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## Role of movement oriented program on sensory process related to children with autism

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### Abstract

With autism spectrum disorders often exhibit co-occurring sensory processing problems and receive interventions that target self-regulation. Sensory interventions and sensory integration therapy are currently being used on practice with effectiveness. Sensory integration therapy as a clinical approach have been able to improve adaptive response to sensory issues but leaving a gap for development of variety of sensory modalities for which intervention approach is being considered as a preferable model in recent practices. Currently, sensory based intervention approaches are characterized as classroom based single-sensory intervention strategies. Alternative use of movement concepts as an intervention strategy following protocols based on movements can be effective for targeting wide variety of sensory processing problems among the autistic children. Movement concepts through locomotor, non-locomotor and manipulative movement can be effective for distinct disorders of autism including of Asperger Syndrome, Fragile X Syndrome, Landau-Kleffner Syndrome, Rett Syndrome, and Williams Syndrome. The proposed intervention program can develop on exploring of existing potentials with autistic and use their capabilities of concrete and literal thinking, obsession with certain objects and subjects, excellent memories, and being 'eccentric.' These movement activities are considered high-functioning and are capable of holding and supporting to make the child independently capable at later stage of life.

**Keywords:** Autism, sensory processing problems, sensory intervention, sensory integration

### Introduction

#### Frame work

The past decade in India has seen a change in the way society views for people with disabilities where people with disabilities are considered to be individuals who possess a different set of abilities than the majority of the population. It has long been known that involvement in physical activity contributes substantially to a person's sense of well-being. For most of these early programs, Physical Education for people with disabilities consisted of medically inspired efforts toward remediation of their "condition". However, society began to view people with disabilities as having a value able yet modified set of abilities. This required a different approach to Physical Education. In India Programs in higher education are required to identify the need that persons teaching Physical Education must also know how to address children with disabilities.

Working in a special school for children with special needs it was observed that many of these children have problems with their everyday activities in all the occupational performance areas as well as displaying behaviors that have a negative impact on their functioning and learning like constantly making noises, sensory seeking behavior which include constantly moving, physical clumsiness, loss of attention in class and poor organization of themselves. These behaviors as well as an observed sensitivity to certain "foods, food textures and to sounds" appear similar to those described in children with sensory processing and sensory modulation difficulties. Miller 1 also indicated that: "Children with sensory processing disorders suffer from devastating symptom complexes that significantly affect their self-regulation, self-esteem, social participation, school performance and other functional abilities." Very little research is however available on what behaviors children with SLI exhibit and why. (Miller. L.J, 2003) [5].

Autism spectrum disorder (ASD) is a behaviorally defined neurodevelopmental disorder associated with the presence of social-communication deficits and restricted and repetitive

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behaviors. In the latest conceptualization of ASD, these two behavioral dimensions represent the core defining features of ASD, whereas associated dimensions, such as intellectual and language ability, provide a means for describing the ASD heterogeneity. According to APA Autism also includes stereotyped pattern of behavior. This stereotypical pattern is due to abnormalities in sensory processing (APA, 2000) [1]. Hence, it is important to get an understanding of what sensory processing implies and what constitutes sensory processing disorders.

The brain receives information through the sense organs like eyes (sight), nose (smell) and ears (sound). It then processes the information received to make sense of the world around us. Billions of neurons of the brain are involved in processing input from the environment and helping an individual to respond and behave in an appropriate manner. This is termed sensory processing, sometimes also referred to as sensory integration. When the brain has difficulty in receiving information and responding suitably, it leads to sensory processing disorder or sensory integration dysfunction. The brain is unable to efficiently process and integrate the inputs received from the environment through the senses causing a person to behave in an "irrational" manner. This becomes evident in the way the person responds to certain sensory stimuli. It affects all aspects of a person's life – cognitive, social and emotional.

Dr. Ayers Kranowitz called it "indigestion of the brain," or a "traffic jam in the brain. It must not be confused with brain damage or a disease of the nervous system.

Sensory processing disorders can be broadly classified into three categories:

- Sensory modulation disorder.
- Sensory based motor disorders.
- Sensory discrimination disorders (Kranowitz Stock Carol, 2005, pp. 55, 69-70) [3].

### **Sensory Modulation Disorder (SMD)**

SMD refers to an individual's inability to control the intensity and the type of response to certain sensory stimulus. A sensory stimulus which does not elicit adverse reaction from others, has the ability to evoke a negative emotional or behavioral response from a person suffering from sensory processing disorder. Stress further aggravates and worsens the response. The stimulus could be something as inoffensive as a light but unexpected touch, the texture of food, clothes or toiletry or even certain types of sounds.

### **Sensory Based Motor Disorder (SBMD)**

SBMD shows motor output that is disorganized as a result of incorrect processing of sensory information affecting postural control challenges, resulting in postural disorder, and/or developmental coordination disorder.

### **Sensory Discrimination Disorder (SDD)**

SDD or incorrect processing of sensory information. Incorrect processing of visual or auditory input, for example, may be seen in inattentiveness, disorganization, and poor school performance. Subtypes are: visual, auditory, tactile, taste/smell, position/ movement, interception.

### **Sensory Processing Disorders (SPD)**

SPD are more prevalent in children than autism and as common as attention deficit hyperactivity disorder, yet the condition receives far less attention partly because it's never been recognized as a distinct disease. People with Autism process and respond to stimuli in a much different way. There

are research which investigate differences in sensory processing among age matched children between ages 3 and 6 years with autism spectrum disorders (ASD) and those who are typically developing.

Ninety-five percent of the sample of children with ASD out of 281 sample demonstrated some degree of sensory processing dysfunction on the SSP Total Score, with the greatest differences reported on the Under responsive/ Seeks Sensation, Auditory Filtering, and Tactile Sensitivity sections. The ASD group also performed significantly differently ( $p < .001$ ) on 92% of the items, total score, and all sections of the SSP. These findings, considered with similar published studies, begin to confirm the prevalence and types of sensory processing impairments in autism. Further research is needed to more clearly define patterns of sensory processing in people with ASD (Scott D. Tomchek, 2007) [6].

Though sensory modulation symptoms are common in persons with ASD, they are characterized by heterogeneity in type. Studies have shown that the difference was most marked in children within the age group of 6-9 years. Thus, underscoring the importance of designing research studies and interventions keeping in mind the diversity in sensory abnormality/manifestation and a child's individual requirement. Sensory modulation symptoms are common in persons with autism spectrum disorders (ASD); however have a heterogeneous presentation. Results from 14 studies indicated a significant high difference between ASD and typical groups in the presence/frequency of sensory symptoms, with the greatest difference in under-responsively, followed by over-responsively and sensation seeking. Three moderators that reduced the variability in findings among studies were: chronological age, severity of autism, and type of control group. Sensory differences were highest for studies of children ages 6-9 years, samples with more than 80% with an autism diagnosis, and compared to a CA matched versus a MA or DD matched group. It is important to consider these moderators in the design of studies and interventions addressing sensory symptoms (Ayelet Ben-Sasson, 2009) [2].

Sensory disorder affects a child in many way. A common problem among children with sensory process disorder is a problem of timing in the CNS. Inhibition must be timed just right to balance excitation, so that simultaneous sensory messages can be synchronized. What happens when a child's nervous system has a problem with modulation? The child may be over responsive, under responsive, sensory seeking, or have a combination, with fluctuating responsively (Kranowitz Stock Carol, pp. 69-70). According to Dr. Ayres, "Touch is one of the senses that is especially involved in ongoing process contributing to perception of other type of sensation." This huge sensory system connects us to the world and bonds us to others. It gives us information for body awareness, motor planning, visual discrimination, language, academic learning, emotional security, and social skills. Two components make up the tactile sense. First is Protective or defensive system. Its purpose is to alert us to harmful or healthful stimuli. The second component of the tactile sense teaches us to discriminate what kind of touch we are feeling. In addition to helping us to protect ourselves, to discriminate among objects, and to accomplish what we set out to do, the tactile sense gives us information that is necessary for many kinds of everyday skills (Kranowitz Stock Carol, 2005, p. 83) [3].

### **Effect of Tactile Sense on everyday Skills**

Body Awareness (Body Percept) - The tactile sense along with the proprioceptive sense affects a person's subconscious

awareness of individual body parts, and how the body parts relate to one another and to the surrounding environment. With good tactile discrimination, a child develops body awareness. The child has a sense of where he is and what he is doing  
Praxis (Motor Planning) - Motor planning is necessary for two broad categories of movement, one of which is gross motor control. Gross motor control allows a child to bend, lift, twist, and stretch, to move body from one place to another by creeping or running, and to maneuver his hands and feet. The child with poor tactile processing is out of touch with his body and with objects in his world. Gross motor skills may be delayed, making it very difficult to learn, move, and play in meaningful way. Motor planning is necessary for another category of movement: fine motor skills, which a child usually refines after establishing gross motor skill (Kranowitz Stock Carol, 2005, pp. 91-93) [3].

Vestibular – The vestibular system tells us about up and down and whether we are upright or not. It tells us where our body are in relation to the earth's surface. It sends sensory messages about balance and movement from the neck, eyes, and body to the CNS for processing and then helps generate muscle tone so we can move smoothly and efficiently. The receptor for vestibular sensation are hair cells in the inner ear, which is like a vestibule for sensory messages to pass through. They register every movement we make and every change in head position even the most subtle. Some inner ear structure receive information about where our head and body are in space when we are in motion or motionless tilt our head in any linear direction – forward, backward, or to the side. Our structure in the inner ear receive information about the direction and speed of our head and body when we move rapidly in space, on the diagonal or in the circle. Do you feel little dizzy? Your vestibular system tells you instantly when you had enough of this rotatory stimulation. Gravity stimulate these inner ear receptors (Kranowitz Stock Carol, 2005, p. 113) [3].

### **Effect of Vestibular Sense on Everyday Skills**

Movement and balance - The child with vestibular dysfunction has problem with movement and balance. They moves too little or too much, with too much or too little caution. Her movements may be uncoordinated and awkward  
Muscle tone is the degree of tension normally present when our muscles are in resting state. It is a sensory based motor skill and is a component of normal movement patterns. The vestibular system, along with the proprioceptive system, strongly affects tone by regulating neurological information from the brain to the muscles, telling them exactly how much to contract, so that we can resist gravity to perform skilled tasks

The child with vestibular dysfunction may have loose and floppy body or low tone. This is a postural disorder that interfere with her movement. Nothing is wrong with muscles but brain is not sending out sufficient messages to create necessary tension to move.

Bilateral coordination means, It can use both sides of the body to cooperate as a team. The vestibular sense gives us information necessary for many everyday skills. The child with poor bilateral coordination may have trouble using both feet together to jump or both hand together to catch a ball (Kranowitz Stock Carol, 2005, pp. 122-126) [3].

Movement and Body Position through Proprioceptive

- How our body parts in space
- How our body relate to one another
- How much and how quickly our muscles are stretching
- How fast our body is moving through space

- How our timing is
- How much force our muscles put forth (Kranowitz Stock Carol, 2005, p. 136) [3]

### **Effect of Proprioceptive Sense on everyday Skills**

Grading of movement - Proprioception helps us grade our movements. Grading our movement means that we sense how much pressure to exert as we flex and extend our muscles. We can judge what quantity and quality of muscle movement should be, and how forcefully we should move. The child with dysfunction does not receive efficient messages from his muscles and joints, he has difficulty grading his movement to adapt to changing demands.

Postural Stability – Proprioception gives us the subconscious awareness of our body that helps us stabilize ourselves when we sit, stand, and move. The child with dysfunctions lacks the stability to make fundamentals postural adjustments for these everyday skills (Kranowitz Stock Carol, 2005, pp. 144 - 146) [3].

### **Pedagogy**

Starting from the neck down, muscles near our joints that must be strong enough to do everyday tasks. Neck muscles, shoulder muscles, and arm muscles need to contract to pull, push and carry objects. It can manifest in the inability to carry out simple tasks of daily living like opening a fridge door or a packet of chips. It makes difficult in holding something even a little heavy. This leads to the realization that to execute tasks more than usual effort is required; more than others without this dysfunction. However it is difficult in estimating the optimal strength or effort to be applied. This may proprioceptive awareness. Some of the sensory disorders is a result of certain muscles not getting exercised enough and physical therapy is often recommended.

Next comes core body strength. Poor posture is a characteristics of SPD which is the result of poor core strength. Gravity is pulling, making a bit hunched posture. Consequently, the head is in a poor position to be picking up sights and sounds and processing effectively. The lungs aren't in ideal position for allowing fresh air in and out, leaving the child out-of breath sooner than the typical child. Another very common problem that reveals itself as a result of poor posture and weak arms is poor handwriting. It is a veritable nightmare - sloppy, messy and atrocious! It might seem that the child is simply being lazy and can't be bothered to do a neat job. It is due to poor posture, awkward placement of arms, as well as gripping the pencil too lightly or too firmly.

Leg muscles may not be in ideal working shape either. A child may get tired easily after just a few minutes of walking or running. Or the child may not know how much strength to put into his feet as walks or jumps and ends up stomping or crashing onto the floor (Sounds like proprioceptive again.).

Yet, what these kids really do need is exactly what they try to avoid: play sports. Other forms of exercise are wonderful for them too. Aerobics and muscle-strengthening exercises at a pace they are comfortable with while teaching their bodies to be comfortable with more at each session. All children with SPD (Proprioceptive disorder) are not necessarily clumsy on the field. Some can even be quite good at certain sports. But those who are, and yet have the courage to persist and keep on striving to get better at something that they are naturally not good at, are to be admired and encouraged. Once a teacher recognizes the symptoms of and reasons for poor coordination of a child, he can step in to provide extra practice and differentiate group activities and games in such a way so as to

give a fair chance to these children.

This is why physical therapy is so closely related to occupational therapy. Children with sensory processing disorder can benefit from both although usually only occupational therapy is recommended. Here's what my son's OT has taught him to do: jumping jacks, hopscotch, climb the monkey bars, pump his legs on a swing so that he doesn't need

me to push him, and catch a ball while jumping on a trampoline. They also worked on bridge exercises for core body strength. That sounds a lot like physical therapy. (Sensory, 2011) [7]

### Intervention Program

#### Sensory processing related to endurance/ tone

The infographic is a vertical stack of four circular images, each connected to a blue rectangular text box. The first circle shows a man in a blue shirt and white shorts interacting with several children sitting on a gym floor. The second circle shows a person in a dark jacket and cap performing a physical activity on a paved outdoor area. The third circle shows a man in a red swimsuit and a child in a blue swim cap in a swimming pool. The fourth circle shows a person in a blue sweater interacting with a child in a dark jacket near a large, grey, circular object on a grassy area.

*Basic motor activities*

- Walking/ jogging
- Sitting standing up
- Basic warming up
- Ladder/ cone activities

*Fitness activities/ Motor planning*

- Walk/ Running on Treadmill
- Core strength activities
- Weight bearing activities
- Stretching active/ passive
- Yoga asana

*Sports activities*

- Swimming
- Basketball
- Gymnastics/ Aerobics/ trampoline

*Fun games*

- Tug of war
- Fun wrestling
- Ball in the pool

**Vestibular processing**



*Basic motor activities*

- Backward walk/ side walk
- Four point walk
- Trampoline
- Stairs climbing
- Obstacle under/over
- Basic warming up
- Ladder/ cone activities



*Fitness activities/ Motor planning*

- Incline walk on Treadmill
- Yoga asana
- Callesthénics



*Sports activities*

- Football
- Skates
- Cycling
- Gymnastics/ yoga



*Fun games*

- Parachute activities
- Hot potato
- Blind circle

**Modulation related to body position and movement**



**Note:** Intervention program will be design on the basis of individual threshold. But program can be given in group as well as individual setting.

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