external alert or schedule to remind them for: potty breaks, feeding/drinking schedules, sleeping schedules, etc.
- Check in with them intermittently during meals to prompt them to notice if they feel full to avoid over eating (have them place a hand on their belly and ask if it feels full)



WHAT NOW?

SENSORY DETECTIVES BOOT CAMP



✓ parents ✓ teachers ✓ therapists

Join us in the next Sensory Detectives Boot Camp:
a 4 week, live group coaching program for
parents, therapists and educators who want to
learn how to effectively use the proprioceptive,
tactile and vestibular systems to regulate any
child's nervous system.

Click below to join the next cohort or get on the
waitlist

[LEARN MORE](#)

