

AUTISM, SENSORY PROCESSING AND LEARNING

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We are all dependent upon sensory input. We develop sensory processing skills at different rates, with different adaptive responses depending upon our neurological development and ability to assimilate information from our environment. Sensory processing requires being aware of sensory stimuli in the environment, processing that information and responding to the sensation.

Throughout the day, we make adjustments (modulation) to sensory information and create responses depending upon our level of consciousness/alertness, mood, cognition, social interactions and more.

Individuals with sensory modulation disorders have difficulty maintaining an alert state. Disruptions in modulation may include over responsiveness, under responsiveness, or sensory seeking ([www.sensational brain.com](http://www.sensationalbrain.com)).

Individuals may have sensory motor based disorders. Inefficient processing of sensory input may produce motor responses of postural challenges and poor motor planning. (www.spdfoundation.org).

Sensory Discrimination Disorder (SDD) is present in individuals who have a hard time making sense of sensory input and may appear as having awkward movement, having a lack of interest or attentiveness to the environment and people in the environment. These individuals may require more time to process information. (www.unitedway-weld.org/files).

Benefits of water

Properties of water benefit individuals from early childhood through adulthood, by providing an opportunity to develop more effective motor responses to sensory input.

Hydrostatic pressure dampens the effects of light touch and when combined with

movement, provides increased proprioceptive input. Proprioceptive input alerts the individual of position in space and controlled movement.

Turbulence provides somatosensory input, alerts the body to its position in space and encourages muscles to engage during swimming or water adjustment activities such as floating and moving effectively. Movement of water creates visual/vestibular stimulation. Buoyancy provides an upward thrust, assisting with horizontal position, resisting movement patterns from surface to floor including transitioning from horizontal to vertical. Resistance is created with changes in the speed of movement and length of the lever arm. With the increase of muscle work from resistance, proprioception increases.

Vestibular system

The vestibular system works in cooperation with the visual and auditory systems. Some common signs of vestibular disruptions that may affect an individual performance in the pool are: Insecurity with movement experiences, expressing fear or avoidance of movement, maintaining a midline orientation of the head even when changing positions, avoiding new positions and becoming overly excited with movement activities if responses are overactive. If underactive, the individual may appear clumsy, lethargic, crave movement or be slow to respond to changes in movement or fatigue easily due to poor endurance. Responses in the pool may be fear of drowning, staying near the pool wall or shallow water, averting eyes from the surface of the water, covering the ears or making noises to neutralize ambient sounds, reliant on physical assists (noodles, adults, rails, steps), avoiding flotation assists due to decreased stability, and difficulty

Examples of activities for individuals with vestibular disruptions could include:

Moving up and down: Jumping, hopping, heel lifts, squats, bouncing, linear movement with increased frontal surface: walking forward, backward, running forward, rotary movement: circle games, dancing, performing assisted transitions to horizontal, swimming, including prone or supine floats/glides, rotary breathing, symmetrical (breast strokes) movements or asymmetrical (front crawl)

movement, use of flotation devices for swim skills or recreational activities.

In water activities, the effects of vestibular facilitation last 6-8 hours and onset can be up to 1-2 hours after the session.

Proprioceptive affects on aquatic experiences

Some of behaviors that may be elicited from an underactive proprioceptive system are a lack of awareness or inability to distinguish depths of water (may appear fearless or overly fearful), having difficulty maintaining upright posture or moving against water resistance, experiencing difficulty imitating typical movements of swimming (front crawl arm stroke or efficient flutter kick), and requiring more effort to change positions or motor plan transitional movements like turning from sit to prone to enter at pool edge.

Examples of activities to promote integration of proprioceptive input can include Deck games like “Simon Says”, pool side games including Push ups (arms), push backs (legs), quiet and loud kicks (graded control). In the pool, games and activities can include Tug O war” using braided sponges in chest or waist deep water (depending upon core control), imitation of swim strokes with guided assist or weights, reaching for side of pool, reaching for equipment or deck (graded control), sitting upright on noodle, playing with weighted balls, or using paint rollers to roll objects/pictures (adhere to mirrors, white board), pretend to use an iron to smooth scarves.

Effects of proprioceptive facilitation in the pool can last 1-2 hours after the session has ended.

Tactile behavioral responses to aquatic experiences

Often times, disruptive behaviors related to tactile hypersensitivity may be exhibited in the locker room as well as on deck or in the pool. Typically,

hydrostatic pressure decreases tactile hypersensitivity, so behaviors related to tactile hypersensitivity may be less in the pool than on land. Some common behaviors are discomfort wearing a swim suit (arms and legs exposed, increased awareness of elastic suit edges), avoidance of towels for drying or warmth, increased sensitivity to physical assistance for safety or motor learning, avoidance or reactive to splashing or showers.

Examples of tactile experiences in and about the pool are: Treasure hunts (objects in water filled container, vision occluded by towels or other materials), find objects and identify by touch. Practice kicking with no splash, then gradually increase splash as tolerance increases, Shower games: Use umbrella, rain coat, then slowly remove rain gear. Catch water from shower in bucket, stomp water on floor, use moveable shower head to spray first at feet and work toward the neck and head, dressing/undressing races on deck or in pool (putting on hat, gloves, oversize shirt and pants over bathing suit), play car wash: using sponges to rub own arms, legs, trunk, face, use bath tub crayons to make pictures on pool wall, use scrub brush or high texture cloth to wash picture off, use small paint rollers on arms or legs.

Light touch protective responses are dampened only as long as body parts are submerged. Tactile response to facilitation lasts only during the activity.

Children with Autism often exhibit behaviors that may be related to inefficient processing of sensory information. In addition to assessments, observing the individual's movement, changes in body position related to water depth and buoyancy and response to environmental conditions are important to consider when developing a plan. Positive changes in motor control, language and

socialization may occur following appropriate sensory facilitation. Games and music make learning fun and allow individuals to engage in sensory experience in a safe, noncompetitive way. This, in turn, allows for increased learning and positive feelings toward participation.

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