SENSORY REGULATION IN THE CLASSROOM

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WHAT IS SENSORY PROCESSING?

• According to SPD Foundation, sensory processing (sometimes called "sensory integration" or SI) is a term that refers to the way the nervous system receives messages from the senses and turns them into appropriate motor and behavioral responses.

• Sensory Processing Disorder (SPD, formerly known as "sensory integration dysfunction") is a condition that exists when sensory signals don't get organized into appropriate responses.
Response:
A response is generated.

Sensory Input:
Sensory receptors are stimulated.

Processing:
Sensory information is organised and interpreted, stored and related to previous experiences.
### Three Subtypes of Sensory Processing Disorder

(as described by Lucy Jane Miller)

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| Sensory Discrimination Disorder: | Visual, Auditory, Taste/Smell, |
|----------------------------------| Position/Movement, Interoception|

Our main focus will be on sensory modulation
Sensory Over-Responder

• more sensitive to sensory stimuli compared to others
• interprets sensory information as too much or too intense
• often displays a “fight or flight” response
• often will withdraw or avoid sensation
• defensiveness
• fearful cautious
• strong emotional component
Sensory under-responder

- doesn’t regard sensory stimuli as compared to others
- may appear withdrawn, difficult to engage
- may seem self absorbed, as they do not detect sensory input in their environment
- slow, sluggish
- limited perception of pain
- needs intense sensory input to become engaged
Sensory Craver/Seeker

- bumper and crasher
- constant seeking of sensory input
- dare-devilish behavior
- impulsive
- tendency to get into trouble
Overview of Anatomy in Sensory Processing
Brain

Corpus Callosum:
Primary connection between brain hemispheres

Cerebral Cortex:
Responsible for higher brain functions

Pineal Gland:
May coordinate activity cycles through secretion of melatonin

Thalamus:
Relay for sensory and motor neurons, controls body function

Hypothalamus:
Controls body temperature, regulates pituitary secretions and regulates heartbeat and respiration

Pituitary Gland:
Master endocrine gland. Controls endocrine system

Cerebellum:
Coordinates movement and balance

Brainstem:
Controls basic body functions and relays sensory information
Reticular formation: Interconnected nuclei that are located throughout the brainstem. Regulates alert states with its interactions with the limbic structures, hypothalamus and it influences the autonomic nervous system. Often poorly developed in children with sensory processing disorders.
Limbic System: Regulates changes in attentional responses through coordination of the autonomic, somatic and behavioral systems.

Amygdala: Part of the limbic system. Responsible for emotional modulation, fear, freeze, flight, rapid heart beat, increased respiration, stress, hormone release.
Importance of adequate sensory processing

Graphic design by Maryann Trott and Kathleen Taylor demonstrates when the sensory system is functioning well it will support the development of sensory motor skills and that supports the maturation of perceptual motor, and so forth. Academic learning has all these underlying components that need to be functioning adequately.
WHAT ARE THE SENSES?

There are 8 senses that are recognized when referring to sensory processing disorder. Those senses are:

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

The organs of touch which primarily deal with the skin. It is made up of two components: the discriminative system and protective system. These systems work together to interpret tactile information.

Examples of SPD:

**Over Responder**
- becomes fearful, anxious or aggressive with light or unexpected touch
- avoids touching certain textures of material (play-doh, glue, sand)
- over reacts to a minor injury

**Under Responder**
- seems unaware of touch unless it is intense
- poor body awareness
- may not be aware that hands or face are dirty or feel his/her nose running
- May hurt other children or pets during play unknowingly

**sensory craver**
- touches objects and people constantly, “in your face” behavior
- Seeks certain messy experiences, often for long duration
- rubs or bites own skin, prefers being barefoot
**PROPRIOCEPTION/BODY AWARENESS**

Proprioceptive information is obtained from receptors in our muscles and joints and gives us information regarding body awareness. Rarely overloading to the nervous system.

**Motor challenges**
- Poor motor planning
- Poor body awareness
- Chews frequently on shirt and other non-food items.
- Clumsiness
- Difficulty grading pressure
- Eating, speaking and other oral motor problems

**Sensory Seeker**
- Seeks out jumping, bumping, and crashing activities
- Enjoys bear hugs
- Frequently hits, bumps or pushes other children
- Slaps feet when walking
- Pulls and twists clothing
- Cracks knuckles, pulls on fingers, pokes cheeks
VESTIBULAR/BALANCE

Centered in the inner ear. Provides information regarding movement and head position. Important for development of balance and coordination, as well as eye control.

**Over-Responder**
- may appear terrified of falling even when there is no real risk of it
- loses balance easily and may appear clumsy
- prefers sedentary tasks, moves slowly and cautiously, avoids taking risks, and may appear "wimpy"
- avoids changes in head position

**Under-Responder**
- could spin for hours and never appear to be dizzy
- will not notice or object to being moved
- will not notice sensation of falling or being off balanced, and will not protect self well
- seems to lack inner drive to move actively

**sensory craver**
- in constant motion, can't seem to sit still
- loves to swing as high as possible and for long periods of time
- rocks body, shakes leg, or head while sitting
AUDITORY/HEARING

The auditory system includes an outer ear, middle ear and inner ear. The inner ear consists of the cochlea and vestibular structures. The cochlea decodes sound and the vestibular structures are the center of sensory integration and motor control. There is a close connection between the auditory and vestibular system. When sound is being processed, neural networks throughout the brain are activated.

Over-Responder
- frequently asks people to be quiet
- covers ears
- started with or distracted by loud or unexpected sounds
- fearful of the sound of a flushing toilet (especially in public bathrooms), vacuum, hairdryer, squeaky shoes, or a dog barking

Under-Responder
- often does not respond to verbal cues or to name being called
- appears to "make noise for noise's sake"
- will “turn on” to excessively loud, close or sudden sounds.
- seems to have difficulty understanding or remembering what was said

sensory craver
- craves intense, loud noises
- loves crowds and places with a lot of noisy action
- speaks in a loud voice
The visual system is responsible for seeing. It is a highly complex system. It helps to distinguish visual attributes, such as, size and color. It also helps with eye-hand coordination during tasks, such as, handwriting and catching a ball.

**Over-Responder**
- sensitive to bright lights; will squint, cover eyes, cry and/or get headaches from the light
- has difficulty keeping eyes focused on task/activity he/she is working on for an appropriate amount of time
- easily distracted by other visual stimuli in the room; i.e., movement, decorations, toys, windows, doorways etc.
- avoids eye contact

**Under-Responder**
- often loses his/her place while reading or doing math problems
- difficulty with consistent spacing and size of letters during writing and/or lining up numbers in math problems
- fatigues easily with schoolwork

**sensory craver**
- attracted to shiny, spinning objects, bright flickering light
- seeks visually stimulating scenes and screens for long periods of time
OLFACTORY/SMELL

Responsible for processing smell. It transmits information from the olfactory bulb to the brain. The olfactory bulb also receives information from the amygdala, neocortex and the hippocampus. It can discriminate odors and enhance detection of odors.

**Over-Responder**
- reacts negatively to smells that others do not notice or react to
- refuses certain foods due to their smell
- tells other people how bad they smell
- bothered by household or cooking smells
- refuses to play at others house due to smells

**Under-Responder**
- uses smell to interact with objects
- fails to notice or ignores unpleasant smells
- unable to identify smells
- excessive use of smelling when introduced to objects, people, places

**sensory craver**
- smells strong odors, chemicals, markers
GUSTATORY/TASTE

Responsible for the sense of taste. It discriminates between foods that can be harmful to us or safe for us to eat.

Over-Responder
- picky eater
- may only eat soft foods
- difficulty with sucking, chewing, swallowing
- may gag with textured foods

Under-Responder
- may lick, taste, or chew on inedible objects
- prefers food with intense flavor
- constantly putting objects in mouth
- chews on hair, shirt, fingers

sensory craver
- prefers strong flavored foods, spicy, sweet, salty, bitter
- licks, tastes or chews on inedible objects
Interoception refers to sensations related to the physiological/physical condition of the body. Interoceptors are internal sensors that provide a sense of what our internal organs are feeling. Hunger and thirst are examples of interoception.

(obtained from spdstar.com)
BRAIN BREAK
SENSORY TOOLS AND TECHNIQUES TO HELP MODULATE THE SENSORY SYSTEM IN THE CLASSROOM
TACTILE

- velcro on the bottom of tables or desks
- fidgets
- sensory bins—such as rice, beans, sand, hunt for objects
- play-doh
- finger paints
- identify items with touch only, no vision
- textured pencil grippers
- write in unscented shaving cream
- rub lotion on skin
- gluing projects
PROPRIOCEPTIVE/BODY AWARENESS

- compression vest
- jumping, rockets, toasters
- crash pad
- wipe down desks
- moving chairs or books
- desk or wall push ups
- bear hug
- Wilbarger deep pressure and proprioceptive technique

- weighted vest, 5-10% of body weight, 20 minutes on 20 minutes off is usual recommendation
- weighted blanket, lap pad
- playground equipment, climb, monkey bars
- roll up tight in blanket or mat, pretend to be a burrito or sandwich
- body sock
VESTIBULAR/BALANCE
• spin on a swing in both directions, lying on stomach try to knock down a target (alerting)
• swing forward and back (calming)
• rolling
• somersaults
• helicopter spins
• upside down bowling
• sit cushion
• T-stool
• dance, move to songs
• ball chair
AUDITORY/HEARING

• sound blocking headphones
• listen to music classical is more calming with an even, slow beat, loud bass and uneven beat is more alerting
• Therapeutic listening program
• guess that sound
• musical chairs

• same/different word sounds
• ear plugs
• whisper phone
VISUAL/VISION

- visual schedule
- visual toy
- visual timer
- first and then visual
- watch fish in an aquarium
- read a book
- dim lights to decrease alert state or use bright lights to increase alert state
- decrease visual distractions on desks and walls
- high contrast
- baseball cap, sunglasses
OLFACTORY/SMELL

- scented markers
- scented erasers
- essential oils
- sport wrist bands with applied scented oil
- scented play-doh
GUSTATORY/TASTE and ORAL MOTOR

- chew gum
- chew on a chewie
- sweet, salty, sour, bitter tastes
- suck on hard candy
- drink through a straw
- Camelbak water bottle
- blow bubbles
- blow toys
- blow a cotton ball with a straw
A “sensory diet” (coined by OT Patricia Wilbarger) is a carefully designed, personalized activity plan that provides the sensory input a person needs to stay focused and organized throughout the day.
CASE STUDY WITH ELEMENTARY STUDENTS
STUDENT #1
“Tim” is a kindergarten student who moved to our school in January

Behaviors observed in the classroom:
• Unable to sit still or work for more than two minutes at a time
• Easily distractible
• Oppositional to writing activities
• Would cringe when touched unexpectedly

Is Tim over-responsive, under-responsive or a sensory craverseeker?

What tools could we use with Tim?
SENSORY DIET STUDENT #1

Morning brushing routine
Behavioral plan-20 minutes of work then a reward
Visuals (schedule and first/then)
Two hours later:
Sensory break to swing and crash
Brush to calm down
Transition item (stuffed animal) keeps him calm
Weighted vest
T-Stool
STUDENT #2

“Myra” is 2nd grader, currently in foster care with a diagnosis of ADHD and Bipolar

Over stimulated by sound

Yells and runs out of the classroom

Hides when overwhelmed

Chews on clothes when anxious
SENSORY DIET STUDENT #2

- Multiple breaks a day with an adult
- Cuddle swing
- Headphones
- Chewy necklace
- Quiet corner in the classroom that is just for her
- Stuffed animal for comfort
Lab

Make your own fidgets!

• Stress balloons
• Yarn Fidgets