GROW
THERAPY SERVICES

Sensory Systems

Every day our brain collects information from our senses that tells us about the world around us. Sensory processing is the organisation of that information. It's an automatic, unconscious process which normally occurs without effort. When we do it effectively, we successfully control the degree to which we are affected by sensory inputs.

For some children with developmental problems, sensory processing requires effort and concentration or can be an overwhelming experience. Children with sensory processing disorders can experience a range of symptoms, from being over-responsive (crying at loud noises) to being under-responsive (being unresponsive to pain).

This document has been made to help you understand your own, or your child's 8 sensory systems, and how different sensory inputs affect us.

Smell

The sense of smell is also known as the Olfactory system. It is the most sensitive of our senses and helps us to identify an array of different aromas in the atmosphere. Our sense of smell is strongly linked with our sense of taste and although we can smell when we are born, the ability to distinguish between a pleasant and unpleasant odour is not immediate and our response to aromas must be learnt.

Some activities to help develop the olfactory system:

- Set up a Smelling Station - Use containers filled with different cotton balls containing essential oils, spices, and smelly objects e.g. cheese and rubber bands. These could be used as part of a story or science experiment.
- Use food, cooking and science lessons to stimulate the olfactory senses
- Be mindful of students who are sensitive to smells and odours during food, cooking and science lessons
- Making scented soaps, candles, lotions, bath/shower bombs or scrubs

Taste

Taste is also known as the Gustatory system. This system allows us to recognise five basic taste sensations: sweet, bitter, salty, sour and savoury. Our sense of taste gives us the ability to respond to food that provides us with the nutrients our bodies need to survive. The sense of taste and smell work together to detect chemicals in the air and food. This detection allows us to determine if a food, a drink or something in

the environment is safe or not. Our taste buds are located all over our mouth but are predominantly on the tongue.

Gustatory Activities to try could include:

- Experimenting with temperature:
  - Comparing ice cubes and frozen fruits to water and room-temperature fruit
  - Comparing states of matter e.g. raw egg to cooked egg
  - Experimenting with texture:

- Comparing chewy, crunchy, dry, soft and moist foods

- Sucking and blowing activities:
  - Blowing bubbles
  - Sucking and blowing paint or coloured water from straw
  - Using some musical instruments e.g. the recorder
  - Blowing paper football or feather

Hearing

Hearing is also known as the Auditory system. Auditory processing is all about how the brain recognises and makes sense of sound. Sounds consist of loudness, pitch, how long the sound lasts, and where it comes from. Our brain automatically takes all this sound in, processes the information, and responds appropriately.

The combination of auditory and visual processing is crucial for processing social cues. It assists us in determining changes in tone, volume and expression while joining these up with facial expressions and body language. This sensory system is important for the development of relationships and for recognising emotions.

Strategies that may help children who struggle with auditory sensitivity:

- Prepare the child for any loud noises which can be predicted. Give the child a verbal or visual warning before loud sounds occur (such as lawn mower, or fire alarm drill).
- Reassure the child that the noise isn't going to hurt them. Explain and discuss the noise source to increase the child's understanding.
- Wear snug/tight clothing which can have a calming effect. Using headphones, earmuffs or earplugs can also decrease the level of sound.
- Sucking on a sports water bottle or sour sweets or eating chewy or crunchy foods may help increase concentration in noisy environments.
- Share awareness about your child's sensitivity with teachers, family members, neighbours, etc. When a child knows that adults around him/her understand their "hidden" needs, the child may feel safer and is likely to feel less anxious.

- Use rugs and/or curtains in a room to improve the acoustics of a room and decrease the echo, loudness of and extraneous noise.
- Fidget toys, stress balls and squeezable objects/ toys can also support children who are dealing with distractions of audible external stimuli.
- Being aware of low-level background noises may also be useful, avoiding them where possible could be beneficial e.g. Ticking clocks, computers or projectors in school.

Visual

The visual system is how we receive and process sensory information through our eyes. Our eyes and brain work together to communicate and interpret what we see in our physical surroundings. Our brain identifies the object and gives it meaning. Our visual system allows us to create a memory of the image and gives the context within our environment.

Activities that visually sensitive children may find helpful include:

- If children are visual learners, then pictures might provide the information that they need.
- Provide activities which allow the child to explore and create in minute detail, e.g. making collages out of rice.
- Play alongside and tune into the child. Encourage them to point at what they see as this will help you to understand what they focus on.
- Sensory lights are useful and often relaxing for children who stare at lights. Using interaction switches and voice-activated light boards may also encourage interactive play.

Touch

We all experience touch, also known as the tactile system, all the time, whether it be the touch of the clothes we are wearing, the touch of the chair we are sitting on or the touch we experience when someone cuddles us. Touch is important for social development. It also helps us to assess the environment we are in, for example, determining whether an object is hot or cold and reacting accordingly. It also allows us to feel pain. The skin is the biggest and most sensitive organ of the body and being under or over-sensitive to touch is one of the most common sensory difficulties. The ability to process tactile input is very important as it enables children to regulate their behaviour and maintain attention and concentration to play, learn, engage and participate in functional activities and tasks.

Children who are overly tactile sensitive may find it helpful:

- Do not force involvement in any activity that involves touching. Warn a child if you are about to touch them and always approach them from the front.
- Remember that a hug may be painful rather than comforting.
- It is important however to continue to offer opportunities that encourage new touch experiences.
- Give the child time to accept tactile activities and follow their lead.
- Try not to put a child in a situation where they may be anxious that someone will touch them, for example, lining up.
- Introduce new touches on the back of the hand rather than the palm, as this is less sensitive.
- Try using a firm touch rather than a light touch. Some children enjoy deep pressure massage using objects, such as balls, rather than skin-to-skin.
- Provide long-handled tools, such as spoons and mashers in sand and brushes and rollers in paint. In this way, a child can explore a range of activities without having to touch the sensory material.

Children who are under-sensitive to tactile stimulation may benefit from

- Introductions to different variations of touch, e.g. light and firm will help the child learn to recognise different sensations.
- During seated activities, it can help to sit behind the child and press firmly onto their shoulders. A weighted blanket folded over the child's knees can also help them to sit still and concentrate during focused activities.
- Wrap the child in a thin yoga mat and roll them across the floor.
- Some children like to be laid across a gym ball and rolled backwards and forwards.
- Provide blankets for the children to wrap themselves in whenever they want.
- Give them cushions and soft toys to cuddle tightly.
- Provide squeezy toys, such as stress balls.

Proprioception

The Proprioceptive Sensory System is the "internal" sense of awareness we have for our bodies. Information is passed from our muscles and joints to our spinal cord and brain so that we have a subconscious awareness of where our body is in space. As such, proprioception provides us with an internal map of our bodies. It tells us how our limbs are working and how much force to use when lifting, squeezing, or pushing.

When someone's proprioceptive system is not functioning effectively, they may need to seek out additional input to their muscles and joints so they can regulate their behaviour and stay in control. If someone's sense of body awareness is not well developed, they can appear clumsy.

GROW
THERAPY SERVICES

Proprioceptive activities may include:

- Bouncing on a trampoline is a good way of providing extra proprioceptive input. Alternatives include bouncing on a space hopper or playing 'jumping beans' games. The child may need you to hold their hands and jump up and down on the spot with them.
- Provide lots of opportunities to practice ball games. Use a balloon or beach ball to start with as this is easier for a young child to catch. Try target throwing, drawing a target on the wall or a pavement with chalk. Vary the distance the child stands away from the target, so they learn to use different amounts of force.
- For older children teach them how to play 'wheelbarrows' as this is good for developing upper limb strength, which in turn helps to develop an awareness of force and pressure. Alternatively, lie the child over a gym ball and get them to 'walk' with their hands on the floor in front.
- Walking is a good regulating activity as it provides a rhythmical and predictable sensory input. Walking uphill increases resistance and so provides a stronger proprioceptive input.
- Provide lots of opportunities for dancing and moving to music.
- Yoga is a good way of supporting children with proprioceptive difficulties to develop body awareness. CosmicKids Yoga have a series of online videos to help introduce yoga to young children through story and rhyme.
- Any activities that involve pulling, pushing, or carrying heavy objects provide regulating proprioceptive inputs.
- Some ideas include digging in wet sand and soil, kneading dough, pushing a wheelbarrow, sweeping up using a child-sized long-handled broom and joining in the actions to the 'Row, row your boat' song with a partner. Lycra bands or a body sock may also allow for pulling/pushing activities
- Devise obstacle courses for the child to navigate around. Include tunnels and blankets to crawl under as well as obstacles to climb over.
- Provide a series of different textured surfaces for the child to walk across with bare feet e.g. bubble wrap, sand, grass, carpet squares, feathers etc. Using different textures on the child's feet such as paintbrushes, loofahs, soft clothes etc may also be helpful. Letting the child apply the texture themselves may enable them to tolerate it better.
- Finger rhymes and songs will help the child develop hand and finger awareness.
- Bubble blowing, blowing feathers across the floor or using a straw to play blow football with cotton wool balls are all good ways for a child to develop proprioception of their oral motor skills.

GROW
THERAPY SERVICES

Vestibular

Our vestibular system is how we sense where our body is in space. It is all about our balance and movement and is centred on the inner ear. We all have vestibular organs located in our inner ear. When we move our heads the fluid in these organs moves and shifts which constantly provides us with information about the position of our heads and bodies. It tells us if we are right side up or upside down, moving forwards or backwards, whether we are dizzy or not.

The vestibular sense is perhaps the most important of all our senses as it gives us physical and emotional security; it helps to keep us upright against gravity and it helps us to keep orientated when we bend down as our bodies automatically adjust to stop us from falling. It helps us to move smoothly and efficiently and provides us with the confidence to move and interact with our surroundings.

Our brains receive vestibular information and then decide what to do with it. Our initial protective reactions are 'go for it', 'don't do it' or 'precede with caution'. Our brain assesses the situation and establishes if there is a perceived threat or danger; it will then act accordingly.

- Teach the child to use their feet to activate equipment and to become in control, e.g. swinging self on a swing, or pushing themself along on a Scuttle bug or balance bike
- Going to the park to play on the swings, roundabout, slides or climbing can help children gain vestibular input. You can also buy spinning equipment to use at home.
- Move legs to pieces of music or during rhymes
- Sing songs such as 'Row the boat' and the 'Roly Poly' song, etc.
- Use of a large child-sized ball (gym ball) and encourage the child to lay their body over it and push back and forth with feet on the floor to encourage a rocking motion; use an accompanying song to help maintain engagement.
- Play games where spinning is part of the fun, e.g. 'Ring-a-roses' and 'Pin the tail on the donkey'.
- Sing songs and share interactive books with actions that involve swirling around.
- Try pulling and pushing activities using appropriate materials, e.g. Lycra bands
- If possible, provide a trampoline or trampette for bouncing on.

Interoception

Our interoceptive system is responsible for understanding and feeling what is going on inside our bodies. Sensations such as hunger, thirst, bathroom needs, heart rate, breathing rate, temperature, and emotional regulation are all part of this system.

Gradually, children learn to recognise different internal feelings in their bodies. As a result, they begin to develop an internal literacy so that they can respond to particular feelings in adaptive ways, for example, if they feel cold, they know to put on warm clothing or get a blanket. Our interoceptive system helps us to regulate our emotional self so that if our feelings become heightened, we can work out a way back to an emotionally calm, stable state.

Activities to develop interoception skills might include:

- Provide regular opportunities for extended exercise and 'heavy work' activities, such as pushing a loaded wheelbarrow, carrying a large water bottle, sweeping up or digging. The adult should draw the child's attention to their body sensations after the exercise, such as their heart racing, fast breathing, and feeling hot. After 5 minutes of rest, talk to the child about the changes in their body as it reverts to normal.
- Yoga or exercise can help focus on listening to your body and providing good vestibular and proprioceptive input is helpful for interoception. It encourages children to slow down, pay attention to the present and become aware of how their body is feeling.
- Any activities that involve mindfulness make great interoception activities for children because mindfulness is all about being in the present moment. Sitting still for a minute or two and focusing on an object, such as a snow globe or listening to the surrounding sounds are good ways to help children actively 'notice'. Use visual prompts to practice 'flower and candle' breathing. Teach the child to pretend to smell the flower (take a deep breath in), and then blow the candles out (blowing a deep breath out).
- Play simple games with emotions cards or toys. As well as teaching the child about the names of different emotions, talk about how each emotion makes someone feel physically.
- Children who struggle with interoceptive input often have difficulty with temperature regulation, for example, they may not realise that they need to wear a coat in cold weather. Provide plastic drink bottles, one filled with ice-cold water and one with hot tap water (with the cap securely fastened) for the child to explore. Talk with them about hot and cold and how the bottles feel to touch and hold. Another helpful activity is dressing up clothes for different weather conditions and playing games to practise dressing for the weather.
- Use visual prompts to support the child's understanding of needing the toilet, knowing how often to get a drink, remembering when it is time to eat or that they need to wear a coat to play outside etc. Use these consistently throughout the day.
- Social stories are also a great way to talk about concepts that may be hard for children with interoceptive difficulties to understand and remember. These can be designed to focus specifically on toilet training, temperature regulation or feeling hungry or thirsty etc.