

TREATING TACTILE DEFENSIVENESS IN THE AQUATIC ENVIRONMENT

Being in the water creates an environment of sensory awareness. The smell and taste, perhaps of chlorine or bromine, can quickly be detected. Splashing or moving water can be seen and heard. Movement of water affects the vestibular system, resistance affects proprioception, and any body part submerged affects the tactile system. Sensory systems are closely related and are interdependent which results in an adaptive response to input from the environment.

Compared to all other systems, the tactile system has more receptors throughout the body and can be stimulated through internal or external input. When the tactile and the proprioceptive systems work together (somatosensory system), an individual is aware of the head and body position in space in relationship to oneself, as expressed in body scheme, postural control, and fine motor control. When the tactile and vestibular systems are working together, an individual can motor plan new movement patterns and can integrate familiar patterns to create smooth motion. With all three systems working together, emotional and gravitational security is realized. To recognize the implications of tactile dysfunction on land and water based learning, it is important to understand typical development.

Development of the tactile system

“Touch is one of the first, perhaps *the* first, sensation activated in the womb (along with hearing).” (Berger, 2002). The fetus develops feelings of pain, pressure, and temperature. It uses the hands, feet, and mouth to develop a sense of position in space and promote

movement within its environment. In infancy and throughout the early years, the tactile system discriminates touch input which allows the individual to understand position in space, know where touch occurs, tell the difference between light and deep touch and perceive size, shape, temperature, density and texture. At the same time, the tactile system serves as protection, alerting the being to possible dangers. Light touch stimulates receptors located in hair cells and superficial skin cells and sends warning signals to the brain of possible danger and a fright or flight reaction occurs. (Kranowitz, 1998).

During the growing years, the protective system is less sensitive to input. Instead of reacting with an emotional response (fear, anxiety) to light touch such as wind or a small insect landing on a body part, an individual may respond momentarily with feelings of surprise or discontent, then return to a state of comfort. The discriminative system, however, becomes increasingly alert. The young child discriminates what kind of touch is experienced (light or deep), locates what area is touched, and interprets where the touch originated. Although the protective tactile system is less responsive than the discriminative system during life, both continue to work together in cooperation with all other sensory systems. If however, the protective system is unable to integrate, tactile dysfunction occurs. When an individual has a dysfunctional tactile system, especially one that includes an immature protective system, the ability to effectively perform instrumental activities of daily living is impaired. If the protective system predominates, it may severely limit how a client copes with associated aquatic environments like the locker room and deck. To prepare for and manage responses to tactile dysfunction, it is helpful to imagine what a client is experiencing.

Joey, young teen with cognitive delays, is attending your swim program for the first time. He is accompanied to the pool by his mother. When you meet him on deck, you notice that Joey appears anxious. He stays close to the wall and his mother. He keeps rubbing his arms and legs. His mother reports Joey seemed upset when taking off his clothes and initially refused to put on his suit. As you reach out to shake hands with Joey, he pulls away. He is hesitant to approach the pool edge and needs verbal encouragement to come sit with you. You encourage Joey to kick his legs in the water and with the first splash, he pulls back from the edge. Once in the water, he stays close to the wall. He seems to move with more ease when he is submerged to neck level and adjusts his posture to keep his body submerged. You offer a noodle, he pushes it away and continues to walk about the pool. You notice that if Joey has visual and verbal cuing of what is to occur, he begins to relax and becomes more willing to engage in activity. At the end of the session, he pulls away from your help to dry off. Instead he takes the towel and wraps it tightly around his trunk and arms. Joey exhibits symptoms typical of tactile defensiveness.

A Historical Perspective of Tactile Perception

In 1964, A. Jean Ayers first described tactile defensiveness as an imbalance between the protective and the discriminative systems, which results in anxiety. She suggested the adrenaline (epinephrine) was “released from the sympathetic nervous system during stress [which] played a role in the behavioral manifestations of tactile defensiveness” (Fisher et.al.1991). In 1983, A.G. Fisher and W. Dunn felt discrimination and protection worked as separate functions and agreed with Knickerbocker (1982) that defensiveness was a modulation disorder (an inability to inhibit stimuli). (Fisher, et.al. 1991)

Modulation is the body’s ability to take in different levels of sensory stimuli, and then to react with inhibition or facilitation of the stimuli. (Kranowitz, 1998). With an integrated system, individuals respond differently to all types of sensory stimulation, including tactile input, and can maintain a level of equilibrium. Emotional and physical “highs and lows” occur depending upon daily life experiences. For individuals with immature tactile systems, modulation may be difficult if not impossible at times. Therefore “highs and lows” will occur more frequently or last longer, which interferes with acceptable

participation in daily activities. Significant emotional reactions or abnormal behaviors may be noted in an individual with tactile defensiveness.

Characteristics of Tactile Defensiveness

“*Tactile defensiveness*” is the tendency to react negatively and emotionally to touch sensations.” (Ayers, 1983). All living organisms respond to touch. If an organism is capable of discriminating touch, discrimination may override the protective reaction and allow information to be processed by size, shape or source. If protection overrides discrimination, the reaction may be negative or offensive. Observable behaviors associated with tactile defensiveness may include:

- Avoidance of touch from others-Being tickled by someone may be interpreted as painful instead of pleasurable. A light, unexpected touch may cause discomfort. Emotional reactions may include withdrawal, anger, or avoidance. Physical reactions may include pulling away from the stimulus or rubbing the affected area. If physical assistance is offered, the person may become emotionally upset, refuse to participate or resist close interaction.
- Resistance to self-care tasks, such as dressing, hygiene and grooming—The head has a greater number of sensory receptors than any other parts of the body. Hair drying or combing may be extremely unpleasant to the person with tactile defensiveness. The fear of clothes being pulled on or off the extremities or trunk may cause negative emotional reactions. The mouth also has more tactile receptors than the arms or legs, so tooth brushing may be an unpleasant experience, especially if assistance is needed. The fear of how touch may be presented can impede progress in self-care tasks.

- Preference for certain types of clothing-For the individual with tactile defensiveness, loose, textured or lightweight clothing create feelings of distress or discomfort. Non-abrasive fabrics such as cotton or denim are preferred to wool or possibly flannel. Long sleeves and long leg pants are preferred to short sleeves and shorts—even in the hottest weather. Tighter clothing reduces disturbingly inconsistent light touches and provides more constant feedback that can be gradually ignored by the protective system.
- Minimal use of the arms in functional tasks—Anticipation of participating in a task may be more distressful than the actual participation. Fear and anxiety from previous experiences or the emotional response to what might occur can over ride the individual’s ability to begin a task without reservation. Physical manifestations of anxiety include pulling the arms away, keeping the arms close to the body, or assuming a protective posture with the arms crossed and trunk in forward flexion.
- Physiological changes in response to touch- Increases in tone, heart rate, and respirations may occur as a result of the body’s response to increased emotional arousal.
- Emotional changes in response to touch-Anger, fear, and agitation expressed through verbalizations, crying, self-injurious behavior or physical aggression may occur after touch has been experienced. These outward expressions of emotion may be perceived as “unprovoked” or “spontaneous”. Caregivers may find it difficult to emotionally bond with the individual because physical handling may bring on negative reactions.

- Greater threat of being approached from behind-The individual with tactile defensiveness may have difficulty being in crowded areas, especially if others are positioned behind the client. Anticipating unsuspected touch and fear that develops from anticipation may cause the client to be distracted. Attention to task may be diminished, as the client may be busy visually surveying the whole environment or trying to move to an area where the whole environment can be observed. Responses to touch have been identified in land based setting. As an aquatic professional, it is important to recognize how tactile defensiveness affects performance in the water.

Considerations for Aquatics

For the individual with tactile defensiveness, entering into an aquatic program may be as distressing as initially engaging in any activity. For the “first timer”, the anticipation of a new experience heightens tactile hypersensitivity and modulation of defense mechanisms may be severely impaired. The effects of how a client reacts to the new experience and how the aquatic therapy practitioner responds to the client’s reactions may be seen long after the first session. The aquatic therapy practitioner should allow extra time for adjustment to the new environment, explain what is to happen, demonstrate what is expected and acknowledge the fears of the client. When planning therapy sessions, the aquatic therapy practitioner should:

- Physically handle the client only as needed. When intervening with physical assistance, touch should be firm and supportive. Touch should cover as much surface area as possible. For example, when giving trunk support, use the hands and forearms to cover a larger surface area than using just the hands. Keep the

hands open with the fingers fully extended. Try to imagine you are “supporting” as opposed to “holding” the client.

- Avoid flotation equipment if at all possible. Flotation equipment distorts body scheme by altering the alignment of the center of gravity and the center of buoyancy (metacentric effect). Flotation also adds tactile input and may cause a decrease in attention to task and over reaction to sensations.
 - Avoid undesired splashing. The head and mouth are the most sensitive to touch. Splashing water toward the face and head may be debilitating to the client as drops of water hit the body randomly and unpredictably. Blowing bubbles is an activity that should be closely monitored. The bubbles require air vibrating across the lips and some clients may respond negatively.
 - Use snugly fitting and smooth bathing suit material. This type of suit is calming to the individual with tactile defensiveness. The disruption in interpreting sensory input arises from the arms and legs being exposed. If the client is unable to accept bathing suits, try using wet suits or long leg and sleeve suits.
 - Use more rapid movements to provide increased proprioceptive input that may neutralize the effect of light touch input. Any body part that is immersed in water is exposed to deep pressure input. Slow movements may be irritating as the hair on the arms and legs can move slowly. More rapid movements provide increased proprioceptive input and may neutralize the effect of the light touch input.
- Initially teach swim strokes that do not require movements from water to air such as the breast stroke, sculling, and elementary back stroke. When playing in

shallow water, retrieve toys that are submerged instead of reaching across the surface of the water.

- Be aware of where the client is in relationship of others. Many times, clients will stand beside a wall and watch pool activities instead of engaging. Being able to observe activities increases the client's awareness of position in space in relationship to the environment and to others. Using the visual sense assists in calming and relaxation. Do not force the client to participate in group activities, instead provide encouragement and start with individual or very small group activities. Allow clients to stand against the wall so that the fear of stimuli approaching from behind is diminished.
- Be aware of the fact that gravitational security is a product of the vestibular, proprioceptive, and tactile systems working in harmony. Without harmony, as in the case of tactile defensiveness, performing tasks as jumping in the pool from the deck may be stressful. Fear of assistance from behind to initiate a jump and anxiety of tactile input when assisted at the end of the jump will limit participation. A distortion in body scheme makes it difficult for an individual who has tactile defensiveness to discriminate the distance from the pool deck to the water and may cause anxiety. Suggest the client slide into the pool or enter at steps or ladders.

Although observable behaviors may indicate the presence of tactile defensiveness, further testing provides information about the person's overall sensory processing skills.

Designing an aquatic program for individuals with tactile defensive behaviors

When designing a program for an individual with tactile defensiveness, assessment of the sensory processing system will provide baseline data. The Infant/Toddler Sensory Profile by Winnie Dunn, PhD, OTR FAOTA and Debora B. Daniels, M.A. CCC-SLP, the Allen Sensory Stimulation Kits I and II, the Adolescent/Adult Sensory Profile by Winnie Dunn, PhD, OTR FAOTA, and Sensory Integration Inventory-Revised for Individuals with Developmental Disabilities by Judith E. Reisman, PhD, OTR, FAOTA and Bonnie Hanschu, OTR (Wilbarger, J and Stackhouse, TM, online 2/23/03) identify sensory dysfunctions through interviews or direct testing. The Sensory Integration Praxis Test (originally the Southern California Sensory Integration Tests) is a standardized test developed by A. Jean Ayers and must be administered by a certified tester, (“Child’s Play” on-line 2/23/03).

Kris Martin, OTR/L developed the following scale to rate a client’s in-water tactile performance during initial evaluation and for assessment of progress toward function.

Tactile Defensiveness Evaluation and Rating Scale

Stage 1- Acclimation to Water

Purpose: Encourage tolerance of tactile input of water.

Handling: Only as needed to ensure safety

Appropriate interventions:

- Simple immersion as tolerated

- Create turbulence to increase drag

- Use whirlpool jets to increase tactile input

Description: Flow is a property of water that can be manipulated to serve as a therapeutic tool. Streamline or turbulent flow can be utilized as the in-water tactile stimulation. In addition, progression from tolerance of streamline to turbulent flow can be illustrated as a therapeutic goal. The buoyant nature of water facilitates ease of movement and minimizes the need for significant handling by the aquatic practitioner to produce active function by the client. Flow can help the practitioner avoid eliciting significant sensory defensive reactions in the client.

Stage 2- Tolerance of In-Water Handling

Purpose: Use water as a desensitization medium prior to touch, contact, or handling

Appropriate interventions:

Physical contact of handholding, hugs, and social touch

Massage or deep pressure touch

Modified “brushing”

The brushing technique (now called the Wilbarger Deep Pressure Protocol) developed by Patricia Wilbarger, OTR, and calls for the use of a brush specifically designed for the program. Although the brush is too difficult to use in the water, brushing can be adapted through use of washcloths, sponges, and net scrub balls. The Wilbarger’s protocol for brushing the back, arms, legs and buttocks can be but we (Martin et. al.) recommend brushing a client, using moderate rather than light pressure. Take caution to avoid skin abrasion.

Stage 3- Purposeful Activity

Purpose: Client actively uses upper and/or lower extremities in purposeful in-water activities. Client makes a transition from passive to active participation during this stage.

Appropriate Interventions:

Play and leisure tasks

Swimming activities- progressions from streamline movements of submerged extremities to movements that require breaking the surface of the water.

Simulated self care tasks, especially bathing

Stage 4- Carry-over to Function

Purpose: Overall decrease in severity of tactile defensive behaviors and an increase in tolerance and/or independence in land-based functional tasks.

All clients are not at Stage 1 upon initial in-water assessment and may not advance through all four stages. Because of central nervous system damage or syndromes that may affect physical or cognitive performance, remediation or “cure” of tactile defensiveness is not always possible. However, any advancement into higher in-water phases of treatment, along with any corresponding on-land decreased in tactile defensive behaviors can be viewed as progress.

Following the assessment process, the aquatic therapy practitioner can design an individual program to meet the sensory needs, including tactile defensiveness. When designing a program, Kris Martin, OTR/L recommends the practitioner should keep in mind:

- Maintain temperature at 92 degrees or warmer, which is “thermoneutral” and approximates skin temperature and promotes muscle relaxation.
- Keep physical contact with clients to a minimum because excessive tactile input from the practitioner may induce a negative reaction
- Limit physical contact to what is needed to ensure water safety or promote participation in a therapeutic activity
- Use moderate pressure rather than a light or casual touch when handling clients, as deeper touch is less likely to elicit tactile defensive behaviors
- Execute transitions between positions, handholds, activities in the water, and entries/exits at a comfortable pace for the client.
- Minimize the use of equipment that may provide excessive or undesirable tactile stimulation.
- If equipment must be used, know what parts of the client’s body are hypersensitive in order to avoid unnecessary anxiety, loss of attention, or disruption.
- Give thorough verbal instructions before participation and use continuous verbal prompting and reassurance during activities to help clients learn to respond more positively to tactile stimuli.
- Help clients learn acceptance of tactile stimuli by giving thorough verbal instructions before participation, use verbal prompting and reassurance during aquatic activities.

- Be aware of group dynamics. Undesired behaviors may be exhibited if the client fears being touched by others in the group.

Tactile defensiveness produces emotional reactions more than physical responses. The only identified aquatic precaution for treating the person with tactile defensiveness is that anxiety or fear produced could negate the therapeutic benefits. To minimize emotional reactions, the aquatic practitioner should have a thorough understanding of the participant's water safety skills and pertinent medical conditions. The practitioner should follow standard water safety procedures.

Summary

Historically, treatment options for tactile defensiveness have been land based. Sensory Integration protocols have been developed since A. Jean Ayers first introduced her concepts of the function of the sensory systems. Now the aquatic environment is being explored as an alternative option to traditional land based services. Water possesses tactile qualities and can serve as a desensitization intervention. The aquatic environment provides a unique opportunity to address tactile processing deficits in clients since desensitization can be applied to the whole body simultaneously or to individual parts in isolation. Water promotes integration of input to all of the sensory systems. Knowledge of the principles of water in addition to experience with clients who have sensory needs, an aquatic practitioner can design special programs to help achieve a wide variety of goals including goals that address tactile defensiveness.

Resources

Books:

Ayers, A.J. (1983). **Sensory Integration and the Child**. Western Psychological Services. Los Angeles, CA.

Fisher, A.G., Murray, E. A., and Bundy, A.C. (1991). **Sensory Integration: Theory and Practice**. F. A. Davis Company, Philadelphia.

Kranowitz, C.S. (1998). **The Out of Sync Child**. The Berkley Publishing Group. New York, NY.

On Line Resources:

“A Parent’s Guide to Understanding the SIPT (Sensory Integration and Praxis Tests”. **Child’s Play**. Winter Topic-Nov./Dec. 1999.

<http://home.att.net/~childsplay/topicnov-dec99.htm>. 2/23/03

“What can you expect from Assessment”.

<http://www.sensory.integration.btinternet.co.uk/page4.htm> 2/23/03

Wilbarger, J. and Stackhouse, T.M. “Sensory Modulation: A Review of the Literature”

Occupational Therapy Innovations. <http://www.ot-innovations.com/sensoimotor.html>

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