Loud & Clear!

A Cochlear Implant Rehabilitation Newsletter

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Sensory Processing

Children with autism spectrum disorder (ASD) present with unique sensory challenges. Various studies have estimated that 75 to 100 percent of children with ASD have some degree of sensory processing dysfunction (SPD) (LaVesser & Hilton, 2010). Sensory Processing (SP) is the way in which the central and peripheral nervous systems manage incoming sensory information. Modulation of our sensory system is required for adapted responses to sensory stimulation. Sensory processing includes vestibular-proprioception, exteroception, interoception, and multisensory processing. The vestibular-proprioception senses derive from the head and musculo-skeletal system, as they relate to our body posture and sense in space. They will be described in more detail below. Exteroception are the five main senses people experience (touch, taste, smell, hearing, and vision) from the outside world. Interoception is within the body and includes hunger, visceral pain, body temperature, and bowel/bladder distention. This paper will focus on the vestibular-proprioceptive senses and the most commonly affected exteroceptive senses of hearing and touch.

Impact of the Vestibular System

The receptors for the vestibular system are located in the inner ear. Our vestibular system is pivotal for anti-gravity postures and providing us with our sense of balance. Children with an underactive vestibular system may quickly fatigue when asked to sit still or to stand still and upright for the duration of a meal or lesson at school. They may fall frequently or appear clumsy due to their inability to make rapid postural adjustments to remain upright. Other children may present with an overactive vestibular system. These children are constantly seeking movement and activity and may be disruptive to their classmates due to their inability to sit still. They require frequent movement breaks throughout their day in order to modulate their arousal level. Using a therapy ball or other dynamic seating devices may increase the attention span of a child who has difficulty sitting still and remaining attentive for a lesson.

The vestibular system is closely linked to the visual system. Many children with ASD seek vestibular stimulation via their visual field, such as spinning wheels on a toy truck, lining up objects, or wiggling their fingers in front of their eyes. While many children with ASD experience dysfunction in vestibular processing, the visual system tends to be a relative strength. Children who appear to

never get dizzy may be locking their visual field on one point while spinning. These children are seeking out vestibular input but are not processing the information efficiently. This causes children to become "dysregulated" and they may have difficulty sitting still and concentrating in class or at home. These are children who are constantly "on the go" and are often running or climbing on furniture and playground equipment. For these children, a trained occupational therapist can help the child achieve the vestibular sensation they are seeking by blocking out the visual field in a controlled manner to increase the effectiveness of the spinning and other forms of vestibular input to assist with the self regulation of the child. This helps the child to focus and attend to daily tasks without seeking out additional vestibular input. Providing adequate vestibular input prior to an audiology appointment may help a child sit still during his session. This could be achieved through playing at a playground and swinging prior to going to the office or even swinging younger children in a blanket.

Poor Proprioception

Proprioception refers to one's muscle sense. It is responsible for understanding where one's body is in space via sensations received from tendons, muscles, and joints. It carries information about joint position and movement, and it is vital for motor planning, exhibiting motor control, grading pressure for a given movement, and postural stability. Heavy work activities, such as carrying a full laundry basket or engaging in a game of tug-of-war, help a child to become more aware of where his body is in space so he can effectively navigate his surroundings.

Dysfunction in sensory processing leads to delays in play development. Play skills may be adversely affected by a child's praxis, or ability to plan out and execute novel motor movements. Play may be limited to sensory experiences that are non-threatening, thus limiting opportunities for learning. Children with ASD tend to have poor motor planning skills (dyspraxia), especially in the area of ideation. Poor ideation leads to poor play skills, such as engaging in ritualistic and repetitive games instead of imaginary play.

Dyspraxia can lead to deficits in self-help skills. Those who have it may be clumsy with fasteners and have difficulty operating zippers or buttoning buttons. Children with ASD and deafness may have difficulty managing their hearing aids or cochlear implant processors independently. For example, they may have difficulty changing batteries or changing programs. Handwriting may be illegible due to difficulties with grading pressure and/or planning out letter formation. Use of visuals, verb rehearsal, and repetition of tasks have proven effective to train motor memory and teach skills to children with ASD. For example, providing children with ASD a step-by-step picture book with instructions on how to change a battery or put on their headpiece or hearing aid can assist with their independence and thoroughness of completing the task.

Auditory Defensiveness

A child who is deaf with ASD presents with further unique challenges. Auditory defensiveness is the most commonly reported SPD in ASD. When a child is fit with an amplification device, whether it is a hearing aid or cochlear implant, some children with ASD may have an increased perception of loudness. The audiologist can help by limiting the maximum acoustic output levels of hearing aids to facilitate acceptance of amplification. If a child wears a cochlear implant, the audiologist may consider placing several programs on the processor that gradually increase in volume, and progress the child through those programs more slowly than traditionally expected. Hyperacusis (hypersensitivity to certain frequency and volume ranges) is common and can affect daily routines, quality of peer interactions, and curiosity about the environment. For more information on ideas to deal with hyperacusis, please listen to Christine Barton's webinar at: http://www.audiologyonline.com/ce/advanced-bionics/events/details/23774/deafness-with-autism-music-therapy.

Tactile Defensiveness

Tactile defensiveness is another common SPD in ASD. Children with tactile defensiveness typically respond positively to deep pressure and negatively to light touch. The light touch receptors are closely linked to one's fight-or-flight response, whereas the deep touch receptors inhibit the fight-or-flight response. Tactile defensiveness can affect the ability to create accurate ear molds and a child's willingness to wear behind-the-ear processors and headpieces, if a child will not tolerate the sensation of either of those pieces of equipment on his ear or head. Use of deep pressure, combined with calming activities such as massaging the limbs while the child wears a weighted blanket in a low-sensory input room, can help modulate a child's sensory system so she is more willing to allow the additional tactile input. Using a weighted blanket or vest while visiting the audiologist provides additional pressure to the child, thus increasing awareness to their proprioceptive system, and may have a calming effect on the child.

Visiting the audiologist's office prior to the date of the appointment can help reduce any anxiety about visiting a novel location. Taking pictures of the actual office and the tools that will be used can help familiarize the child with what will happen during the visit. The child can also practice looking in ears, taking impressions or placing processors and headpieces on stuffed animals or dolls prior to the visit. Consider the use of retention devices for hearing aids or off-the-ear wearing options for cochlear implants. To ensure continual use of

hearing aids and cochlear implant processors, use of social stories outlining the importance of the wearing these devices can help with the cognitive aspect of wearing a hearing aid or implant processor. For younger children, a behavior plan or token chart may be effective in providing reinforcement for usage.

Sensory strategies are effective in increasing engagement and joint attention, as well as modulating a child's arousal level. They should be considered for every child with ASD in order to ensure the best possible outcomes in treatment.

Listen to a webinar on this topic at:
http://www.audiologyonline.com/ce/advanced-bionics/events/details/23775/deafness-with-autism-occupational-therapy

Next Issue A Music Therapy Perspective

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