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Occupational Therapy using the Sensory Integrative Model of Practice: A Case Study

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Capstone Project for Occupational Therapy Doctorate

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Abstract

This paper presents a case report of a child with sensory processing dysfunction and describes how this disorder affects his ability to function within his environment and complete daily occupations. During a four month period, a sensory integrative approach is utilized throughout occupational therapy treatment sessions in order to increase vestibular stimulation, body awareness, and proprioceptive input in order to improve how sensory stimuli are integrated. A review of assessment data as well as information gained through parental interview is included to provide a detailed illustration of the client. The goals and objectives selected for the client are noted in addition to the changes in occupational performance in relation to meeting the designated goals. Parental interview data indicate progress in completion of school-based occupations such as using scissors to cut objects and writing with a pencil using a tripod grasp. The results of this case study support the main principles of sensory integration theory that suggest development of one’s sensory processing capabilities, or improving the ability to integrate sensory stimuli impacts adaptive behavior and subsequent occupational performance. Sensory integration theory and the success of using this model of practice is supported based upon the documented results of this study.
Introduction

The client is a five-year-old boy diagnosed with global developmental delay and symptoms characteristic of mild autism. Initial concerns included torticollis, a shortening of the Sternocleidomastoid affecting the client’s left side, having an unknown etiology. There is also poor motor coordination, motor planning, and a decrease in fine motor coordination. Direct occupational therapy interventions were designed to address the client’s sensory-processing ability, increasing duration and frequency of adaptive responses, fine motor coordination, and neuromuscular control. An initial evaluation, clinical observations and parental interview suggested the need for the sensory integration model of practice and sensory integration-based interventions would be appropriate to increase participation in therapy as well as allowing the client to be functional within his environment.

Sensory integration theory was first initiated and developed by Dr. Jean Ayres, an occupational therapist who also received a doctorate in educational psychology (Kimball, 1999). Ayres’ research included a focus on children with mental retardation, autism, pervasive developmental disorders, sensory defensiveness, behavioral disorders, and other types of neurosensory-based problems, which began in the late 1950’s.

Sensory integration can be defined as the organization of sensation for use (Ayres, 1979). The senses provide us with information about the physical state of our body and the surrounding environment. Many types of sensory stimuli rapidly enter the brain at any given moment. The brain must be able to organize and discriminate among the various sensations in order to develop and function efficiently. Sensory integration, essentially, puts all the parts together by allowing the body to be aware of different
sensations stemming from the same experience. For example, when an individual cuts an onion he is able to see, hear, smell, feel, and have an awareness of what the muscles and joints are doing. Our bodies allow us to experience different things as a whole, without requiring much conscious effort. Sensations are experienced through a series of electrical impulses as well as the involvement of biochemicals. These impulses are integrated within the brain to generate meaning. As a result, sensations are transformed into perceptions.

The development of sensory integration begins as an embryo when the fetal brain detects the movements of the mother’s body (Ayres, 1979). A large amount of sensory integration must occur during the first year of life in order for the child to be able to crawl, stand, and walk. Typical playing at infancy and early childhood provides the various sensations imperative for the development of integration. Much information is taken in from the environment that elicits awareness of the body and utilizes sight and sound. Each child is unique in regards to how well the nervous system integrates information. Sensory integration must be developed through interaction of the environment. The greatest outcome that is vital for optimal function is for the body to adapt to the many changes that occur within our body as well as the objects in which we interact.

Adaptive responses are precise and goal-oriented reactions produced from a sensory experience (Ayres, 1979). An example of an adaptive response can include picking up an apple on the kitchen counter to eat because you are hungry. An important aspect of this type of response is to learn something new by conquering the challenge. An established adaptive response allows the brain to mature and become more organized.
During early childhood the main function of the brain is to experience different sensations and derive meaning. The child tries to receive as much information from the objects in which he interacts in order to produce body movements to accommodate these sensations. Adaptive responses at this age are more motor-oriented in nature than mental and the first seven years of life is the time of sensory–motor development. As the child continues to grow more mental and social responses become more prominent and replace a good portion of the sensory-motor processes. The more recently developed responses, however, are built upon the underlying sensory-motor responses. A well established sensory-motor basis sets up the ideal foundation for learning mental and social skills throughout life.

Each of the sensory systems has a distinct role in sensory processing that is complex and influences the other sensory systems. The somatosensory system is responsible for proprioception (Lane, 2002). Proprioception is the ability to sense the direction and speed of movement as well as knowing the amount of effort required to pick up an object. It allows one to be aware of the orientation of the body, timing movements, and the amount of force the muscles must exert. Proprioceptive feedback is predominantly derived from muscle spindles, mechanoreceptors of the skin, and motor commands. The purpose of proprioceptors is pertinent to the motor responses by which reflexes, automatic responses and planned actions occur (Ayres, 1972). It is the movement produced among these three groups that allow humans to adapt and live within the environment. The proprioceptive flow can take various routes that ultimately determine the type of effect. When the autonomic nervous system is activated by reaching the cortex, this can result in a positive emotional state. Impulses that are sent to
the cerebellum are involved in regulation and coordination of motion. Also, non-conscious proprioception from muscles provides the afferent messaging required for normal muscle contractions that allows for skeletal movement. Impulses from the eyes aid in creating visual form and space perception.

The tactile system is a complex system composed of two divisions, the dorsal column medial lemniscal system and the anterolateral system, which are responsible for various functions (Kimball, 1999). The dorsal column medial lemniscal system plays a large role in praxis. The common types of sensations recognized within this system consist of discriminative touch, conscious proprioception, touch pressure, and vibrations. The anterolateral system is comprised of spinothalamic, spinoreticular, and spinotectal pathways. Collectively, these pathways assist with the creation of sympathetic arousal response and transfers inputs into the reticular formation. This system discriminates pain, temperature, and other types of subtle touch such as a tickle and itch.

The vestibular system is responsible for detecting motion, primarily acceleration, deceleration, and gravitational pull (Ayres, 1972). Vestibular and proprioceptive processing are believed to contribute to development of body scheme, postural responses, coordination of movements, stabilization of the eyes in space, and coordination of the eyes, head, and body (Lane, 2002). The vestibular system consists of the semicircular canals, otolith organs, utricle, and the saccule. Receptors are located within these structures, which detect movement and are in close proximity to the auditory system. These nuclei receptors receive input from the spinal cord, cerebellum, and the visual system. The processing of these inputs allows for detection of the speed and direction of head movement and provides an awareness of the body in relation to the environment.
The auditory system is responsible for the processing of sound waves (Lane, 2002). It is the main sense that is commonly associated with attention and language development (Ayres, 1972). The typical components involved in audition are being able to differentiate various parameters of sound, such as duration, frequency, intensity, and sequence. Once sound waves enter the brain stem many connections are made with other processes before reaching the cortex. This type of stimuli is believed to be one of the most prominent ways to arouse the brain through the reticular activating system. Clinical research suggests that the vestibular stimuli have an effect on auditory and language. Within the auditory pathways are feedback loops which are linked to somatosensory inputs. These pathways are essential for organizing the orientation of the head, eyes and body to sound (Lane, 2002).

The visual system is the one system that is most relied upon in order to function from day to day. Vision allows humans to be able to navigate within the environment, judge the speed and distance of objects and to recognize people and objects as being familiar (Lane, 2002). It is a complex system with three pathways that integrate information. Visual processing is the end product of the information processed (Ayres, 1972). Each eye transmits impulses to both of the cerebral hemispheres and integration occurs after intercommunication among the hemispheres. Vision is influenced by nonspecific reticular or thalamic stimulation. It is this action, in part, that is essential to visual perception.

Collectively, all of these sensory systems (proprioception, tactile, vestibular, auditory, and visual) provide the foundation for the development of the functions necessary to produce adaptive responses (Kimball, 1999). In order to achieve a desired
adaptive response, the individual must have a sensory system that modulates within functional levels and the processes must be present to support the integration of stimuli. Unfortunately, not everyone is born with a well-developed sensory system that allows for efficient sensory processing.

Poor sensory integration can lead to problems in children such as being considered a slow learner or have behavioral problems (Ayres, 1979). A sensory integrative disorder is not comparable to a medical problem that can easily be determined by lab tests. It is difficult to isolate and only trained professionals are able to detect behavior representative of poor sensory integration. Some of the early signs of sensory integrative problems include a delay in reaching milestones as a baby such as rolling over, creeping, standing, and walking. A delay in language is another common indicator of sensory issues, for information does not register as it should. It is in the first seven years of life that a child learns most about the sensations in his environment. As a child’s sensory system matures, it has the ability to create an adaptive response to sensations in different situations. Each adaptive response leads to a greater organization of the brain and leads to further integration of sensations which arise from the process to create that response.

Sensory system dysfunction occurs when the brain does not process and organize sensory impulses in a way that provides the individual with accurate information about himself and his environment (Ayres, 1979). When sensory stimuli are not processed efficiently this often leads to behavior that is not directed effectively. Also, learning is a difficult task and the individual often does not feel secure about himself, is not able to tolerate everyday stresses, and successfully complete essential occupations. Sensory
processing dysfunction occurs when neural impulses do not reach their destination in the brain in a quick and efficient manner. Poor sensory integration can result in aphasia, which is difficulty in speaking and understanding what others are saying. A child may also have difficulty with understanding ideas and generalizations in addition to deficits in motor planning and interacting with his environment.

Other common characteristics of sensory processing dysfunction are hyperactivity and distractibility. A child may exhibit behavior in which he is constantly moving all over the place and does not attend to tasks for extended periods. In the context of behavior, a child may unintentionally cause more problems for parents. Since the environment can be threatening, a child is less apt to be content. Sharing objects can be very difficult since one with sensory processing dysfunction often cannot focus on the needs of other people. The child tends to be sensitive and his feelings often become hurt. Other children may react to his behavior in a negative way, which ultimately feeds on his negative self-concept.

The sensations from the vestibular and proprioceptive systems provide the body with muscle tone required to keep the body in an upright position. A child with deficits in the area of sensory processing often has low muscle tone, which requires more effort in order to hold his head and body up against gravity. A child may lose his balance and stumble frequently when the vestibular, proprioceptive and tactile systems are not working efficiently. Poor motor coordination is a result of not knowing where the body is in relation to their environment and planning movements while taking into account gravity. A child may not play appropriately with toys or develop play skills necessary to build with blocks or put together puzzles. All of these characteristics are inherent of
sensory processing dysfunction; however, due to the complexity of this disorder some of the characteristics may be absent or be observed at varying degrees for each child is unique.

Occupational therapy using a sensory integration approach is designed to guide intervention for children who have significant difficulty processing sensory information, which prevents their level of participation in daily occupations. Ayres’ sensory integration enhances nervous system of sensation to provide a firm foundation for the development and execution of appropriate behavior (Ayres, 1972; Bundy, Lane, & Murray, 2002). Enhanced sensory experiences are used in the context of meaningful, self-directed occupations in order to support the person’s ability to function and meet the demands of everyday life. Vestibular, proprioceptive, and tactile sensations directly influence the body’s ability to regulate the nervous system and are used as a basis for treatment. Therapy interventions are guided by the occupational therapist to meet each child’s unique sensory abilities and challenges.

Even though sensory integration therapy is commonly used and supported by subjective evidence, there is minimal research to date to establish this as an evidenced based treatment. A meta-analysis completed by Vargus and Camilli (1999) and investigated whether existing studies of treatment using sensory integration approaches support the efficacy of these approaches. The results of this study did not support its effectiveness. An earlier study by Ottenbacher (1982), however, did reveal sensory integration to be an effective form of intervention. These researchers assessed many studies using valid measures to complete their study and the difference in results may be
due to the difficulty in assessing behavior after sensory integration intervention methods had been implemented.

A more elaborate study using a confirmatory factor analysis completed by Mulligan (1998) was used to evaluate a five-factor model of sensory integration dysfunction on the basis of scores on children on the Sensory Integration and Praxis Tests (SIPT). The SIPT was developed in the 1980’s to provide a more thorough test to evaluate praxis (Kimball, 1999). The scoring of this test creates a profile of the child when compared to six diagnostic clusters. The five patterns included in this study are bilateral integration and sequencing, somatosensory, somatopraxis, visuopraxis, and postural ocular motor (Mulligan, 1998). The results of the study supported the second order model, with four first order factors, supporting dyspraxia, bilateral integration and sequencing, visual perception, and somatosensory processing as patterns of sensory integration dysfunction. The second order factor, generalized practice dysfunction, indicated a strong relationship among all four patterns.

Recently, Winnie Dunn presented a conceptual model that takes into consideration the possible roles of the many neural processes, which produce patterns of underresponsiveness and overresponsiveness (Parham & Mailloux, 2005). In this model, there are four main patterns that represent individual differences in sensory responding: low registration, sensation seeking, sensitivity to stimuli, and sensation avoiding. These patterns are thought to develop from the neural processes of habituation, sensitization, threshold, and homeostasis. An individual who is considered low registering often is underresponsive due to a high threshold for reactivity and requires a high level of stimuli from the environment in order to be able to attend and function. A person who is
sensation seeking also is considered underresponsive and has a high threshold for stimuli. This type of individual actively seeks out intense sensory input. Those individuals who are a part of the sensory sensitivity quadrant have a heightened awareness of sensory stimuli because of a low threshold and are easily distracted by sensory stimuli. Individuals tend to passively cope with this surge of input. Those who are sensory avoiding also have an increased awareness of sensations, however, they try and avoid these types of sensations that register as noxious. One of the benefits of this model is that it provides a means of understanding what types of environmental factors are essential to an individual and how to accommodate an individual in order to create an environment to facilitate optimal function.

The Sensory Profile is a commonly used assessment created by Winnie Dunn in 1999 to describe responses to sensory events in daily life (Dunn, 2001). The Sensory Profile for children represents children from 3 years old to 10 years old. The frequency of each behavior is marked using a 5-point Likert scale with the terms ranging from always to never. Sensory processing is a complex mechanism and individuals do not experience sensory events of daily life in the same manner. As previous studies have shown, internal and external conditions affect the way people process sensory information. They may be more sensitive (have lower thresholds) to some types of sensory input, or individuals can be less attentive (have higher thresholds) to other types of sensory input. A model must be able to signify complex processes without being too complex in and of itself to be understood. Dunn’s model of sensory processing is meant to provide a framework for studying, interpreting, and gaining insights into the nature of sensory processing, and describing the effects of sensory processing on performing daily occupations.
Intervention addresses the interference between our desired life and our current performance; knowledge of sensory processing can lessen this gap and increase the chances of enduring a life that can provide the most meaning and purpose.

Background Information

Per record review and parental interview, the client was the mother’s first child. During the pregnancy there was bleeding noted throughout and delivery was relatively uncomplicated. The client experienced ingestion of meconium, which was treated and did not have any serious affect on the health of the baby. During infancy the client had numerous ear infections and was sick with the flu several times. Due to having severe fluid in his ears, the client underwent PE tube placement in January 2005. The client lives at home with his mother and a younger brother. The child had not met milestones of rolling over, crawling, transitioning to standing, and walking. A speech delay was also a concern, for the client did not speak his first words until about two-years of age. At this point the client’s pediatrician diagnosed the client with global delay and mild autism and recommended the child have a consultation with an occupational, physical and speech therapist to complete a developmental evaluation. In early infancy the client received all disciplines of therapy services inconsistently at The Rehab Center. At the age of four, the client enrolled in preschool at Richland New Hope, which is a facility that provides services for children with disabilities. The client also receives occupational and speech therapies, each thirty minutes per week at this location. He has been taking Risperdal for the past year to increase his attention and lessen aggressive behaviors. The most significant problems noted at preschool included hitting others, inattentiveness due to visual and auditable distractions, and getting out of his chair or circle time frequently.
These behaviors improved once the client was on a set schedule and the therapist implemented different types of fidget toys and a weighted vest.

A history and interview with the client’s mother provided a detailed description of the client and his sensory processing issues, which many of the Winnie Dunn’s Sensory Profile was completed by the client’s mother; the fine motor section of the Bruininks-Oseretsky Test of Motor Proficiency was administered as well as the Miller Assessment for Preschoolers. Based upon the results of the assessments given, goals and objectives specific to the client were created. The goals addressed the main areas of concern in regards to the test results and consultation with the client’s mother. Weekly notes were documented and goals progress charted.

The fine motor section of the Bruininks-Oseretsky Test of Motor Proficiency indicated the client was not proficient in the tasks administered. Three sections were added together to get the overall score for the fine motor portion; Response Speed, Visual-Motor Control, and Upper-Limb Speed and Dexterity. He scored just below expectations in the upper-limb speed and dexterity section; however, the other two were severely low. During the writing activities he displayed a right hand preference, using a firm tripod grasp that was pushed against the paper to receive the input to know his pencil was touching the paper. Copying was difficult for the client for he was unable to reproduce any of the shapes due to decreased visual perceptual abilities.

The Miller Assessment for Preschoolers (MAP) was administered to screen the client’s sensory and motor abilities, verbal and non-verbal cognitive abilities and motor planning. The client scored at-risk in all areas assessed. Most of the activities were above the client’s skill level. In the fine motor coordination portion, he demonstrated a
tripod grasp with fingers spread far apart while using a pencil. The client was not able to follow a sequence of directions and answer general information questions. He was able to repeat sentences; however, there was difficulty in sequencing multiple digits. In the cognitive abilities, non-verbal index, he imitated tapping blocks in a demonstrated sequence and completed puzzles with a straight edge. In complex tasks which required motor planning, he experienced difficulty imitating postures and copying designs.

*Upper Extremity Function*

*Range of Motion and Muscle Tone.* The client was able to demonstrate full range of motion throughout his trunk and upper extremities. His muscle tone appeared to be slightly hypotonic based upon observation of his movements and sitting posture.

*Hand Dominance.* The client preferred to use his right hand to complete activities.

*Grasp.* The client used an ulnar grasp (thumb, ring, and little finger) to pickup 1-inch blocks in order to stack. This proved to be the same with other small objects such as beads and puzzle pieces. He incorporated a tripod grasp when using a writing piece. He held the pencil tightly within his fingers and pressed down firmly against the paper, almost breaking the tip of the pencil.

*Manipulation of Objects (in-hand).* The client was able to pick up individual coins incorporating a lateral pinch grasp to palm the item. He did not transfer the coin from the palm to his fingers distally. He used his other hand to interchange the coin into the fingertips. He infrequently demonstrated isolated index finger use.

*Bilateral Hand Skills.* The client did not exhibit proficient bilateral hand integration. He typically only used one hand to complete activities such as picking up coins, stacking blocks, and drawing. He did, however, incorporate the use of both hands
while using scissors to cut paper. Cutting with scissors must be supervised due to the client becoming easily distracted and he often does not watch where he is cutting.

_Eye-Hand Coordination_. The client demonstrated eye-hand coordination in throwing stuffed toys into a container while lying prone on the net swing. He placed large rings onto a holder while sitting on a platform swing in slow motion. Bean bags were also tossed into a box with 100% accuracy while in quadruped.

_Oral-Motor_. The client exhibits decreased lip closure and ability to feel the sensation of saliva at the corners of his mouth. Mother reports he typically breathes through his mouth and consistently drools throughout the day.

_Visual Perception/ Visual Motor Integration_. The client was assessed using the Beery Test of Visual-Motor Integration. This test was given to determine a child’s handwriting ability. The test starts with the child being asked to imitate drawing a vertical line, horizontal line, and a circle. After imitation the child progresses to develop the skill of copying a figure or shape from a drawing. The client was only able to imitate drawing a horizontal line.

_Clinical Observations_. A summary of the clinical observations of the client’s strengths and weaknesses are found in the following sections.

_Muscle Tone and Postural Control_. Based upon observation, the client appeared to have minimal low tone overall. He demonstrated poor posture while sitting on the floor using his arm for support if sitting long-legged, however, he preferred to “w” sit. During table activities the client would use his elbows for additional support. The client’s mother reported he usually leans against something like the couch or a chair if sitting for several minutes in one location. The client was only able to assume the prone
extension posture after imitation, but could not maintain the position longer than 2 seconds. He was not able to attempt the posture after the initial test.

*Somatosensory Processing.* The client does not have an extreme aversion to different textures and typically eats a variety of foods. In terms of tactile processing, he has minimal discretion in touching things or eating foods he has not yet experienced. He does prefer to wear socks even when wearing sandals. He likes to wear clothes that have sleeves. He enjoys taking baths and playing in water. He does not like to get dirty and needs to wash his hands soon after coming into contact with gritty materials such as mud. The client’s vision is necessary for him to know where his body is in relation to his environment. He is not able to stand with his feet together when his eyes are closed without experiencing a loss of balance.

*Praxis.* The client demonstrates gross, uncoordinated movements. It is difficult for him to plan and execute a function such as throwing a ball to a far target. He is able to release heavier objects more readily and with more precision than lighter objects. He requires assistance to hold the platform swing in order to be seated. After sitting cross-legged on the swing he feels confident to let go of one of the ropes and typically experiences an anterior loss of balance. The client exhibits uncoordinated movements while running for his legs and arms are not in-sync of one another, appearing clumsy.

*Activities of Daily Living.* Per parental report, the client requires assistance to select clothing and distinguish the front from the back. He is able to put on pullover shirts and elastic pants on with supervision. He requires assistance to put on his socks and shoes. He has difficulty with fasteners such as buttons, zippers, and snaps. He attempts to fasten the closures, however, becomes agitated and mother has to intervene. He is able
to feed himself at mealtimes using a fork and spoon. He requires minimal assistance to
cut up certain foods that cannot be done using a fork. His social skills are limited,
however, he has learned to share and play with his younger brother with adult
supervision. Attending preschool has improved his play skills; however, it is difficult to
keep his attention focused on one toy or activity for more than a few seconds. His mother
would like to see him be able to develop more independent play behavior and to seek out
and explore toys.

*Sensory Profile.* The Sensory Profile was administered as a part of the evaluation
to determine whether specific components of sensory processing are affecting his ability
to function and perform daily occupations within his environment. The Sensory Profile
designed by Winnie Dunn in 1999 was given to the client’s mother, whom is his primary
caregiver. The Sensory Profile is a measure of a child’s behavioral response to everyday
activities such as riding in a car and food preference. The profile consists of 14 sections
associated with auditory, visual, activity level, taste/smell, body position, movement,
touch and emotional/social. The client’s mother was provided with the rationale for the
test in hopes that it could be determined if there were particular areas which could be
addressed in therapy. The behaviors were graded based upon the frequency in which the
behaviors were witnessed, with the options being always, frequently, occasionally,
seldom, and never. After all 125 items of the assessment are scored, the results depict
what is significant in regards to the behaviors and provide direction for therapy in regards
to which areas need addressed as well as recommending activities at home that tailor to
the needs of the client.
Sensory processing requires the ability to register and process a large amount of stimuli, which is most often received from all of the senses simultaneously. In order for stimuli to be integrated and produce a meaningful response, the brain must be able to sort all types of information that is taken into the system and process that which is most important while the irrelevant stimuli is filtered out and discounted. Sensory modulation is the process of being able to efficiently process sensory stimuli and to produce a response that is appropriate. This is the body’s mechanism for regulating the actions necessary to complete different tasks. Children who experience sensory modulation dysfunction may have difficulty maintaining the arousal level to attend to certain tasks and their sensory systems may not be able to sustain the level of processing necessary to complete a task and to transition to another which may produce a new stress to the system.

A summary of the results of the Sensory Profile indicate issues in the areas of fine motor/perceptual, poor registration, inattention/distractibility, and sensory seeking. Per parent report, the client is always active, runs and crashes when playing and typically throws toys instead of initiating meaningful play. His inattention to tasks can be contributed to an increase of auditory processing. He easily becomes distracted with any type of common sound such as a person’s voice or a person walking down the hallway. The client scored in the typical performance range in the areas of oral sensitivity, sensory sensitivity, and sedentary. The results of the Sensory Profile and clinical observations of performance revealed difficulties in the areas of processing auditory and visual stimuli.
Based upon information received from the evaluation and assessment data, detailed goals were created and discussed with the client’s mother in order to address specific areas of concern which had been identified prior to the beginning of therapy. He had decreased performance in the areas of praxis specifically in the areas of motor planning and motor execution based upon the results of the Bruininks-Oserestksy Assessment. Other underlying areas involved are decreased vestibular processing, fine and gross motor coordination, and poor body awareness as suggested by the Sensory Profile completed the client's mother, his primary caregiver. In addition, this assessment revealed poor registration capabilities, is easily distracted and has poor attention. The client’s deficits in praxis contribute to the difficulty he experiences in completing occupations that require precision. His level of performance is dependent upon his ability to process sensory stimuli from the environment. Occupational therapy goals were determined based upon the results and observations from the evaluation and are concentrated in the following areas: 1. Improving sensory processing capabilities necessary for producing controlled responses to consequently improve behavior and increase body awareness, and 2. Increasing neuromuscular control to elicit more coordinated gross and fine motor control.

The goals and objectives selected for the client are as follows:

1. Increase frequency and duration of adaptive responses.
   a. The client will engage in a table occupation during therapy session for 2 minutes without requiring redirection.
b. The client will actively participate in three new occupations throughout therapy sessions without refusing and requiring physical redirection ¾ trials.

*Rationale.* During the initial evaluation of the client, completing activities requiring more than several seconds of attention and transitioning between activities was difficult and required physical redirection. There was a decrease noted in sensory modulation, the ability to control sensory input. This was demonstrated by the client’s hyperactive behavior, distractibility, crashing into objects and throwing toys. Improving how various stimuli are processed and registered will help to improve attention to task, praxis, seek alternative methods of sensory input other than self-mutilation. Subsequently, these skills will improve gross and fine motor coordination essential for attending and transitioning between activities.

2. The client will improve fine motor skills
   a. The client will utilize a fine pincer grasp to pick up small objects such as blocks 75% of the time.
   b. The client will properly hold scissors with thumb on top and manipulate them in order to snip the edge of paper.

*Rationale.* During the evaluation the client experienced difficulty catching and releasing objects, for when he placed an object on the ground it most frequently was thrown across the room. He also could not properly demonstrate how to hold scissors with the thumb
on top and the middle, ring and little finger on the bottom. He was not able to coordinate his hand to open and close the scissors. The client did not exhibit the visual motor skills to use his hands and eyes together.

3. The client will develop neuromuscular control for consistent, coordinated movements to demonstrate age appropriate play and daily occupations 75% of the time.
   a. The client will improve posture by sitting unsupported on the floor for 3 minutes to complete an occupation.
   b. The client will be able to maintain the prone extension posture for 5 seconds.

Rationale. When the client was evaluated, he demonstrated hypotonia in his trunk muscles for he used his arm to support himself while completing activities while on the floor. His gross motor skills were poor as he experienced tripping over his feet when moving several times. He was unable to assume and maintain the prone extension posture for more than two seconds. To compensate for his decreased body awareness he would play rough with objects and others.

Interventions/Outcomes

A sensory integrative approach focuses on improving the ability to organize and process information, which allows for increased independence and participation in routine daily occupations. Sensory integration theory incorporates the dynamic interactions that take place between the abilities and disabilities and how these
individuals interact within their environment (Bundy, 1991). This theory is guided by the following principles as determined by Dr. A. Jean Ayres: 1. Sensory input can elicit an adaptive response, 2. Registration of meaningful sensory input is essential in order to create an adaptive response, 3. Adaptive responses play an important role in the development of sensory integration, 4. Organization of adaptive responses typically results in better overall behavior, 5. More complex behaviors are built upon those behaviors learned in early life, and 6. The more a child’s activities focus on his inner being, the greater the possibility his sensory processing system will become increasingly organized (Parham & Mailloux, 2005).

The types of occupations that can be implemented during therapy sessions for children with sensory integrative dysfunction are endless and can easily be made into a fun activity. Each occupation must be selected with a specific client in mind and be directed to meet the needs of that individual. Interventions must reflect upon the interests of the child as well as choosing an activity that is an appropriate challenge and to not set the child up for failure. The importance of therapy is to provide opportunities to elicit an adaptive response. Ayres suggests implementing treatment that involves a balance among structure and freedom. This implies that professional judgment must be used to determine when it is best to allow the child to make decisions and when to intervene and provide a structured environment. The child must be an active participant in order to mature an inner drive. Collectively, all of these characteristics of intervention must be considered to provide the best environment that fosters growth and allows a child to overcome challenges. A description of the intervention strategies implemented as well as the outcomes are listed below.
Therapy sessions focused primarily on setting up the course of events for the day to allow the client to know and prepare for which activities would be completed on a certain day. To assist with the transition between activities the OTS first lowered to his level to ensure his attention was focused, made eye contact, and verbally told the client the next activity for completion. The OTS held the hand of the client and led him to the next activity. This method became the routine for several therapy sessions. A trial of not having any contact with the client between activities was tried; however, this attempt failed as the client ran to play on the gym set due to the lack of guidance. The next strategy focused on gradually, decreasing the time spent holding his hand and modifying this contact to an occasional light touch on his shoulder. This approach works and allows the client to have a smoother transition between activities.

Other therapeutic activities implemented to improve sensory processing and behaviors involved providing vestibular stimulation and proprioceptive input. The session typically started with an activity that had a calming effect, which allowed the client to focus on a task for a longer period of time. The client attended therapy after preschool let out and his sensory-seeking behaviors are at a high level. The use of the various types of swings such as the platform and net swings were used in a rhythmical, back and forth pattern to provide the needed vestibular stimulation. The client would sit cross-legged on the platform swing while holding on to the ropes for support. Prone lying on the net swing still provided the input in a different position. Other types of activities were completed while on the swing such as those to facilitate trunk control and increase upper body strength. Also, the client would choose to bury himself in the ball
pit to receive sensory input he craved. This also provided him with the same level of stimulation needed for calming and to attend to tasks.

Progress has been noted in his behaviors for he has become accustomed to the structure of the therapy sessions and what is expected from him. He is able to sit at the table to complete an activity for two minutes or longer without being redirected. His mother and teacher have noted an improvement in his behaviors. He has not bitten his brother or anyone in the past four weeks and is able to concentrate in the classroom with his peers for several minutes without becoming distracted.

Therapy interventions were centered on occupations that required the client to manipulate objects by predominantly using his thumb and index finger. Some of the initial activities included picking up coins and placing them in a bank to isolate a fine pincer grasp. The client tended to pick up objects by using an ulnar grasp, so the smaller objects worked best to eliminate this type of grasp. Pinching miniature clothespins onto a tree helped to build the strength and dexterity in his hands and fingers. Stacking one inch blocks and using tweezers to pick up pegs also were activities utilized to enhance fine motor coordination.

In order to address the areas of fine motor coordination in regards to using scissors and cutting, similar activities were used to get the concept of opening and closing. Zach had difficulty positioning the scissors as well as coordinating the movement associated with opening and closing the scissors to cut. In order for the client to understand the open and close process tongs were used to pick up blocks, squish balls, and jacks. The tongs allowed the client to easily bring the ends together to pick up the object. Since the tongs have the automatic release this provides a cue to lessen the grasp
of the fingers in order to allow the tongs to open. Other interventions included the use of scissors to cut a straw. After a piece of the straw is cut it flies in the air. The client was able to pick up on the cause and effect. He enjoyed seeing the pieces fly as a result of his actions. This activity was motivating for him and he wanted to continue. Gradually this skill was transferred to cutting paper.

Therapy sessions focused on occupations to help normalize muscle tone while building endurance for play activities. These occupations focused on muscles that provide gross movements. It is important to improve the strength of these muscles to further achieve fine motor coordination skills. Prone lying on the net swing required the client to use his upper body strength to move his body in order to retrieve objects placed on the mat below. Weight bearing on the hands and forearms provides proprioceptive input and requires cocontraction of the muscles. Also, this occupation facilitates neck extension in order for the client to see which direction he needs to go. Sitting cross-legged on the platform swing while moving activates the trunk muscles to maintain an upright posture. Also occupations on the scooter board while lying prone require the arms to move about while keeping the lower extremity raised off the ground. Stacking play bricks incorporates bilateral hand integration as well as lifting and reaching overhead to improve posture. Using alligator tongs to retrieve balls and place them in the ball pit is a fun way to incorporate bilateral hand use in order to open and close the tongs and builds strength by lifting the tongs in order to access the ball pit. Moving bolsters across the gym requires heavy lifting and pulling.

Progress has been noted in the area of increased core muscle strength as well as upper body strength. This has increased his ability to participate and endure occupations
that require heavy lifting, pushing, and pulling. The client was able to function more independently during treatment sessions and did not require as much assistance or physical prompting to assume correct posture. Although some improvements have been noted, he still continues to experience difficulty maintaining good posture for several minutes and can become fatigued after participating in activities that require a lot of energy.

Occupational Analysis of One therapeutic Occupation

The OTS planned this intervention session by taking into consideration several factors. Most importantly the intervention selected involved activities that addressed the needs of the client. The incorporation of a sensory integrative approach that would facilitate the desired behaviors from the client and also taking into consideration the equipment available as well as the setup of the clinic. After planning the treatment session, the elements of the intervention proceeded as follows. The physical layout of the building and the objects in the environment were taken into consideration when planning the session for the client is easily distracted by auditory and visual stimuli and. To limit the amount of exposure to sound and other attractive objects in the environment, the OTS made certain most toys were put away in the closet, there were not any other clients in the therapy room during this intervention, and the doors were closed to reduce the amount of noise caused by other clients and coworkers in the hallway in addition to the PA system. The platform swing was setup prior to the beginning of the session and the client was given instruction on the day’s events. Upon entering the room, the client and the OTS walked over to the mat area where the client removed his shoes. The client sat cross-legged on the platform swing while hanging on to the supporting ropes. The OTS said
“let’s swing” and pushed the swing to move the swing in a rhythmical back and forth motion. This type of movement increased vestibular stimulation, which improved his ability to process visual and auditory information. After a few seconds the client’s eyes lit up and he presented with a smile on his face. After approximately one minute the OTS stopped the swing in order to elicit eye contact and increase the amount of verbal communication. The client made eye contact with the OTS for approximately five seconds and answered “swing” while pulling the ropes to simulate the movement of the swing after being asked what he wanted to do. The OTS pushed the swing for another minute before the occupation was modified. The vestibular input provided by the slow rhythmic swinging helps to modulate excessive vestibular activity. This sensory input elicited the adaptive response for the client to remain engaged in the occupation and to prepare him for the next occupation.

While the client remained seated on the swing, brightly colored, plastic rings on a holder were introduced to the swinging intervention. The OTS handed an individual plastic ring approximately 6 inches in diameter to the client. The ring was placed overhead and to the sides in order to facilitate use of the trunk muscles to maintain his upright posture while reaching for the ring with the swing still in motion. Also, the occupation required his upper extremity to cross midline. The client had to incorporate bilateral coordination and visual-motor skills in order to place the ring on the target. The continuous vestibular input from the swing elicited the adaptive response of improving his ability to release the plastic ring with increased accuracy, which ultimately can assist in making judgments in regards to his environment. The holder was strategically placed
in various locations to increase the challenge of planning and executing an action. This activity was concluded after the client successfully placed 10 rings onto the holder.

The therapy session was altered into a game “the logs into the woods.” This intervention involved the client moving different-sized and shaped bolsters from the place in the corner of the gym to the open area on the carpet in the middle of the room. There were nine bolsters that were moved a distance of approximately 20 feet. The use of both hands was required in order to pickup each bolster to place it on the carpet. The client picked up three of the bolsters individually, secured each in a vertical direction, and carried the complete distance. The remaining he attempted to carry, however, he dragged across the floor due to the length and weight of the bolsters. This occupation provided deep pressure sensation, which helps organize and reduce a child’s hyperactivity (Ayres, 1972). After all the bolsters were arranged on the floor, the client retrieved a black rubber inner tube which was placed on one side of the room. A container full of bean bags was carried to the opposite side of the room in which the inner tube was laid. The client helped lift the container on one end while the OTS lifted the other side. The heavy lifting activities were selected to increase deep pressure. Verbal instructions were given to pick up a bean bag and crawl over the bolsters that were arranged on the floor in quadruped to place the bean bag into the inner tube. Imaginative play was used by the OTS telling the client to pretend the bean bags were the squirrel’s food and he needed to crawl over the logs to reach the squirrel’s nest. A demonstration of the intended activity was completed with the client the first time. This activity was completed several times. The client required verbal and physical redirection to task several times throughout the activity. Since he was moving fast he wanted to run across the room. The quadruped
position increased proprioceptive input to encourage body awareness, required neck extension, and visual motor coordination. Contraction of the neck muscles and the required movement of the eyes send proprioceptive impulses to the brain (Ayres, 1972). Full body movements build the foundation for hand and finger movements required to use utensils and writing tools. Towards the end of the activity the client became tired; however, he continued to enjoy the intervention for he was laughing throughout and completed the intervention through its entirety. The OTS commended the client on his good work and told him he was strong and his muscles were getting bigger.

Reevaluation

To document progress, the client was reevaluated using the Bruininks-Oseretsky assessment. There was not any discernible differences noted since the initial evaluation. In terms of the goals, the client successfully met three of the six goals created. He was able to pick up objects such as blocks and coins using an isolated pincer grasp over 75% of the time. Also, he remained engaged in therapeutic occupations for at least 2 minutes during treatment sessions without requiring redirection. He was able to maintain the prone extension posture for six seconds. This was an improvement over the initial time of two seconds. He did make improvements in the areas of fine motor coordination. For example, he integrates the use of both hands for cutting occupations; however, he requires physical assistance to position the scissors at the onset of the occupation. This is an improvement when compared to inconsistently being able to open and close the scissors without verbal cuing. His sitting posture has improved, for he uses his arm less frequently to support himself when sitting on the floor to complete an occupation. He can sit unsupported on the floor while using both hands to complete an occupation for
approximately two minutes, which did not meet the goal. The transitions between selected occupations became easier for there was no longer any refusing, however, there was still physical redirection required for over 75% of therapy sessions.

Conclusions

It is hopeful at discharge the client will have progressed to the extent of meeting all or most of the objectives and many of the issues associated with sensory integration dysfunction would have less of a negative affect on the individual’s ability to participate in daily occupations such as play, social interaction, and school tasks. It is hopeful that the client will have become more independent to complete occupations of daily living and explore objects in the environment in a way that is functional and meaningful. It is recommended to reevaluate a client every 6 months or less to determine if the client is making advancements towards the current goals or if new objectives should be created.

Continuation of occupations using a sensory integration approach in the clinic as well as home activities is recommended in order for maintenance and progression. These types of activities will provide the basis needed to process all types of stimuli, which in turn will result in increased muscle strength, body awareness, and gross and fine motor coordination.

Those providing care for the client should understand the complexity of a sensory processing dysfunction and be made aware of the possibility of regression in certain situations such as new experiences, places and situations that involve a high level of visual and auditory stimuli, and other activities that may be challenging for the client to complete successfully. If and when therapy sessions are terminated, it is important for parents and caregivers to feel confident in being able to plan the next step that fits within
their lifestyle and addresses their needs. The occupational therapist can help in making this type of transition by suggesting parenting classes designed for parents of children with sensory processing dysfunction, acclimate the caregivers to the resources available in their community that provide services, suggest support groups, recommend books and other helpful resources is also essential in this process. Most importantly, it is essential that caregivers are aware of the types of interventions that are used throughout therapy sessions so that the developing skills can be maintained in the home setting. Excellent communication between the therapist and the caregivers is crucial to achieve the long lasting effects of a sensory integration approach.

Although progress has been made in the area of increased duration of adaptive responses in engaging in occupations the interventions can be modified to produce more complex responses. Therapy should be continued in order to maintain the responses, build upon responses already established and to achieve new adaptive responses.

The client has made progress in the areas of fine and gross motor coordination. However, this progress has not been significant enough for the client to be comparable to a child of typical development within the same age range. Poor fine motor coordination remains an issue for this client for he has difficulty maintaining an appropriate grasp while using a pencil or other small objects such a small strawberry topper tongs. Gross motor occupations such as “heavy” lifting are extremely fatiguing after several minutes. Occupational therapy is crucial in maintaining the skills and strength, but also to build upon these areas in order to be able to function and utilize appropriate play skills and complete school age tasks.
This case study provides a report of a child with a sensory processing dysfunction that presents deficits in the areas of occupational performance. This report summarizes the findings and effects of implementing a sensory integration approach over a course of several months. Specific interventions have been documented based upon the sensory integration theory, requiring clinical reasoning in order to specifically apply this theory to meet the needs of the client. These principles were used to direct the evaluation process, interventions, and to assess progress made throughout the course of treatment.

This case study supports the principles of the sensory integration theory by providing an example of how various types of interventions can result in improvements in processing sensory input. These specific interventions highlight the fact that developing sensory integration requires efficiency in the processing center in order to build upon the skills necessary in order to successfully learn and interact with the surrounding environment. As Ayres (1979) states “the sensory integration that occurs in moving, talking, and playing is the groundwork for the more complex sensory integration that is necessary for reading, writing, and good behavior” (p. 7). It is amazing to know that all of the sensory information developing children need is found within our own environment. Sensory integrative methods are natural and are found to be the most effective means of treating sensory processing dysfunction in comparison to medications, mental examinations, and a rewards system. It is evident that this client’s behavior and development were impeded by poor sensory processing and the implications of sensory integration theory used throughout therapy are able to provide the level of organization necessary to assist the brain in being able to register and process information in a meaningful and purposeful way.
References


