Making Sense of Sensory

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Sensory Processing & Sensory Processing Disorder

• “Sensory processing refers to the way the nervous system receives messages from the senses and turns them into appropriate motor and behavioral responses.”  SPD Foundation

• Our bodies must process and integrate constant sensory information coming from the environment and also from inside our own bodies.

• To be neurologically organized, all the sensory systems must work together to provide us with the optimal level of arousal.

Sensory Processing Disorder (SPD)

• “Sensory Processing Disorder exists when sensory signals don’t get organized into appropriate responses and a child’s daily routines and activities are disrupted as a result.”  Lucy Jane Miller, 2006

• Some children present with sensory challenges that result in atypical reactions to typical experiences.

Why We Must Address SPD

A child who has difficulty receiving and interpreting sensory input can have difficulties with:

• social interactions
• communication
• making and keeping friends
• daily routines and activities
• behaviors
• self-regulation
• self-esteem
• academics
• the occupation of childhood (learning & developing)
Take in Multi-Sensory Info (input) Integrate & Process Sensory Info Child's Response (output)

SPD = Input/Output Problems

Sensory Processing Disorder
• Sensory Processing Disorder is treated by an experienced occupational therapist.
• However, all early childhood professionals need to have a basic understanding of sensory processing and be equipped with strategies on ways to help young children who present with sensory issues.
• Today, we are talking about children with sensory dysfunction, who may, or may not, have a formal diagnosis of SPD.
• SPD is not currently recognized in the medical community as a formal diagnosis.

Etiologies of SPD
• The exact cause of SPD—like other complex neurobehavioral disorders such as autism spectrum disorder (ASD) and ADHD—is unknown.
• According to Lucy Jane Miller, PhD, OTR, there are three likely contributors to SPD:
  1. Heredity/genetics
  2. Adverse prenatal and delivery complications (drug/alcohol exposure, prematurity, birth trauma)
  3. Environmental factors

SPD Subtypes
Lucy Jane Miller, PhD., OTR

Sensory Modulation Disorder: problem turning sensory messages into controlled behaviors that match the situation
  • Sensory over-responsivity
  • Sensory under-responsivity
  • Sensory seeking/craving

Sensory-Based Motor Disorder: problem with stabilizing, moving, or planning a series of movements in response to sensory demands

Sensory Discrimination Disorder: problem with sensing similarities and differences between sensations

The Dysregulated Child (Sensory Modulation Disorder)
• Describes a child who has difficulty turning sensory messages into behaviors that match the situation.
• Children who struggle with modulation have difficulty with self-regulation—they are not in a “ready state” for learning (they are dysregulated).
• There are three ways a child can be dysregulated:
  1. Over-responds to sensory input
  2. Under-responds to sensory input
  3. Craves sensory input

Dysregulation
H₂O Analogy

Neurotypical person = filling an 8 ounce glass with tap water (controlled and efficient)
Sensory over-responsivity = filling a shot glass with a firehose (getting too much input too fast)
Sensory under-responsivity = filling a large pitcher with an eye dropper (takes an extended amount of time to get enough input)
Sensory craving = filling a Styrofoam cup that has holes in the bottom (can’t ever get enough input, no matter how long you try)
Sensory Over-Responsivity

- Oh no! response
- Nervous system over-responds to sensory input
- Low threshold to sensory input (responds too quickly)
- Sensory information rushes in like a runaway train
- Also called “sensory defensiveness”
- Overwhelmed, anxious, and emotionally laden
- Overly cautious and resistive to change
- Difficulty with transitions
- Has a fight or flight response to sensory input

Sensory Under-Responsivity

- Huh? response
- Nervous system under-registers sensory input
- These kids require more input for longer periods of time with greater intensity in order to perceive information coming in through the senses
- Inattentive, withdrawn, difficult to engage, poor self-motivation, slow to respond, unaware of what’s going on in the environment
- Low activity levels; prefer sedentary activities such as screen time

Sensory Craving

- More, more, more! response
- Nervous system never seems to get enough or the right kind of sensory input
- Seeks unusual amounts of sensory input
- Lacks safety awareness, takes bold risks, is impulsive
- Constantly moving, touching or chewing
- The more sensory input the children receives, the more disorganized he/she becomes
- Often described as “naughty”

A child can be dysregulated in more than one way...

Example 1: A child can be over-responsive to certain kinds of sensory input and under-responsive to others.

Child is over-responsive to certain food textures and under-responsive to pain

Example 2: A child can be under-responsive to certain kinds of sensory input and constantly seeking other types of input.

Child is under-responsive to loud noises and seeks oral input (chews on everything)

The 8 Sensory Systems

External Senses
- Visual (sight)
- Auditory (hearing)
- Gustatory (taste)
- Olfactory (smell)
- Tactile (touch)

These are considered the 5 basic sensory systems.

Internal Senses
- Proprioception (body position and awareness sense)
- Vestibular (balance and movement sense)
- Interception (internal physiological body condition sense)


**Nervous System**

- Visual
- Auditory
- Gustatory
- Olfactory
- Tactile
- Proprioception
- Interoception

**The Big 3**

**Visual Sense**

- Sensory acuity is different from sensory processing.
- Visual acuity is the actual physical ability of the sensory organs (eyes) to receive input (to see). Visual acuity needs are addressed with glasses.
- Visual processing is the brain’s ability to process the information the eyes take in. Visual processing needs are addressed with changes to the environment/activity and vision therapy.
- Many children with visual processing deficits actually have intact acuity (20/20 vision).

**Auditory Sense**

- Sensory acuity is different from sensory processing.
- Auditory acuity is the physical ability of the sensory organs (the ears) to receive input (to hear). Acuity needs are addressed with hearing aids.
- Auditory processing is the ability of the brain to process the information the ears take in. Auditory processing needs are addressed with changes to the environment/activity and therapy.

**Gustatory Sense**

- The taste buds can detect 5 flavors: sweet, salty, sour, bitter and savory (umami).
- The gustatory sense allows us to know what we are eating, even if we don’t see it first.
- People with a well regulated gustatory sense will tolerate and welcome the introduction of new foods.

**Olfactory Sense**

- Smell travels to the limbic system (emotional part of the brain—this is why the smell of apple pie reminds us of grandma’s house).
- Taste and smell are closely tied together.
- There are 5 tastes we can detect (salty, sweet, bitter, sour, savory)—any other flavor we detect is actually provided by the olfactory sense.
- If you can’t smell, you can’t taste, which is why having a cold decreases your appetite.
- If something smells bad, you can almost taste it.

**Tactile Sense**

- The tactile sense is the largest sensory system because the skin is the largest organ in the body.
- The skin contains sensory receptors for touch, temperature, pressure, and vibration.
- There are two types of touch receptors:
  1. deep pressure touch receptors (calming/inhibitory)
  2. light touch receptors (alerting/excitatory)
“Every one of us, from infancy onward, needs steady tactile stimulation to keep us organized, functioning and healthy.”
Carol Kranowitz, 2003

“...children who don’t play much or are rarely touched develop brains 20 – 30% smaller than normal for their age.”
Baylor College of Medicine

Proprioceptive Sense
- Sensory information comes through receptors in the muscles, joints, ligaments and tendons.
- This sense allows you to know where your body is without having to look (referred to as body awareness).
- Body awareness (“internal eyes”) aids in accurate motor planning.
- Vision is not necessary to understand body ownership.

Vestibular Sense
- This is the most powerful sensory system.
- This is like our internal GPS system.
- Vestibular input is processed in the inner ear.
- The vestibular sense is important for the development of balance, orientation, coordination, eye control, attention, security in movement, and some aspects of speech and language.
- This sense also detects if we are in a safe, relaxing place or in danger. If danger is detected, the person will go into fight, flight or freeze mode.

The vestibule is filled with fluid and as you move, lean, or spin the fluid in the inner ear sends a message to your brain about how your body is positioned (whether you are sitting or standing, in motion or standing still, balanced or off-balance, upright or horizontal, moving forward or backward, walking or running, right side up or upside down).
- The vestibular system is like a carpenter’s level.

The semicircular canals process movement/primarily starting and stopping: on an airplane the only time you experience the sensation of movement is at take off, landing and turbulence.
- The utricle and saccule process smaller sustained movements. This helps with balance, extensor tone, linear movements and feeling grounded (the person’s relationship to gravity).
Vestibular input has to be processed bilaterally (we have two ears!).
- Kids with vestibular problems may have difficulty choosing a dominant hand due to difficulty with bilateral integration.
- Tasks involving both sides of the body (zipping a jacket, riding a bike) depend on effective vestibular function.

Why do some people get motion sickness? The visual system receives information that competes with the vestibular system. When reading in the car, the eyes see still words, but the ears feel the linear movement of the vehicle.

The vestibular system and the cochlea (the hearing portion of the inner ear) are anatomically connected. Therefore, stimulating the gravity receptors impacts the hearing receptors. Research (by Ray, Kin & Grandin, 1988) has shown that vestibular stimulation can increase spontaneous speech productions.
- Movement is important to enhancing speech development in children with speech delays.

According to Carol Kranowitz, “Moving activates the ability to speak. A child with vestibular and language problems benefit greatly from therapy that simultaneously addresses both types of dysfunction...therapists report that just putting the child in a swing during treatment can have remarkable results.”

Interoceptive Sense
- This is the “How do you feel?” sense.
- This sense tells you about the physiological condition of your body related to:
  - Pain
  - Sickness
  - Temperature
  - Itch
  - Thirst and hunger
  - Breathlessness/pounding heart
  - Need to use the bathroom
  - Fatigue

The Vestibular Sense and Speech & Language Development
- There is a connection between the vestibular sense and speech and language development.
- The vestibular and auditory systems work together as they process sensations of movement and sound—these senses are closely connected because they both begin to be processed in the receptors of the ear.
- The vestibular system plays a role in the development of language—therefore children with vestibular dysfunction may also have speech, language, and/or auditory processing difficulties.

The Hidden Sense
The Big 3

- According to Dr. Jean Ayres, the tactile, proprioceptive and vestibular senses are the “Big 3” for kids with sensory dysfunction. The other senses can’t work properly if the Big 3 aren’t doing their job.
- The Big 3 are also referred to as “The Power Senses.”

Tactile Input: Symptoms of Sensory Over-Responsivity

- Dislikes tight fitting clothes (jeans, hats, turtlenecks, underwear, socks, belts, coats)
- May wear clothing not appropriate for the season, because child only wears loose-fitting clothes (no coat, sundress, no underwear, & flip flops in the winter)
- Picky about clothing/dislikes certain fabrics
- As a toddler, may constantly take clothes and diaper off
- Startles easily with light or unexpected touch (tactile defensiveness)
- Aversive to tags and seams in clothes
- Has difficulty transitioning from winter clothes to summer clothes (long sleeves to short sleeves, pants to shorts, boots to sandals)
- Doesn’t like to be held or cuddled
- Resists affection
- Wipes off place where kissed
- Avoids group activities for fear of being touched or bumped into
- Avoids standing close to other people (dislikes waiting in line)
- Excessively ticklish
- Dislikes being hugged, but may give hugs (child does not want touch to be imposed on him)
- Overreacts to minor cuts, scrapes and mosquito bites
- Refuses to walk barefoot in the grass or sand
- Is bothered by the wind
- May toe walk to avoid having feet touch the surface
- Won’t leave bandages on skin
- Is distressed by diaper changes
- Bothered by dirty hands—wants to wash them frequently
- Avoids using hands during play
- Dislikes messy play such as finger painting, playing with shaving cream or using glue
- Hates being buckled into the car seat
- Aversive to taking a shower (prefers a calm bath)
- Dislikes having face washed
- Distressed by having nails clipped
- Is bothered by having hair washed or brushed
- Aversive to haircuts (may be physically impossible to take child to a barber/salon)
Tactile Input:
Symptoms of Sensory Under-Responsivity
- Lacks awareness of being touched or bumped
- Doesn’t seem to notice when being handled aggressively
- May dress inappropriately for the weather due to not noticing extremes in temperature
- May not notice if bath water is too hot or too cold
- Oblivious to hands or face being dirty or wet
- May not be aware that nose is running
- High pain tolerance/doesn’t cry when getting shots
- Isn’t bothered by wet or dirty diapers

Tactile Input:
Symptoms of Sensory Craving
- Intrusively touches other people (“space invader”)  
- Explores surfaces or textures repeatedly by touching, rubbing, licking, squeezing, etc.
- Excessively mouths objects (past age 2)
- Scratches or rub own skin excessively
- Engages in self-injurious behaviors (pinching, biting, banging head)
- Seeks out messy play
- Sleeps with excessive number of stuffed animals and blankets on the bed

Proprioceptive Input:
Symptoms of Sensory Over-Responsivity
- Proprioceptive input is helpful to the nervous system, so we do not typically see over-responsivity in this sensory system

Proprioceptive Input:
Symptoms of Sensory Under-Responsivity
- Poor body awareness
- Doesn’t know where body is in space
- Difficulty imitating body movements and actions to songs and fingerplays
- Difficulty maintaining posture; slumps when sitting in a chair or when seated on the floor; leans head on hands when working at a desk
Proprioceptive Input:
Symptoms of Sensory Craving

- Seeks out constant input to muscles and joints
- High-impact jumping (gives the joints in the hips, knees and ankles a jolt)
- Flaps hands or arms excessively (gives the joints in the shoulders, elbows and wrists a jolt)
- Loves heavy work (pushing, pulling, or dragging weighted or bulky items; working against gravity)
- Frequently cracks knuckles or neck
- Kicks floor or chair while seated
- Walks on toes for increased input

Vestibular Input:
Symptoms of Sensory Over-Responsivity

- Has gravitational insecurity/fearful of feet leaving the ground (general fear of movement)
- Dislikes playground equipment that involves movement (slides, swings, teeter totters)
- Fearful of going up and down stairs/ladders
- Is uncomfortable in elevators and on escalators (may try to sit down)
- Over-responds to ordinary movements (appears terrified); physically clings to caregiver
- Fearful of walking on uneven surfaces

Vestibular Input:
Symptoms of Sensory Under-Responsivity

- Little desire to move and explore environment
- Doesn’t get dizzy with rotary movement (spinning)
- Unaware of sensation of falling; doesn’t protect self well during a fall
- Has poor muscle tone and/or coordination resulting in:
  - limp or floppy body
  - difficulty with hand dominance
  - skipping of the crawling stage
  - weak gross and fine motor skills; poor imitation skills
  - “w” sitting (often used as a strategy for poor trunk or pelvic stability; poor static balance)
“W” Sitting

The vestibular system coordinates body movements, maintains balance and equilibrium, and helps children develop normal muscle tone.

A deprived vestibular system can contribute to weak core.

Vestibular Input:
Symptoms of Sensory Craving

• Seeks intense movement in all directions and angles (the faster the better)
• Loves to jump, spin, skip and roll excessively, without getting dizzy
• Delights in being upside down; loves doing somersaults
• Loves roller coasters and spinning rides
• Likes to jump from high heights/somersaults up wrong side of high staircase
• Is a thrill seeker
• Loves being thrown in the air

Communicative Functions of Behavior

Communicative Functions of Unwanted/Unexpected Behavior

1. **Attention**: Child seeks out attention from the adult (the child often does not care if the attention is positive or negative).
2. **Escape**: Child uses the behavior to avoid an undesirable activity or interaction.
3. **Access**: Child engages in a behavior in order to access a preferred item or activity.
4. **Physical Need**: Child engages in a behavior due to being overly tired, hungry, or ill. If rest time, a nap, or food improves the child’s behavior, then the response was likely due to a physical need.

Important Points...

1. You can’t teach a child anything until he is in a ready state for learning.
2. All behavior is communication.
5. **Frustration:** Child displays unwanted behavior due to difficulty knowing how to handle strong feelings appropriately. Causes of frustration may be related to: limited expressive language skills, talking but not being understood, having a highly emotional personality, and being told “no.”

6. **Sensory Need:** Child’s behavior provides some type of sensory input that is pleasing, or removes some type of sensory input that is aversive. If the behavior occurs in a wide range of settings, with a wide range of consequences, and sometimes occurs even when the child is alone, the behavior may be sensory-related.

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**Behavioral Tantrum vs. Sensory Meltdown**

- Behavioral tantrums (temper tantrums) and sensory meltdowns can look and sound similar.
- The causes and appropriate responses from the adult, however, are completely different.
- In order to provide the necessary support, we need to understand how they differ.

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**Anatomy of a Behavioral Tantrum**

- Purpose of a tantrum is to manipulate the caregiver in order for the child to get his way (socially driven)
- Child can stop mid-tantrum and start up again when the adult is looking (which means he is in control)
- Tantrums are typically sparked by frustration with being told “no,” having strong emotions, being tired or ill, having limited expressive language skills, or being misunderstood due to unintelligible speech
- Tantrums end when the child gets what he wants (attention, escape, access, or a physical need is met)

**Anatomy of a Sensory Meltdown**

- A fight or flight response due to feeling overwhelmed by the external or internal sensory input
- Child is neurologically disorganized and the behavior serves no end result that is obvious to the caregiver
- Meltdowns are sparked by exposure to sensory triggers (which differ for each child)
- Child isn’t seeking attention from the caregiver; meltdowns aren’t socially driven
- Meltdowns slowly lessen in intensity and eventually end due to fatigue or changes in sensory input

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*A child throwing a temper tantrum looks like he’s giving a performance, while a child having a sensory meltdown looks like he’s fighting for his life.*

Terri Mauro, 2006

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**Effective Interventions for Supporting the Dysregulated Child**
General Strategies for Home, Therapy & Classroom

- Children need to interact with sensitive adults who can guide the exploratory play and learning process and help them feel safe
- Offer multisensory experiences to facilitate development by selecting strategies and activities that will help children achieve a ready state for learning (circle time examples: Bus, Teddy Bear)
- Some children need alerting activities and some need calming activities, but the most important thing young children need is opportunities for purposeful **PLAY-BASED MOVEMENT**

Alerting Input

- Jerky movements/changes in direction
- Fast movements/speech
- Side to side movement
- Inversion
- The unexpected
- Bright/fluorescent/flushing lights
- Upbeat, loud music
- Light touch
- Loud sounds/voices
- Cold or changing temperatures
- Rough texture
- Strong odors
- Bright colors
- Pokey or prickly
- Bold, bright, colorful, busy background stimuli

Calming Input

- Rhythmic movements
- Slow, steady movements/speech
- Linear movement
- Eyes right with horizon
- The familiar
- Soft, natural lighting/dimly lit rooms
- Slower paced music
- Quiet sounds/voices
- Warm/neutral temps
- Smooth texture
- Mild odors
- Muted colors
- Deep pressure touch, heavy work
- Subdued backgrounds/limited visual stimuli

Alerting or Calming?

- Fast spurts of running
- Carrying heavy books to the library
- Doing somersaults
- Playing peek-a-boo
- Swinging on a glider/porch swing
- Being tickled
- Putting objects into a bucket repeatedly
- Lining up toys

Sensory Play

- Fairly new category of play “invented” because childhood has moved indoors
- Play has become a sedentary activity (the lack of play-based movement contributes to problems with core strength, gross motor development, & motor planning)
- Today children tend to expect two things from play: to be entertained or instructed (screen-based play doesn’t support the development of social skills)
- The “iPad finger” doesn’t strengthen muscle tone in a child’s hands, or support the development of fine motor skills

Sensory Toys

- Sensory toys/fidget toys often aren’t functional
- Sensory toys are used to regulate the child, but then traditional toys need to be introduced to enhance learning and development
- Children with sensory dysfunction often lack purposeful play and need to be taught how to play traditional toys
Activities Based on The Big 3 (The Power Senses)

• Tactile
• Vestibular
• Proprioception

Embed Learning Goals into Tactile Activities

T-1: If child is tactilely defensive, it is important to approach her from the front and avoid light touches
T-2: Play in sensory bins—for tactiley defensive kids, move gradually from dry textures (lentils, beans, pebbles, bird seed, rice) to messy, wet or sticky textures (this is how the brain accepts and processes tactile input)
T-3: Explore messy play with finger paint, shaving cream, pudding, whipped cream (can put in plastic bag)
T-4: Water play; “paint” the fence using a large paintbrush and a bucket of water

T-5: Create with play-dough, clay, Silly Putty or moldable sand
T-6: Offer different tools for scooping or pouring
T-7: Play with a pin toy
T-8: Have child identify objects by touch from inside Ned’s Head (game is called “What’s in Ned’s Head?”)

T-9: Make edible jewelry by stringing cereal or popcorn
T-10: Prepare different textured foods/snacks
T-11: Allow child to sit on outside of circle so nobody sits directly behind him or her
T-12: Offer a carpet square or hula hoop to help define personal floor space
T-13: Allow child to be the line leader or the caboose (reduces chance of having touch imposed on him by 50%)
T-14: Give a firm back rub (deep pressure is calming)
T-15: Offer a weighted blanket or a weighted lap pad
T-16: Make forts and secret hideaways using pillows, blankets, comforters

T-17: Engage in outdoor activities such as collecting bugs, digging in the garden, pulling weeds, collecting acorns and pine cones, going on a nature walk
T-18: Therapeutic brushing can reduce the fear and discomfort of being touched (Wilbarger protocol)
T-19: Take care of a pet: brushing a dog, petting a kitten or snuggling a guinea pig
T-20: Role the child up in a blanket like a burrito
T-21: Make a “sandwich” with the child in between two couch cushions and “spread” mustard or mayonnaise on child’s extended arms and legs with a brush or washcloth
T-22: Decorate cardboard boxes with paint, markers, stickers, or tape

T-23: Encourage child to discriminate among different textures by feeling and describing the objects (hard/soft, bumpy/smooth, cold/warm, heavy/light, etc.)
T-24: Play dress up with a variety of hats, shoes, gloves, feathery boas, and silk scarves
T-25: Pop bubble wrap
T-26: Play with wood chips, rocks, pebbles
T-27: Play with ice cubes
T-28: Write/draw with a vibrating pen
T-29: Create a tactile path: (soft rug, bubble wrap, sandpaper, foam egg crate, bathmat, artificial grass)
T-30: Play with water beads
T-31: Explore and toss different textured bean bags
T-32: Rub lotion on skin
T-33: Read touch-and-feel books
T-34: Wear a pressure vest or weighted vest/backpack

T-35: Play with Water Wiggles
T-36: Play catch with Koosh balls
T-37: Walk on stepping stones
T-38: Make and play with Goop (water and corn starch)
T-39: Draw or write in salt
T-40: Draw on sandpaper, cardboard or other textured surfaces
T-41: Wear a “onesie” or undershirt that is 1-2 sizes too small (feels like a hug)
T-42: Play with “mermaid” sequins
T-43: Play in a sandbox
T-44: Make mud pies

Proprioceptive Input
- Proprioceptive input can be obtained by lifting, pushing and pulling heavy objects, including one’s own weight (activating muscles through joint compression and joint traction)
- Proprioceptive input can be used to help the child calm down, become more alert and improve focus and attention
- Almost everything we do provides proprioceptive input EXCEPT:
  - Sitting still and screen-based play

Embed Learning Goals Into Proprioceptive Activities

P-1: Heavy work (involves moving against resistance) such as carrying heavy groceries, pulling a loaded wagon, rearranging furniture
P-2: Hold up the wall (do wall push-ups)
P-3: Sweep, dig, rake or shovel
P-4: Hang by arms on chin up bar or monkey bars
P-5: Offer joint compressions (although self-propelled movement and input is best)

P-6: Play tug of war (can use a dog toy)
P-7: Pound golf tees into sturdy Styrofoam
P-8: Climb in and out of a pool float
P-9: March/stomp (Ants go Marching song)
P-10: Water the plants
P-11: Wheelbarrow walk
P-12: Tear cardboard
P-13: Arm wrestle
P-14: Play leapfrog
P-15: Rough and tumble play
P-16: Play with a weighted ball
P-17: Pour different consistencies (water, sand, etc.)
P-18: Hug/tackle a blow-up punch bag
P-19: Crash into pillows or beanbag chairs
P-20: Climb the wrong way up a slide
P-21: Jump on a trampoline

P-22: Push the trashcan to the curb
P-23: Crawl around on the floor during play time
P-24: Give bear hugs
P-25: Pull small beads out of clay or Thera-Putty
P-26: Go bowling
P-27: Jump over a rope repeatedly
P-28: Pull a small wheeled backpack
P-29: Do the army crawl
P-30: Jog in place
P-31: Play with the Play-Doh Fun Factory
P-32: Squeeze and relax hands

P-33: Have pool noodle “sword fights”
P-34: Do the crab walk
P-35: Do push-ups
P-36: Open and hold heavy doors for other people
P-37: Wear wrist or ankle weights
P-38: Put together Pop Beads and then pull them apart
P-39: Wear a body sock
P-40: Push a friend in a laundry basket
P-41: Crawl through a resistance tunnel
P-42: Pull stretchy bands

Strive to provide the path of MOST resistance!

P-43: Play with Pop Toobs
P-44: Do jumping jacks
P-45: Empty trashcans or recycling bins
P-46: Do chair press-ups
P-47: Make fun sounds with Boom Whackers
P-48: Squeeze stress balls
P-49: Limit screen time
P-50: Play outside every day

Vestibular Input
• Vestibular input is provided through movement (back and forth, side to side, rotary, vertical, starting and stopping), inversion, and balance activities
• Reactions to vestibular input can be very powerful, so we must watch closely for signs of sensory overload, especially if the child is minimally verbal
• There are two types of input:
  ➢ Passive input is when someone provides input to the child
  ➢ Active input is when the child provides the input himself

Important Activities for Building the Vestibular Sense in the Early Years
• Playing on the floor
• Rolling
• Crawling
• Tummy time
• Rocking
• Climbing
• Jumping
• Swinging

Concern: Containerized Babies
Embed Learning Goals into Vestibular Activities

V-1: Jump and bounce/vertical input ("jumping improves rhythm and helps regulate the nervous system," Kranowitz)
V-2: Walk on uneven surfaces such as a sandy beach, mulch, a meadow, a shallow pool of water, rocky terrain
V-3: Sit in a rocking chair for rhythmic movement
V-4: Do somersaults
V-5: Swing child upside down ("tick tock")
V-6: Go up and down stairs

V-7: Piggy back rides
V-8: Dance, march, and twirl (dance ribbons)
V-9: Roll on a peanut ball or a bolster type pillow
V-10: Roll down hills
V-11: Play on a teeter-totter
V-12: Wagon rides
V-13: Jump rope
V-14: Log rolling (roll back and forth across floor)
V-15: Play Ring Around the Rosy or Duck, Duck, Goose
V-16: Ride on a scooter board
V-17: Play on a Sit-n-Spin
V-18: Swing (on a swing, in a hammock, on a porch swing, on a tire swing, or in a blanket)
V-19: Swing in different positions (prone, seated, standing)
V-20: Pull child around on a blanket (works best on hardwood floors or linoleum)
V-21: Fill socks with dry soup beans, rice or sand and have child walk on them
V-22: Pass ball over head/through legs
V-23: Run, gallop or skip
V-24: Bounce child rhythmically on a large ball
V-25: Hop on a ball with a handle
V-26: Spin on a merry-go-round

V-27: Offer dynamic sitting options such as:
- Ottoman or 2 stacked couch cushions
- Disc'o Sit cushion/textured seating disc
- Putting a tennis ball on 2 chair legs
- Partially inflated beach ball
- Coffee can stools
- Video game chairs
- T-stool
- Large therapy ball
- Cabela’s silent spin bucket seat
V-28: Invert the head
V-29: Stand child on your lap while holding her hands
V-30: Slide and climb on playground equipment

Angie Voss, OTR, explains that swinging can have a powerful effect on the brain’s ability to process sensory input (15 minutes of swinging can have a 6-8 hour effect on the nervous system)
V-31: Walk on stone walls or landscaping railroad ties
V-32: Swing from monkey bars
V-33: Sing “Row, Row, Row your Boat” while rocking back and forth with a partner
   Row, row, row your boat
   Down the jungle stream
   If you meet a crocodile
   Don’t forget to scream!
   “AAAAHHHH”
   Row, row, row your boat
   Gently back to shore
   If you meet a lion
   Don’t forget to roar!
   “ROAAAAARRRR”

V-34: Ride a rocking horse
V-35: Balance on a rocking board
V-36: Sit in or on a Bilibo

V-37: Play airplane or horsey

V-38: Ride a trike or bike
V-39: Navigate an obstacle course
V-40: Engage in balancing activities at the park or playground
V-41: Walk across a balance beam
V-42: Walk on a suspended bridge
V-43: Do Yoga poses (Downward Dog)
V-44: Do jumping Jacks
V-45: Play hopscotch
V-46: Stand on one foot
V-47: Do Headstands
V-48: Hang upside down on playground bars

V-49: Single point axis spinning activities
   Note: Spinning (rotary movement) needs to be limited and supervised. Angie Voss, OTR recommends working closely with your OT before doing spinning activities — this type of vestibular input can be disorganizing and lead to dysregulation. Voss recommends that spinning be limited to one revolution per second with a maximum of 10 revolutions, then switch directions.
V-50: Play outside every day

Strategies for Supporting the Oral-Seeking Child
(Kids who constantly mouth, chew or bite)

- Snack on chewy foods such as gummy bears, bagels, licorice, beef jerky, chewy granola bars, fruit leather, raisins, tootsie rolls
- Chew gum
- Eat thick crunchy foods such as Dutch pretzels, raw veggies, hard granola bars, sliced apples
- Use sippy cups with straws instead of spouts (sucking is organizing to the nervous system)
- Sip milkshakes or applesauce through straws

The Oral-Seeking Child

3 sensory systems receive input when the child chews
1. tactile: when anything touches the lips, tongue, and cheeks
2. proprioception: chewing and sucking provides organizing input
3. taste: receptors on the tongue can detect 5 flavors (sweet, salty, sour, bitter, and savory)

Oral sensory input is a quick way to help organize a dysregulated nervous system
Straw Hierarchy

- Try carbonated beverages (such as sparkling water)
- Offer cold or frozen foods such as popsicles, ice chips, frozen grapes, slushies to drink
- Try high intensity flavors such as salsa, Hot ‘n Spicy Cheez-Its, jalapeno flavored chips, Hot Tamales, black licorice, radishes, pickles
- Eat sour snacks such as sour gummy worm and citrus fruits (oranges, lemons, grapefruit)
- Incorporate mouth toys into play (whistles, kazoo, harmonicas, party blowers, etc.)

Environmental Modifications

What can we change in the environment?
- Reduce distractions
- Provide fewer options
- Change the furniture/seating options
- Adjust the amount of sensory input/stimulation
- Adjust the type of sensory input/stimulation
- Change the location
- Use sensory stories (www.sensorystories.com)
- Provide visual cues/schedules
- Provide a “womb” environment

Sensory Diets

- “A sensory diet is a group of activities that are specifically scheduled into a child’s day to assist with attention, arousal and adaptive responses.”
  www.ssdmo.org
- Angie Voss, OTR, recommends that a child have access to different types of sensory input AS NEEDED, rather than providing the input in a pre-determined manner
- Voss refers to this as a “Natural Sensory Diet”

- A rigid sensory diet may not be able to meet the child’s fluctuating sensory needs from day to day (a specific strategy may work on Monday, but be totally ineffective on Tuesday)
- Voss explains that the brain responds best to purposeful and meaningful activities and only the child’s brain knows what it needs at any moment
- A natural sensory diet is child-led; teaching the child to seek out the type of input his nervous system needs is essential for learning to self-regulate
Case Studies

Haircuts cause distress
Possible explanations
• Sensory defensiveness or over-responsivity in one or more of the sensory systems
• This is multisensory activity that involves social interactions with nonpreferred, unfamiliar people, in an unfamiliar environment
• Distress may be triggered by the cape, the sound or vibration of the clippers, the smell of the unfamiliar hair products, the chattering of all the people, hair touching the skin or clothes, the squirt bottle
• Touch is imposed on the child the entire time
• The chair moves up and down

Possible strategies for this child
• Have the barber chair go up and down periodically throughout the haircut (passive vestibular input)
• Have the child sit in a regular chair or on the floor if the movement from the chair is a problem
• Cut the hair dry (no hair washing or spray bottle)
• Make appointment during the least busy time of day
• Prepare the child: go visit the barbershop/salon several times before the haircut; allow child to watch parent, sibling or other child get their hair cut
• Remember, one traumatic experience at the barber shop or salon can create a negative memory that is difficult for the brain to overcome—so the first experience is the most important one

Child holds it together at school, then melts down at home
Possible explanations
• Sensory input has a cumulative effect—many kids function well in the morning, but are struggling by the afternoon
• By the time child arrives home, his nervous system is completely overloaded (long day at school, loud bus ride, may be hungry)
• Also, kids tend to let it all out in the environment in which they feel the safest
• School offers more structure and predictability

Possible strategies for this child
• Respect and acknowledge this as a sensory signal that the day was challenging and overwhelming
• Offer a sensory retreat to help unwind and unload (the “womb” effect)
• Offer a snack
• Encourage swinging in slow rhythmical planes
• Offer inversion, full body deep pressure touch, and proprioceptive input
• Decrease stimulation for 1-2 hours after school
• Reduce expectations (related to conversation, homework, chores, sports) immediately after school
Child has difficulty going to sleep or staying asleep

Possible explanations
• The sleep-wake cycle is controlled by the same area of the brain that controls self-regulation
• Children who struggle with self-regulation often have difficulty establishing sleep patterns
• Children who are seeking sensory input often struggle with sleep, because the body is constantly craving sensory input
• Screen time within 2 hours before bed can prevent melatonin from being released

Possible strategies for this child
• Proprioception is the key to establishing successful sleep patterns
• Provide a heavy quilt or weighted blanket
• Offer compression clothing under PJs
• Provide deep pressure touch to the body before bedtime
• Eliminate screen time 2 hours before bed; reading is a better option to promote sleep
• Let the child sleep in a sensory retreat such as a tent or fort
• Make a “nest” out of pillows on the bed
• Establish a consistent bedtime routine

• Allow the child to sleep on a mattress on the floor
• Provide at least 15 minutes of rhythmical swinging prior to bedtime (hammock or cuddle swing)
• Provide a large stuffed animal or body pillow for the child to hug
• Avoid sugar and carb snacks before bed
• Offer a small nightlight
• Provide white noise (music, humidifier, fan)
• Be sure the child is not too hot

Closing Thoughts
Embedding learning activities into tactile, proprioceptive, and vestibular activities will help to organize the dysregulated child’s nervous system.

Sensory trumps everything!

Suggested Readings and Resources
Books:


Websites:
• www spd foundation.net
• www sensory processing disorder com
• www asensorylife com