Sensory Processing and Regulation

Overview Description

Our brains constantly process and organise huge amounts of sensory information on a daily basis. Sensory processing is a neural process by which information from one's own body and from the environment is sorted, organised, and altered so that an adaptive response is produced to meet the demands of the circumstances. Or "a term that refers to the way the nervous system receives sensory messages and turns them into responses" (Miller, 2006, p6).

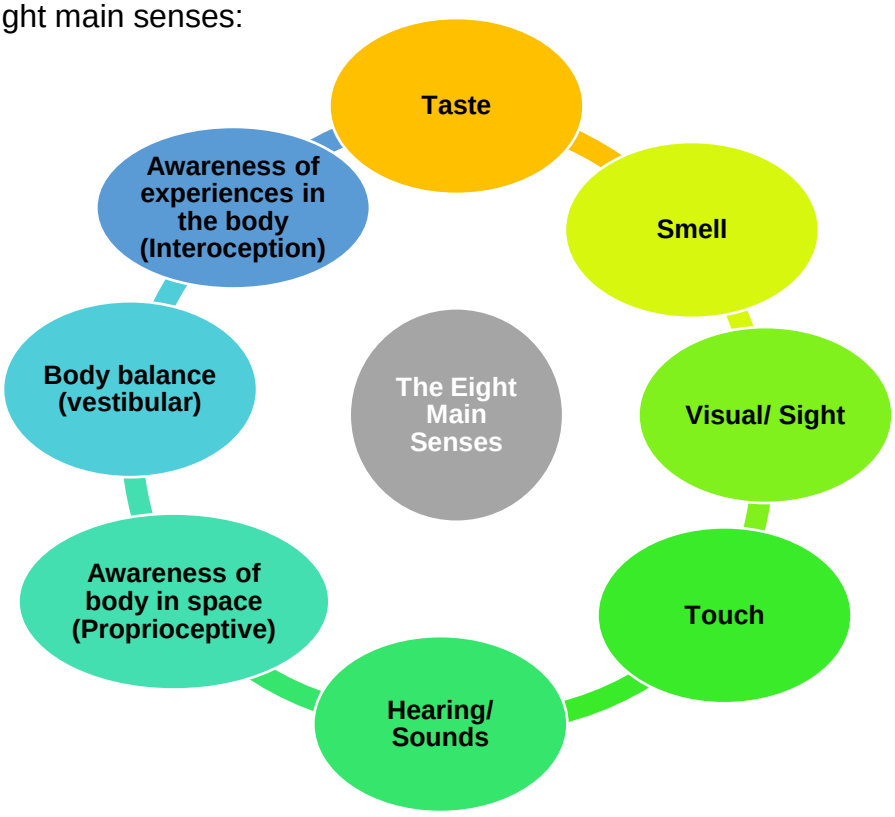
We all process sensory information differently and can be hyper or hypo sensitive to sensory information. For some children, young people and adults, this impacts how they interact with the sensory environment and can lead to them overly seeking or avoiding sensory input.

Difficulties in sensory processing can affect every aspect of a child's development including their posture, catching a ball, focusing in a classroom, building friendships. Sensory processing and regulation are also intrinsically linked.

Sensory Processing

When we are babies, our initial way of learning about and interacting with is through our senses. Playing and interacting with everything around us stimulates the senses and creates engagement with others. This forms a platform from which we see the world and how we relate to it. Therefore, our sensory processing takes place automatically in normal development and forms the foundation for our emotional development, our attention and listening skills, our cognitive growth, our emotional regulation and organisation of behaviour.

There are eight main senses:



All of us have different sensitivities to and preferences for sensory information which impact how much we may seek or avoid sensory experiences in our daily lives. Our sensory sensitivities can change over time and can have a short- or long-term impact on our lives.

Most of the time we manage a lot of our sensory experiences with ease. This will mean that our arousal state is, more often than not, pitched at 'just right'. However, if we are struggling to process information then this will impact how regulated we are and how we manage within specific environmental and social experiences.

Over-responsive or hyper-sensitive: This means that there is difficulty in suppressing information that we receive into that sensory system. This will mean that we over react to a normal amount of sensory stimulation and therefore will feel overloaded and may experience hyper-sensitivity.

Under-responsive or hyposensitive: This means that the nervous system is not receiving enough stimulation through one or more sensory organs. This means that we will need additional input to help them be aware of what is happening in that part of their nervous system.

Sensory discrimination: This is how we take in the sensory information and assign meaning to it. For example, auditory discrimination involves hearing the information, working out where it has come from and who has made the sounds.

Sensory processing difficulties

Difficulties in sensory processing can affect every aspect of a child's development including their posture, catching a ball, focusing in a classroom, building friendships.

For some children, they may have a Sensory Processing Disorder (SPD). Research indicates that the bodies of children and young people with SPD do not organise or integrate sensory information properly which makes it difficult for them to generate appropriate responses to their environments. For these individuals, sensory information is confusing and at times, can result in displays of behaviours that are challenging.

For some children, young people and adults, there are other reasons why they are more sensitive to sensory information. The following are examples of children who may experience sensory processing difficulties:

- Children who have a hearing or visual impairment may be extra sensitive to their other senses;
- Children who are neuro-diverse and have conditions such as Autism, ADHD;
- Children with health needs such as epilepsy, fibromyalgia, chronic fatigue, a brain injury;
- Children who have experienced trauma, neglect or abuse in their pre-natal or early years; and,
- Children with social, emotional and mental health needs such as anxiety.
- Gather the child's view on this and involve them in the evaluation, if possible.

Sensory Processing: The Eight Senses

Sensory processing difficulties and trauma

Sensory processing difficulty can be linked to exposure to early childhood trauma; or 'adverse childhood experiences'. Although children will not remember language or specific experiences, we know that children remember what happens to them in their senses. These sensory memories are imprinted into their autonomic systems in the brain (i.e. our unconscious system that regulates our bodily functions). This means that their brain and body will remember what happens to them as a baby.

Children need help from adults to understand and take in the sensory information they are receiving. They also need a range of sensory experiences in their childhood to healthily develop all eight senses. If children have not had attuned and nurturing adults during their childhood, this can mean that they have not had the help they need to interpret and understand the sensory information they have received. This can lead them to experience sensory information as unsafe and trigger their survival system. This can mean that their inbuild safety alarm system is set on high alert to specific sensory experiences. This will impact on their ability to regulate and to carry out coordinated movements.

If you believe that a child is experiencing sensory processing difficulties due to adverse childhood experiences or trauma, it is important to introduce sensory regulation activities that will not trigger their survival responses. **Research suggests that introducing activities that focus on the proprioceptive system and the visual system are less likely to trigger a survival response.**

For more information, visit Beacon House and look at the Occupational Therapy section which has an article called: Sensory Processing, coordination and attachment article. It can be found here: Resources (beaconhouse.org.uk). They also have helpful articles on developing fine motor skills, postural control and the oral sensory system.

How to support children with sensory processing?

This section describes general strategies as well as information about each of the eight senses and individualised strategies.

It's important to be curious about the child's presenting behaviours and to explore whether they may be responding to a sensory input in their educational setting.

Setting-wide:

- Think about what is in your classroom that increases and reduces arousal levels. Are there adaptations you can do within the environment of your classroom?

- Consider the rest of the day, what are overly stimulating environments (e.g. big spaces, the dining hall, echoing rooms, P.E in the hall, assembly)? How can these be adapted to support all children?

- What are the transitions like for children (e.g. between classes, start and end of day, moving around, lunchtime)? Are there ways of supporting these to be calmer and less stimulating?

For an individual child

- be curious and try to identify more about their sensory processing profile.

- Plan and arrange a sensory diet with personalised strategies that considers: where and when they take place (incorporating specific stop and starts), what you are hoping to notice change, an attempt to balance sensory overload and developing their tolerance for daily sensory input, child-centred with lots of opportunity for the child to choose etc.

- Use a tool to help explore the child's responses to the sensory strategies used. Gather the child's view on this and involve them in the evaluation, if possible.

Olfactory System (sense of smell)

The olfactory system is responsible for picking up odours and sending this information through our nervous system. Children with healthy olfactory system are able to tolerate pleasant and unpleasant smells without extreme reactions. They are also able to discriminate between 'good' (safe, pleasant, and evokes positive feelings) and 'bad' (dangerous, displeasing) smells.

Children who are 'hypersensitive' to smells may:

- Gag or throw up when they encounter what may seemingly be 'mild' smells
- Be distracted by smells that most of us would not notice
- Struggle at mealtimes
- Complain that they smell everything

Children who are 'hyposensitive' to smells may:

- Seem to crave certain smells, e.g., by holding non-food items close to their noses to smell them for long periods of time
- Use smell to attempt to learn about their surroundings
- Fail to discriminate and respond to 'safe' and 'unsafe' smells

What might help?

- Reduce perfumes and scents
- Monitor smells from outside of classroom

Oral (taste)

Healthy oral sensory systems lead children to enjoy (or at least try) a variety of foods with different tastes and textures. They do not seek additional oral sensory experiences such as chewing on non-food items to regulate their behaviour as their daily oral experiences provide them with enough proprioceptive input.

Children who are *'hypersensitive'* to oral sensory input may:

- Choke or gag
- Be described as 'picky eaters'
- Have an extremely limited diet
- Refuse to use utensils because they don't like the feeling of spoons/ forks touching their lips/ mouths
- Resist oral sensory experiences through behaviours such as screaming, running away
- Resist having their teeth brushed

Other children are 'hyposensitive' to oral sensory input, which may lead them to:

- Bite, chew, lick or mouth non-food items such as clothing, parts of furniture, toys
- Try to bite others
- Over-stuff their mouths during mealtimes
- Make frequent sounds with their mouths for extra stimulation
- Have poor coordination of movements of the mouth including chewing or drinking
- Have poor oral motor planning and speech production

What might help?

- Chew tools or trying to find an item that is safe to eat but that is a similar texture or mouth-experience than the non-edible item
- Sucking on a water bottle
- Try redirecting the young person to carry out some of the heavy work activities to distract them and also calm their overly alert sensory systems down. It can be helpful if the school has 2 lunch sittings to allow the young person free time first.
- Remember we all have food preferences, some food types we just don't like and this is okay.
- If craving strong foods, let them eat spicy and sour foods, it may be important to help them regulate. Add spices for strong flavour to food.
- Offer taste preferences during snacks and challenging times, e.g. studying for test, homework, chewy foods help regulate.
- Have crunchy foods with soft food (e.g. crunchy cold apples)

Visual processing

There are also some children who are 'hypersensitive' to visual information. They may:

- be overwhelmed by the amount of displays on the walls, bright lights and the movements of people around them
- Fail to focus on tasks such as colouring because they are distracted by all the visual information presented on the page

Some children, on the other hand, are 'hyposensitive' to visual information, which could lead them to:

- Stare at someone or something for a long period of time
- Quickly become confused during visual activities

What might help?

- Sit them at the front of the class so they are not distracted by other young person when looking at the board and they are close to the teacher.
- Provide a written sheet on the desk to copy from rather than copying from the board.
- Use large print books/work sheets.
- Use a finger or ruler to mark where reading.
- Use a typo scope when reading
- Photocopy work onto a different coloured paper
- Use an angled writing surface to reduce the distance the eyes have to travel from the board to the paper.
- Keep visual and auditory distractions to a minimum.
- Use different colours for different lines on the whiteboard
- Teach skills to adapt their eye-contact

Auditory processing

Children who experience difficulties processing auditory information may miss key instructions/ information, which can then lead to them misinterpreting information and/ or instructions.

Some are *'hypersensitive'* to sounds. These children are typically overwhelmed and/ or frightened by sounds, and struggle with the unpredictability of environmental sounds. They may:

- Avoid or withdraw from noisy and crowded environments
- Be startled easily or appear distracted because they focus on every noise that is around them
- Appear agitated and ready to flee
- Show physical signs of avoidance to sound

On the opposite end of the spectrum are children who are '*hyposensitive*' to sound. They do not easily register auditory cues, and could therefore:

- Appear as if they are not listening

- Fail to respond appropriately and at the right time, e.g., they may not follow instructions immediately
- Be very loud when talking, humming or singing
- Talk out loud when performing a task. They may talk to themselves before and during each step of an activity.
- Have difficulty in remembering what you told them.

What might help: hyper-sensitive?

- forewarn the young person of any loud noises before they occur (i.e. bells/fire alarms).
- To minimize auditory distractions, a classroom with a rug or carpet would help decrease background noises.
- Allow them to wear ear defenders or ear plugs when there is expected to be excess noise in the room.
- Acknowledge existing noises, tell them what it is and then bring back.
- Allow extra time or to leave before/after crowded change over time.

What might help: hypo-sensitive?

Only speak to the young person when they are facing you and looking at you. Use straight forward short sentences.

- Start with one instruction and increase as the young person is able to retain more information.
- Ask the young person to repeat the instruction to you.
- Wait for the young person to process the information and respond, which may take them longer.
- Reduce extraneous noise OR wait until it has gone before giving instructions. (Do not expect a young person with these difficulties to concentrate when there is a lot of noise going on outside the classroom).
- Give written instructions, prompt sheets, as well as verbal ones.
- Repeat sentence with same words – do not paraphrase.
- Model good speech. - Even if child has trouble responding they may have understood what you said.
- Allow a child to respond where possible in their own time. - Don't interrupt, rush or pressurise the child.
- Encourage the use of drama. - This can be used to reinforce auditory processing.
- Reduce auditory and visual distractions. These compete for a child's attention.

Proprioceptive system

Proprioception refers to the way our joints and muscles send messages to our brains about our bodies' positions and movements. It therefore allows children to write without pushing too hard or too soft and take a drink without crushing a cup. It also helps children to move in coordinated and efficient ways. Proprioceptive activities can be passive (where resistance is applied) or active (where we actively participate in movements). Some children may need to seek out additional proprioceptive input, which could lead to:

- Playing 'rough', e.g., preferring to push and bump into others

- Struggle with judging the amount of force needed for each movement
- Stand too close to other people because they can't measure their proximity to others and judge personal space

Some, however, may be 'hyposensitive' meaning that they:

- Have poor body awareness, appear weak and clumsy, often bump into people and things accidentally
- Struggle to maintain an upright posture, lean on people and or walls, or sometimes fall off of their chairs
- Use too little force
- Struggle with fine motor skills and manipulating small items
- May move their whole body rather than just their head to look at something

What might help?

- Proprioceptive can be a tool for calming, organising and self-regulating the brain and nervous system.
- 15 minutes of proprioception activities can have a 1-2 hour positive effect.

Activities

- Deep pressure touch: hand hugs or squeezes, pressure on legs, arms, feet, and back
- Heavy/hard work – muscle engagement
- Wheelbarrow walking or moving in a purposeful big/slow way (marching, stomping, skipping, running, hopping)
- Carry heavy items (e.g. laundry basket)
- Chewy food
- Drinking smoothies/thick milkshakes through a straw
- Push/pull heavy items (e.g. shopping trolley)
- Digging in sand/soil
- Cushion games – jump on them, cushion sandwich
- Cycling, swimming, gymnastics (not running as this can trigger the flight response)
- Outdoor activities like raking leaves, shovel snow, pushing a wheelbarrow, carrying a bucket of water
- Deep pressure hugs
- Heavy quilts/blankets/bedding or compression clothes (leotards, leggings, athletic clothing)
- Make a tent/pillow cave
- Large gym ball activities – roll on it, walk on hands, lie backwards and rock back and forth
- Roll up tightly in a blanket – be a sausage roll
- Trampoline
- Prior to handwriting have the child do some warm ups including pressing palms together, pulling each fingertip, press the palms on to the desk etc.

Tactile System (touch)

When children's tactile systems are functioning well, they are not easily distracted by the constant tactile information they experience throughout their daily lives. They are able to discriminate important from unimportant tactile information. This is an important aspect of regulating behaviour and maintaining attention.

Children who are 'hypersensitive' to tactile sensory information may:

- Avoid getting their hands/ faces/ body messy
- Steer away from activities such as finger painting, or even eating certain types of food
- Struggle with hygiene activities such as toothbrushing, bathing, showering or haircuts
- Struggle to tolerate certain types of clothing

Children who are 'hyposensitive' to tactile sensory inputs, on the other hand, may:

- Seek out touch and hugs
- Sit very closely to others
- Seek out different textures
- Fiddle with different objects
- Seem fearless because they touch everything without considering whether it is dangerous to do so or not
- Fail to react or show preferences for certain types of tactile experiences

What might help hypo-sensitivity

- A variety of touch activities – massage, exploring objectives with hands
- Contrasting tactile experiences within learning – ie sandpaper
- letters/drawing in shaving foam
- Fidget toys – probably more textures and firmer.

What might help hyper-sensitivity

- To stand at the end or beginning of queue at lunchtime. This will decrease the chance of bumps.
- Arranged seating to minimise the risk of being bumped by classmates
- Modifications to the art activity to accommodate their sensitivity to touch. Be aware that materials such as glue, finger paints, clay, papier-mâché, etc., may cause the young person to have an aversive response. Using tools (i.e. hammer, paint brush, etc.) may help the young person participate more fully.
- To use some of the heavy work activities (see proprioception section). This can help to reduce the anxiety and impact around tactile experiences.
- Avoid light touch, use firm pressure when touching the young person and always approach from the front.
- To use 'fidget' toys, permit them to use one object. Set boundaries for them using it.

Vestibular system

The vestibular system, centred in the inner ear, is in charge of our balance and movement. When it is fully functioning, children are able to move freely in a coordinated manner. They can start and stop any movements without causing any distress. They are comfortable with activities such as running, walking, climbing, and jumping.

It is important to note that the vestibular system is very closely related to the visual sensory system. When children feel balanced and centred, their eyes are able to move smoothly and steadily. Difficulties with tasks that require the eyes to move left to right (such as reading) or up and down repeatedly (such as copying from the board) may be signs of a disrupted vestibular system.

Problems with the vestibular system may lead children to:

- Have the need to move constantly, e.g., bounce, fidget, rock
- Move in an uncoordinated way, e.g., when jumping, walking, running
- Slouch at their desks
- Appear weak or 'floppy'

What might help?

- Use a firm, supportive seat that will not tip, to help the young person feel stable and secure whilst at their desk. Make sure their feet can stay flat on the ground.
- The young person may become distressed or anxious with changing positions in the classroom e.g. getting down onto the floor, onto a chair etc. Use visual markers so the young person has a clear aim of where to go e.g. put their favourite cushion on the floor so they can aim to be sitting on top of it.
- Think about what position the young person likes to be in during different activities in the classroom. Let the young person maintain the position they are happy and secure in (e.g. cross-legged on a chair, foot on a footrest?).

Interoception system

Our interoception system detects the internal state of our body and how our body feels from the inside. This helps us to experience body sensations such as a growling stomach, dry mouth, tense muscles and racing heart. Awareness of these body sensations helps us to experience much needed emotions such as hunger, fullness, thirst, pain, body temperature, need for the bathroom, sexual arousal, relaxation, anxiety, sadness, frustration and safety. This system helps us to maintain a sense of homeostasis and self-regulation and these feelings can happen at both a conscious and unconscious level.

You might notice the following in children who find interoception more difficult:

- Recognising when hungry, full or thirsty
- Identifying when tired
- Toilet training (daytime and/or night time)
- Overly sensitive to pain or high pain threshold
- Pinpointing symptoms of illness
- Identifying emotions in self or others
- Recognising signs of distress as they build up

What might help?

- Drawing attention (sensitively) with children and young people to how their body feels at different times – when hungry, when upset, when nervous, when excited.
- Breathing exercises, mindfulness and/or yoga all help focus attention on how the body feels
- Heat/cold activities – close eyes and be given an object (or dip your finger into some water) …is it hot, warm or cold. Bringing attention to that awareness
- Use a heart rate app – ask them to jog/skip to bring up heart rate (measure it), then ask them to try to get it as low as possible (by deep breathing, being still, closing their eyes.

Top Tips! For Early Years

Think about the *types* of sensory information specific children can cope with best and which types they appear to struggle with. Consider building up a sensory profile for this child, and use this to modify their sensory experiences.

Ask yourself; what is: soothing, energising, or unpleasant for this child? You can then manipulate the environment to better meet the child's sensory and learning needs e.g. numbers incorporated within appropriate sensory play such as shaving foam or sand.

Useful links:

https://www.sensorysmarts.com/sensory-checklist.pdf

https://autismawarenesscentre.com/what-is-a-sensory-diet/

Post-16 Top Tips!

Young people who have had sensory sensitivities for years will have learned at least some accommodations to get around them and are less likely to experience the extreme behaviours and responses they did when they were younger. However, years of feeling different and not knowing why, and noticing that they have never been quite as mature and self-controlled as their peers, may take their toll.

Young people with sensory processing issues usually struggle with self-esteem. They need a lot of encouragement to admit they have sensory issues and need some help.

Young people's hormonal changes can affect their sensory sensitivities by making them more sensitive to input than they were in the past. The normal changes of adolescence can also make them more emotionally sensitive. It is important to help young people to understand what is happening and what helps them to cope.

It is important to continue to support young people to increase their tolerance of sensory experiences in their day to day lives and to help them to manage with the sensory environment of adulthood. Encourage young people to cook, garden, do art or arts and crafts, and engage in other activities that challenge their sensory sensitivities.

It is important to help young people to develop a positive sense of self. Reassure young people about their sensory sensitivities and helping them to see that they are a difference in brain wiring that can have advantages but that can also be controlled and addressed to make life a little easier. *Raising a Sensory Smart Child* has specific advice on helping teenagers overcome their defensiveness about having sensory processing disorder and how to talk to them about the "little tricks" they can learn to "make their lives easier."

Resources and Signposting

Sensory Suggester Tool: https://sensory.semh.co.uk/

This tool has been designed to support education staff and parents to understand behaviours that may have a sensory function. It provides a table which describes whether your child is over-responsive, under-responsive (passive) or under-responsive (seeking) on all 8 sensory systems. This can provide a starting point to help explore ways to adapt the environment and start teaching the child strategies to develop their tolerance to the sensory input.

Useful websites:

- https://www.autism.org.uk/advice-and-guidance/topics/sensory-differences/sensory-differences/all-audiences
- https://www.theottoolbox.com/sports-water-bottle-self-regulation-tools/
- https://nationalautismresources.com/school-sensory-rooms/
- https://harkla.co/blogs/special-needs/sensory-diet
- https://semh.co.uk/
- https://resources.leicestershire.gov.uk/sites/resource/files/field/pdf/2017/9/21/Sensory-processing-pack-for-schools-KS1-4.pdf
- Sensory Experiences – Sensory Trust
- https://inclusiveteach.com/2020/03/20/150-sensory-learning-ideas/
- Who Has Sensory Sensitivity? - Sensory Friendly Solutions

Recommended books:

- 'Answers to Questions Teachers Ask About Sensory Integration' by Carol Stock Kranowitz, Jane Koomar, and Stacey Szklu
- 'Understanding Your Child's Sensory Signals: A Practical Daily Handbook for Parents and Teachers' by Angela Voss OTR
- 'The Out of Sync Child' by Carol Kranowitz
- 'The Sensory Child Gets Organised' by Carolyn Dalgliesh
- Your Essential Guide to Understanding Sensory Processing Disorder By Angie Voss.
- The Scared Gang By Éadaoin Breathnach (sensory processing and trauma)
- Resources (beaconhouse.org.uk) (Sensory Processing and trauma)