

Sensory Processing Disorders (SPD)

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From **the SPD Foundation:**

- Research indicates that at least 1 in 6 children experiences sensory challenges sufficient to disrupt their academic, social, and/or emotional development.
- That's about 16% of the childhood population - 4 to 5 children in every classroom.

How a Normal Sensory System Works:

- Takes in information through the senses:
 - *Touch
 - *Vision
 - *Hearing
 - *Taste/Smell
 - *Movement
 - *Vestibular
 - *Interoception
- Combines the incoming information with prior information, memories and knowledge already stored in the brain
- Attempts to apply meaning to the stimulus and effectively respond

The Process of Sensory Integration

- Sensory systems begin forming in utero
- Fetal life is rich in sensations



Sensory Integration in Infancy

- Baby is introduced to intense sensory experiences at birth
- Depends on caregiver for regulation of systems



Sensory Integration in Early Childhood

- Begin self regulation
- Engage in sensory exploration
- Learn how to make things happen
- Improve body movement



What happens when the Sensory Processing System does not fully mature?

Sensory Processing Disorder

- A neurological disorder causing difficulty processing information from the senses
- Sensory information is received NORMALLY, but perceived ABNORMALLY
- May cause distress or confusion
- May affect learning, social interactions, task performance, and everyday activities
- Can lead to motor, emotional, psychological, social, communication, and/or behavior problems

SPD are associated with:

- Autism
- Intellectually challenged
- Pervasive Developmental Disorders
- ADD/ADHD
- Learning disabilities
- Genetic disorders

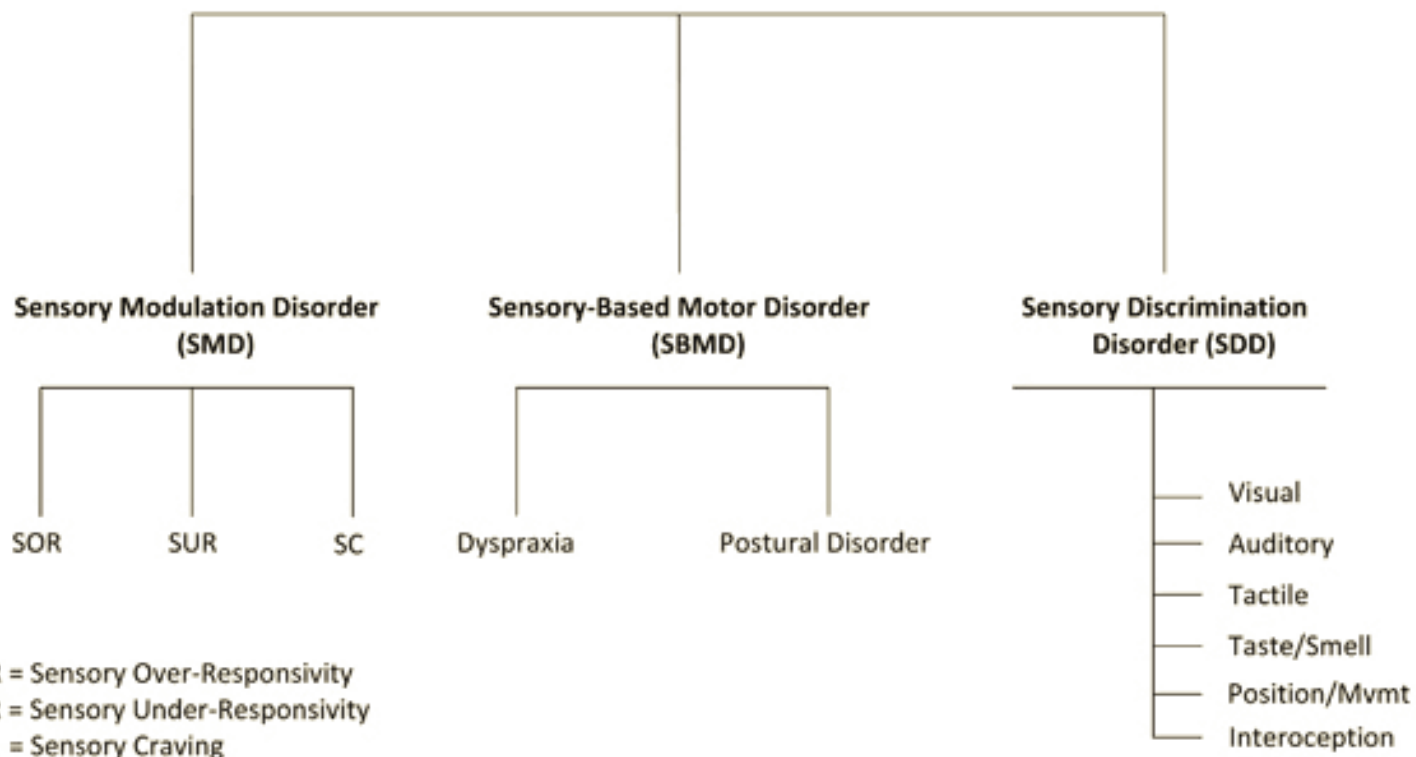
Possible causes of SPD

- Structural abnormalities
- Trauma or defect in sensory receptors
- Brain/head trauma
- Biochemical abnormalities
- Sensory deprivation
- Genetic disorder
- Prenatal drug/alcohol use
- Physical/sexual abuse

Types of SPD

- Sensory Modulation Disorder
- Sensory Based Motor Disorder
- Sensory Discrimination Disorder

Sensory Processing Disorder (SPD)



Sensory Modulation Disorder

- Difficulty regulating responses to sensory input – responses are not adjusted to the situation
- Difficulty achieving and maintaining a optimal range of arousal and adapting to challenges in daily life
- To be labeled a “disorder” must be severe enough to disrupt ability to meet life’s daily challenges



Sensory Over-Responsivity

- Responds too much, too frequently, or for too long to sensory stimuli
- Hyper-sensitivity to sensations e.g. sights, sounds, touch, movement, smells, taste
 - Examples: Bothered by –
 - Smells in a restaurant
 - Being touched expectantly
 - Being in a car or up high
 - Loud unexpected sounds
 - Having hair cut or brushed
 - Food textures
 - Brushing teeth

Sensory Over-Responsivity: Behaviors

- When overwhelmed by sensory stimulation:
 - Upset by transitions or unexpected changes
 - Aggressive or impulsive
 - Irritable, fussy, moody
 - Unsociable, avoids group activities and has trouble forming relationships
 - Excessively cautious and afraid to try new things
 - Often labeled a "fussy baby", "difficult", or "out of control"

Fight or Flight Neural Reaction

- <https://www.youtube.com/watch?v=jdJpLvSTZMU>

Sensory Under-Responsivity

- Less sensitive to and less aware of sensory stimuli than most people
- Examples:
 - Doesn't cry when seriously hurt
 - Doesn't seem to notice when being touched
 - Unaware of the need to use the toilet
 - Doesn't respond to their name being called
 - Usually does not notice strong odors or smells
 - Often has poor muscle tone and slow motor responses

Sensory Under-Responsivity: Behaviors

- Poor inner drive, uninterested/unmotivated in exploring the world around him/her
- Passive, quiet, withdrawn
- Difficult to engage in conversation or other social interactions
- Easily lost in their own fantasy world
- Apathetic and easily exhausted
- Excessively slow to respond to directions or to complete assignments

Sensory Craving

- Seems to have an intense, insatiable need for sensory stimuli – more than most people
- Often in the vestibular or proprioceptive domains
- Examples:
 - Is on the move constantly
 - Likes/Needs crashing, bumping into things, roughhousing
 - Excessive need for spinning, swinging, or rolling
 - Constantly touching objects or people
 - Hard to inhibit verbalizations, trouble turn-taking in conversations
 - Watches spinning objects

Sensory Craving: Behaviors

- Constantly wants control over every situation
- Does not wait turn, interrupts constantly
- Angry or even explosive when required to sit still or stop what they are doing
- Intense, demanding, hard to calm
- Excessively affectionate physically
- Prone to create situation others might perceive as "bad" or "dangerous"

Sensory Based Motor Disorder: Postural Disorder

- Difficulty stabilizing the body during movement or at rest such that the individual is challenged or unable to meet the demands of the environment or of a given motor task
- Often characterized by abnormal muscle tone, inadequate control of movement, or inadequate muscle contraction for executing movement against gravity or resistance



Sensory Based Motor Disorder: Postural Disorder

- Weak muscles and poor sense of where their body is in space
- Poor balance – prone to falls
- Demonstrates poor bilateral coordination
- Decreased trunk rotation
- Poor ocular-motor control
 - Difficulty smoothly moving eyes across a line of print
 - Difficulty shifting gaze from left to right, near to far

Postural Disorder Strategies

- Core Strengthening Activities
 - Yoga
 - Animal walks
 - Bike riding/horseback riding
- Dynamic seating – ball chairs, standing desks, wiggle cushions

Sensory Based Motor Disorder: Dyspraxia

- Praxis = Motor-Planning:
 - The ability to think of, plan, sequence, and then execute a new goal-directed action
 - Praxis includes 3 distinct elements:
 - Cognitive visualizing or imagining an action
 - Planning and sequencing
 - Motor execution
- Once the activity is learned and able to be performed automatically – without conscious thought – it no longer requires a motor plan

Sensory Based Motor Disorder: Dyspraxia

- Demonstrates clumsy, awkward movements
- Has difficulty learning new motor tasks
- Decreased ability to play team sports that involve timing and sequencing
- Has difficulty with fine motor tasks (i.e. buttoning, tying shoelaces, handwriting)
- Has poor body awareness and difficulty organizing and planning movement sequences
- Messy eater

Dyspraxia Strategies

- Games such as Simon Says, Twister
- Obstacle courses
- Identifying & planning how to do an activity
- Work on timing – jump rope, kicking a ball
- Activities such karate, dancing, trampolines

Sensory Discrimination Disorder

- Children do not accurately register sensations
- Difficulty differentiating between similar stimuli
- Trouble distinguishing between size, quality, shape, and texture of sounds, sights, and other sensory stimuli
- Often masquerades as a behavioral problem



Sensory Discrimination Disorder

- Tactile – sensing touch & localizing where it occurred
 - Difficulty identifying an object by touch alone (i.e. finding a pencil in desk)
 - Difficulty buttoning & unbuttoning – needs eyes to guide fingers to button holes
 - Handwriting – may not hold pencil correctly – may squint, or put head close to paper
 - Difficulty differentiating between similar objects

Sensory Discrimination Disorder

- Proprioception – knowing just the right amount of tension/force to use when responding to stimuli
 - Has difficulty using the correct amount of pressure with markers, pencils, glue sticks
 - Difficulty judging correct amount of force to use when throwing or kicking a ball
 - Difficulty using safe amount of force when playing games such as tag

Sensory Discrimination Disorder

- Visual – eyes bringing in information about the surrounding environment. Works with other systems to determine where we are in space
 - Difficulty recognizing shapes – unable to differentiate between a square & a rectangle
 - Difficulty recognizing symbols – i.e. letters - a "b" and a "d" may look identical
 - Difficulty lining up numbers in columns
 - Difficulty scanning a page to look for key words in a text
 - May have problems reading facial expressions

Sensory Discrimination Disorder

- Auditory – processes & interprets information that is heard
 - Talks too loudly or too softly
 - Difficulty recognizing differences between similar sounds, i.e. “bad” vs “bag”
 - Difficulty distinguishing where a sound is coming from
 - Poor listening skills – difficulty following directions

Sensory Discrimination Disorder

- Vestibular – helps determine where we are in space in relation to gravity
 - Is needed for balance along with the visual & proprioceptive system
 - Difficulty changing positions or directions when moving
 - May not be aware which direction they are falling
 - May not be able to move with vision occluded

Sensory Discrimination Disorder

- Vestibular – cont'd
 - The effects vestibular dysfunction may seem abstract, but they quite profound (Bialer, D., Miller, L. 2011)
 - Anatomically connected to the hearing system
 - Gravitational insecurity – fear of movement
 - Over-responsivity to movement – nauseous, dizzy
 - Discriminative – unaware which way they are moving
 - Needs intense, high volume of movement



Sensory Discrimination Disorder

- Olfactory – important for taste & eating, and being aware of danger
 - Sensitivity to smells that may affect their ability to eat a range of or to try new foods
 - May have difficulty sitting at the dinner table or eating in restaurants
 - May have difficulty interacting with certain people because of the way they smell
 - Refuse to use public bathrooms

Sensory Discrimination Disorder

- Taste – provides information regarding the quality of the foods & liquids we eat
 - May have difficulty distinguishing between sweet, salty, bitter, and spicy foods
 - Refuse to eat certain textures
 - Severe cases may cause malnutrition and require G-tube feeding

Sensory Discrimination Disorder

- Interoception – provides sensations from our internal organs such as our stomach, intestines, and bladder
 - May not know when they are hungry or thirsty
 - Poor bladder/bowl control
 - May feel sick but unable to identify where
 - May confuse emotional states for feelings from within their bodies

Principles of Intervention

- Find the "Just Right Challenge"
 - The child must be able to successfully meet the challenges that are presented
- Adaptive Response
 - The child adapts his/her behavior with new and useful strategies in responses to the challenges presented
- Active Engagement
 - The child must want to participate
- Child Directed
 - The child's preferences are used to initiate changes

Sensory Strategies

- Activities may be considered either alerting or calming – may have different effects on different individuals at different times
- Some may both be alerting and calming
- Responses can change depending on energy level, mood, blood sugar levels, environmental factors

Auditory Strategies

Sensory Modulation

- Calming for Overresponders
 - Noise-reducing headphones or earplugs
 - Calming music or sound machines
 - Use a soft, calm voice & don't talk too much
 - Provide a visual schedule
- Alerting for underresponders
 - Combine movement and music – fast & slow
 - Musical instruments
 - Animated voice
 - Provide a visual schedule
- Sensory Cravers
 - Background noise / music with headphones
 - Incorporate sound into daily activities

Auditory Strategies

Sensory Discrimination

- Rhyming games (www.pbskids.org)
- Games such as Sound Bingo, Listening Lotto, or Hullabaloo
- Acting out or role-playing games

Visual Strategies

Sensory Modulation

- Calming
 - Avoid fluorescent, bright lights
 - Muted wall colors & decreased visual stimulation on walls
 - Visual schedule
- Alerting
 - Play "flashlight tag" in a darkened room
 - Use bright, fluorescent colors for clothes, toys, bedroom décor
 - Use a "time timer" for work completion
 - Visual schedule
- Sensory Cravers
 - Use bright colors and bright lights
 - Environments with lots of visual stimulation
 - Vary where the child sits in the classroom

Visual Strategies

Sensory Discrimination

- Word searches, crossword puzzles
- "What's Missing in the Picture?"
- Weighted balls, beanbags, and bowling with targets
- Alphabet "I Spy"

Oral Strategies

Sensory Modulation

- Calming
 - Chew gum or hard candy
 - Drink water through a straw or water bottle with a bite valve (i.e. Camelback)
 - Chew toys
- Alerting
 - Chew gum or hard candy
 - Drink cold water
 - Spicy, salty, sour, or sweet foods
- Sensory Cravers
 - Blow bubbles, balloons, or whistles
 - "Chewlry" or pencil toppers
 - Chew gum or hard candy

Oral Strategies

Sensory Discrimination

- Play guessing games
 - Taste - salty? sweet?
 - Texture - crunchy? smooth?
- Try one new food at a certain time/day

Olfactory Strategies

Sensory Modulation

- Calming
 - Aromatherapy (vanilla, rose, lavender)
 - Scented fidget toys, markers, playdough
 - Scented pillow pad
- Alerting
 - Aromatherapy (citrus, peppermint, coffee)
 - Same as above
- Sensory Craver
 - Same as above
 - Help in the kitchen when cooking

Olfactory Strategies

Sensory Discrimination

- Describe what they smell
 - Does it smell sweet? Sour?
- Important for recognizing danger in food or environment
 - Describe what a dangerous situation smells like – i.e. something burning in the oven
 - Food that has gone bad

Proprioception Strategies

Sensory Modulation

- Calming
 - Weighted blankets, lap pads
 - Wall or chair push-ups
 - Chew gum
 - Deep pressure
 - Heavy lifting
- Alerting
 - Quick deep pressure or light touch
 - Vibrating toys
 - Animal walks
- Sensory Craver
 - Trampoline or monkey bars
 - Incorporate lots of movement into daily life

Proprioception Strategies

Sensory Discrimination

- Games: Operation, Jenga, Don't Break the Ice
- Balloon painting
- Mechanical pencils
- Writing on cardboard
- Tag, Tug of War in a controlled environment

Vestibular Strategies

Sensory Modulation

- Calming
 - Slow, linear movement
 - Rocking chair
- Alerting
 - Rotational movement – be careful!
 - Unpredictable movement – freeze dancing
 - Hippity Hop ball
- Sensory cravers
 - Riding bikes/horses
 - Trampolines – different positions
 - Playgrounds

Vestibular Strategies

Sensory Discrimination

- Twister
- Playground equipment:
 - Teeter-totters
 - Slides
 - Swings
 - Upside down

Tactile Strategies

Sensory Modulation

- Calming
 - Rolling up in blankets, warm towels
 - Soft textures
 - Warm bath
 - Fidgets
- Alerting
 - Sensory bins filled with rice, flour, or sand
 - Finger painting
- Sensory cravers
 - Use a variety of textures with clothing, furniture or utensils
 - Barefoot
 - Activities that incorporate touch

Tactile Discrimination

Sensory Discrimination

- Finding things in bins using touch only
- Textured dominos
- Find something that is soft, rough, smooth
- Ned's Head game

Using muscles to help with regulation

- Joint traction is a form of proprioception. It occurs when there is tension, pull, or traction placed on a joint. It is very important for developing body awareness and body in space. It also promotes self-regulation and can be very calming, regulating, and organizing for the brain and nervous system.
- Natural ways to achieve joint traction:
 - Climb or hang from a tree
 - Hang from a bar at the playground, trapeze bar, or chin up bar
 - Hang from knees over a playground bar
 - Drape backwards over a large therapy ball, arms over head
 - Hang over the side of the bed
 - Stretching activities or yoga
 - Theraband activities
 - Heavy/hard work activities involving pulling things such as a wagon
 - Carry heavy objects such as a water pail

Heavy Activities

- Home: carry groceries or laundry, vacuum, wash windows, load dishwasher
- School: clean dry erase boards, carry books, push in chairs, sharpen pencils
- Outside: rake leaves, push a wheelbarrow, carry bags of dirt, gather fire wood

Websites

- <https://www.spdstar.org/> (Star Institute)
- <http://spduniversity.org/> (SPD University)
- <http://asensorylife.com/index.html>

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