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A Survey of Illinois Speech-Language Pathologists Regarding Sensorimotor Techniques

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A Survey of Illinois Speech-Language Pathologists

Regarding Sensorimotor Techniques

(TITLE)

BY

Patricia Ann Finley

THESIS

SUBMITTED IN PARTIAL FULFILLMENT OF THE REQUIREMENTS
FOR THE DEGREE OF

Master of Science

IN THE GRADUATE SCHOOL, EASTERN ILLINOIS UNIVERSITY
CHARLESTON, ILLINOIS

2002

YEAR

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A Survey of Illinois Speech-Language Pathologists Regarding Sensorimotor Techniques

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Abstract

Research studies have suggested improvement in communication deficit areas when sensory integrative techniques involving sensorimotor stimulation are implemented to facilitate speech-language therapy objectives. Therefore, a questionnaire was designed by the examiner to identify the extent of awareness, training, incorporation, and co-treatment of sensorimotor techniques of Illinois speech-language pathologists. The subjects were also asked to rate the effectiveness of different sensorimotor techniques and to rate the benefits when incorporating sensorimotor techniques into therapy. Subjects consisted of 232 speech-language pathologists who completed the questionnaire.

Results revealed that speech-language pathologists working in rehabilitation had a higher awareness level about sensorimotor techniques than those working in other settings. Speech-language pathologists working in private practice had a higher level of training in sensorimotor techniques than those in other settings. The highest level of incorporating sensorimotor techniques and co-treating with occupational therapists was also found in the rehabilitation setting.

Results were evaluated to determine if significant differences existed across the different work settings of speech-language pathologists. Significant differences were found between the work setting groups in their awareness of sensorimotor techniques, their training for sensorimotor techniques, the extent to which speech-language pathologists incorporate sensorimotor techniques, and in co-treatment with occupational therapists.

Results were calculated to see if there was a correlation between speech-language

pathologists with training in sensorimotor techniques and incorporation of sensorimotor techniques into therapy. A significant correlation was found between training and incorporation of sensorimotor techniques into therapy.

The respondents were also asked to rate the effectiveness of different types of sensorimotor techniques. Results concluded that visual techniques were less effective than other types of sensorimotor techniques. Oral-motor and multimodality techniques were rated as being the most effective.

Finally, respondents were asked to rate the benefits of sensorimotor techniques. Results indicated that all the developmental areas showed improvement when sensorimotor techniques were incorporated into therapy, with improvement in attention to task having rated as the most benefit of sensorimotor techniques.

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CHAPTER 1

Introduction

During the first year of life, an infant needs an enormous amount of sensory stimulation for development to occur, leading to crawling and walking (Ayres, 1995). By eighteen months, a toddler stops developing new neurons because the brain has an adequate supply. However, new synaptic connections keep multiplying as they are utilized on a daily basis as a child continues to integrate new sensations (Kranowitz, 1998). A child needs play experiences to integrate the sensations stimulated in the body. The process of sensory integration occurs as a child organizes sensations in the brain (Ayres, 1995).

"Sensory integration is the organization of sensation for use" (Ayres, 1995, p.5). The brain organizes all the sensations for people to process (Ayres, 1995). "Numerous bits of sensory information enter the brain at any given moment. The brain must sort, locate, and organize all these sensations to form perceptions and beliefs and to learn" (Richard, 2000, p.97). Everything that is seen, felt, smelled, heard, or touched is processed in the brain and organized in a way to recall information, such as whether a person smelled or tasted a banana. The senses also enable a person to discriminate between objects. If an individual is blind-folded and eats an orange, the taste sensation takes over to let the person know what fruit is being eaten (Myles, Cook, Miller, Rinner, & Robbins, 2000). To discriminate, the brain must first register what is being processed through the senses. "Sensory processing provides the energy and knowledge needed to

direct the body and mind and keep them productive" (Richard, 2000, p.97).

Sometimes deficits occur in the interpretation of sensory stimuli. When there are deficits in the sensory process, the term is called sensory integrative dysfunction. This occurs when there is an irregularity or disorder in brain function that makes it difficult to integrate sensory input (Ayres, 1995). The inefficient neurological processing of information received through the senses can lead to problems with development, learning, and behavior (Kranowitz, 1998). Sensory integrative dysfunction (SI Dysfunction) means that a child is unable to analyze, organize, or connect sensory messages in the brain because there is a "glitch" in the areas of the brain where this occurs (Kranowitz, 1998). This "glitch" or "malfunction" does not allow the brain to process or organize the flow of sensory impulses (Ayres, 1995). The "malfunction" takes place during one of the steps of the sensory process. Ayres (1995) describes this dysfunction as the child having a "full staff" of neurons, but the neurons are not working together.

The cause for sensory dysfunction is not known; however, there are several hypotheses. According to Ayres (1995), some researchers believe that certain children have a hereditary predisposition. Others postulate that the increase in environmental toxins, such as destructive viruses, air contaminants, and other chemicals ingested into the body, may contribute to this type of dysfunction (Ayres, 1995). A final possibility may be a lack of efficient oxygen in newborns at birth (Ayres, 1995). Whatever the cause, sensory integrative dysfunction exists and can affect a child's learning capabilities in addition to contributing to other developmental difficulties.

The remedial approach for sensory integrative dysfunction is called sensory

integrative therapy, designed to stimulate the nervous system and facilitate learning. Sensory integrative therapy involves full body movement which provides vestibular, proprioceptive, and tactile stimulation (Ayres, 1995). Before therapy is introduced, a child is evaluated by an occupational therapist. The occupational therapist is the professional typically in charge of generating a therapy plan. However, an occupational therapist can consult with a classroom teacher, speech-language pathologist, and/or a special education teacher for therapeutic intervention. Children with sensory integrative dysfunction often have other disabilities as well, necessitating professional consultation by the occupational therapist with other professionals involved to provide them with insight and suggestions to facilitate a child's learning.

The effectiveness of sensory integrative therapy is inconclusive in reference to speech–language therapy. According to Mauer (1999), there have been documented studies in which sensory integrative therapy did not target cognitive, language, or academic skills; however, notable improvements were observed in these higher level skills following sensory integrative treatment (Ayres & Mailloux, 1981; Ottenbacher, 1982). Mauer (1999) also stated that "Sensory integrative therapy is intended to result in the normalization of sensory processing, and thus, enhance the development of higher, dependent, cortical functions, such as oral and written language" (Mauer, 1999, p.389). Mauer (1999) concluded that further research needs to be conducted in the area of language learning to identify which disorder areas could benefit from sensory integrative treatment.

CHAPTER 2

Review of Literature

Neurological Development of the Sensory System

As a fetus begins to grow in the womb, the fetal brain begins to develop. The brain senses movements made by the mother's body (Ayres, 1995). Neurons (i.e., the nerve cells which function and structure the nervous system and the fundamental building block of the brain) and synaptic connections (i.e., junction of two neurons where an impulse is transmitted from one neuron to another) begin to multiply rapidly. Once a baby is born, billions of neurons and trillions of synapses are already installed. The sensations of touch, smell, and hunger activate synaptic connections to help an infant survive, e.g., responding to a nipple to suck (Kranowitz, 1998). In order for a baby to respond, a process called myelination occurs. Myelin is a substance that coats the axon areas of neurons to protect, smooth the path, and speed up neural connections (Kranowitz, 1998).

During the first year of life, an infant needs an enormous amount of sensory stimulation for development to occur, leading to crawling and walking (Ayres, 1995). By eighteen months, a toddler stops developing new neurons because the brain has an adequate supply. However, new synaptic connections keep multiplying as they are utilized on a daily basis as a child continues to integrate new sensations (Kranowitz, 1998). A child needs play experiences to integrate the sensations stimulated in the body. The process of sensory integration occurs as a child organizes sensations in the brain (Ayres, 1995).

Sensory Integration

Sensation allows individuals to see, hear, feel, smell, and taste in the environment (Myles et al. 2000). The act of feeling something soft or smelling something cooking on the stove utilizes the senses. Two other senses that are not typically addressed include the vestibular and proprioceptive systems. The vestibular system provides information about where an individual's body is in space and keeps the body in balance (Myles et al. 2000). Proprioceptive information enables the brain to know where a certain body part is and how it moves (Ayres, 1995).

"Sensory integration is the organization of sensation for use" (Ayres, 1995, p.5). The brain organizes all the sensations for people to process (Ayres, 1995). "Numerous bits of sensory information enter the brain at any given moment. The brain must sort, locate, and organize all these sensations to form perceptions and beliefs and to learn" (Richard, 2000, p.97). Everything that is seen, felt, smelled, heard, or touched is processed in the brain and organized in a way to recall information, such as to whether a person smelled or tasted a banana. The senses also enable a person to discriminate between objects. If an individual is blind-folded and eats an orange, the taste sensation takes over to let the person know what fruit is being eaten (Myles et al. 2000). To discriminate, the brain must first register what is being processed through the senses. "Sensory processing provides the energy and knowledge needed to direct the body and mind and keep them productive" (Richard, 2000, p.97).

In order to understand sensory integration and possible deficits, one must first comprehend the process used to integrate information. The brain goes through a

sequential series of steps to process stimuli. The first step is an awareness of the stimuli or the registration step. The awareness level is the point at which the individual "knows" that he has been touched, for example. The threshold has to be reached before the central nervous system can consider the other steps (Myles et al. 2000). "With a low threshold, the nervous system responds frequently to stimuli because it does not take very much input to reach the threshold and activate the system. With high thresholds, the nervous system does not respond to stimuli because it takes a lot of input to reach a threshold ..." (Dunn, 1999, p.32). People can have low or high thresholds depending on which particular sense is being innervated at the time. For example, some individuals may have low thresholds for certain smells but high thresholds for particular tastes. This may also be associated with an individual being hyper/hypo responsive to certain sensory sensations. Hypersensitive means that the threshold is low and the system may overreact to a stimulus. Hyposensitive refers to the threshold being high or underreactive to the stimulus (Myles et al. 2000).

The second step in processing information is orientation. This is when a focus is placed on the input and attention given to the stimuli. The brain decides which stimuli to pay attention to and which to ignore (Myles et al. 2000).

The third step, interpretation, is when the person relates past experiences to the present stimuli (Myles et at. 2000). These experiences can be emotions or memories. One important part of integration is the "fright, flight, fight" reactions that can occur as a protective mechanism (Myles et al. 2000). These are extreme behavioral responses to unexpected or light touch (level of threshold), unstable surfaces (vestibular), loud noises

(threshold), visual distractions (orientation), or certain tastes, textures, and smells (thresholds) (Williams and Shellenberger, 1996).

The fourth step is organization. The brain determines if a response to stimuli is necessary and what type of response should occur (Myles et al. 2000). The final step is execution of a response. This part of the process includes emotion and the display of an action or response. The response could be a physical response or a conscious choice not to respond (Myles et al 2000). The sensory integration process occurs in less than a second, beginning with the registration step and ending with the execution of a response (Myles et al. 2000).

During embryological development of a human fetus, the brain and central nervous system evolve to organize sensory information (Myles et al. 2000). However, in some people, the nervous system does not develop appropriately, resulting in sensory deficits. For young children with sensory deficits, learning becomes a challenge. Sensory deficits can cause intellectually normal children to experience difficulty learning. It can also contribute to behavioral problems in the school environment (Ayres,1995). Since the brain-behavior connection is so important, a child with sensory deficits has a disorganized brain, resulting in disorganized behavior. If general development is disorganized, it becomes difficult to recall or learn from experiences. The aberrant behaviors are caused by faulty organization of the brain, not a deliberate choice to misbehave (Kranowitz, 1998).

Sensory Integrative Dysfunction

Deficits in interpreting sensory stimuli are referred to as sensory integrative

dysfunction. This occurs when there is an irregularity or disorder in brain function that makes it difficult to integrate sensory input (Ayres, 1995). The inefficient neurological processing of information received through the senses can lead to problems with development, learning, and behavior (Kranowitz, 1998). Sensory integrative dysfunction (SI Dysfunction) means that a child is unable to analyze, organize, or connect sensory messages in the brain because there is a "glitch" in the areas of the brain where this occurs (Kranowitz, 1998). This "glitch" or "malfunction" does not allow the brain to process or organize the flow of sensory impulses (Ayres, 1995). The "malfunction" takes place during one of the steps of the sensory process. Ayres (1995) describes this dysfunction as the child having a "full staff" of neurons, but the neurons are not working together.

The cause for sensory dysfunction is not known; however, there are several hypotheses. According to Ayres (1995), some researchers believe that certain children have a hereditary predisposition. Others postulate that the increase in environmental toxins, such as destructive viruses, air contaminants, and other chemicals ingested into the body, may contribute to this type of dysfunction (Ayres, 1995). A final possibility may be a lack of efficient oxygen in newborns at birth, i.e., the occurrence of oxygen deprivation at birth could cause the dysfunction (Ayres, 1995). Whatever the cause, sensory integrative dysfunction exists and can affect a child's learning capabilities in addition to contributing to other developmental difficulties.

Children who are cognitively normal frequently experience problems learning (Kranowitz, 1998). They can also have difficulty controlling their behavior or understanding the disciplinary actions introduced to manage inappropriate behaviors. A

child with sensory integrative dysfunction may not be able to understand the consequences of an action taken. In addition, children with sensory integrative dysfunction can evidence poor coordination, emotionality, and/or withdrawal. Social deficits result in difficulty making friends or knowing how to engage in reciprocal play (Kranowitz, 1998). Parents, doctors, and educators might not recognize sensory integrative dysfunction in children and blame problems on behavior, reluctance to participate, or low self-esteem instead of a poorly functioning nervous system (Kranowitz, 1998).

Parents do not always realize that a child's behavior or learning problems could be the result of a neurological disorder that is not under voluntary control of the child (Ayres, 1995). They may believe that a child is intentionally trying to misbehave through actions, such as acting out in class and not wanting to work (Ayres, 1995). In reality, the child could be experiencing legitimate neurological challenges to their learning.

Sensory Integration's Impact on Learning

It was once believed that learning and movement were totally different entities. However, with new technology, neuroscientists are discovering how closely related they are (Jensen, 1998). For example, during Positron Emission Tomography (PET), doctors are able to view a patient's brain activity in the temporal, parietal, and part of the occipital lobes during a reading activity (Jensen, 1998). This suggests overlap in functions of brain lobes. If this is the case, one can better understand the possibility of a child experiencing difficulty learning if a "glitch" exists in part of the brain. Since lobe functions are closely related, a reading problem could actually result from a problem in several different areas of the brain.

The brain also requires energy to learn. The primary energy source is blood, which provides nutrients like protein, trace elements, glucose, and oxygen (Jensen, 1998). Oxygen is most critical to the brain and needed for basic functioning. Without oxygen, an individual would lose consciousness in seconds (Jensen, 1998). When movement is involved, more oxygen flows to the brain, enabling it to be more alert and function better.

How important is movement to learning? A neurophysiologist, Carla Hannaford (1995), explains that the vestibular and cerebellar systems (motor activity) are the first sensory systems to mature. In the cerebellar system, the vestibular nuclei and the semicircular canals of the inner ear gather information and feedback for movement. Those messages travel through the nerve tracts back and forth from the cerebellum to the rest of the brain, which includes the sensory cortex and visual system. These systems also activate the reticular activating system (RAS) located near the top of the brain stem. The RAS is important since it regulates incoming sensory data. This interaction helps turn thinking into actions, coordinate movement, and maintain balance (Hannaford, 1995). Movement keeps the brain system activated for learning to occur by providing oxygen flow to facilitate cortical alertness and focus. If a child has difficulty with sensory integration and does not have movement to stimulate the brain, then the individual may need a program in which to help maintain oxygen flow to the brain and establish alertness for incoming stimuli.

The remedial approach for sensory integrative dysfunction is called sensory integrative therapy, designed to stimulate the nervous system and facilitate learning. Sensory integrative therapy involves stimulating and adapting responses according to a

child's neurological needs. It usually involves full body movement which provides vestibular, proprioceptive, and tactile stimulation (Ayres, 1995). Before therapy is introduced, a child is evaluated by an occupational therapist. The occupational therapist is the professional typically in charge of generating a therapy plan. However, an occupational therapist can consult with a classroom teacher, speech-language pathologist, and/or a special education teacher for therapeutic intervention. Children with sensory integrative dysfunction often have other disabilities as well, necessitating professional consultation by the occupational therapist with other professionals involved to provide them with insight and suggestions to facilitate a child's learning.

Research Findings

Several studies have been completed to evaluate the efficacy of sensory integrative therapy. Ottenbacher (1982) reviewed eight studies to assess the literature on the effectiveness of sensory integration therapy. Each study was conducted using two groups. One group received sensory integrative therapy while the other group received no services. Subjects were diagnosed with mental retardation, a learning disability, aphasia, or "at risk" for learning disability. A variety of measures were used to evaluate academic achievement, improvement in motor and/or reflex integration, and improvement in language function. Results revealed that the subjects who participated in the sensory integration therapy performed significantly better on measures of overall development, gross motor ability, and language development than members in the control group who did not receive sensory integrative therapy (Ottenbacher, 1982).

Sensory integrative therapy has also been noted to be effective with preschool age

children. Younger children respond well to early intervention because their central nervous systems are still flexible, or "plastic." (Kranowitz, 1998). Neuroplasticity means that the child's brain functioning is not fixed; it can be changed (Kranowitz, 1998). Since it can be changed, sensory input can facilitate development in a positive way (Richard, 2000).

In early intervention, play is an essential component of the developmental process (Sparling, Walker, & Singdahlsen, 1984). A pilot project was conducted using play techniques which focused on sensorimotor activities using fourteen subjects who were neurologically impaired with physical handicaps at the United Cerebral Palsy Developmental Center in North Carolina. The mean chronological age was 4.5 years. Eight children were severely impaired and six were moderately impaired with mental ages ranging from trainably mentally retarded to average intellectual ability as determined by the Columbia Test of Mental Maturity (Burgemeister, Blum, & Lorge, 1954) and the Pictorial Test of Intelligence (French, 1964). All the children participated as one group; there was not a control group for this project. A total of eighteen adult participants were involved, including nonworking parents, staff members, teachers, and therapists who participated in sessions with the children. The children were evaluated using the Vulpe Assessment Battery (Vulpe, 1977) for pre- and post testing. The instrument was given by the physical therapist, special educator, and communication specialist, all whom were trained to administer the test. The program for the children consisted of using sensorimotor, symbolic, and sociodramatic play activities to address the following areas of development: gross motor, fine motor, language, cognition, activities of daily living, and

social-emotional. Educational drama was included to address duality inherent in pretend or symbolic play. Educational art was included as a sensorimotor process by making paintings using the children's feet or hands, wood, string, etc. The initial activities for each day included sensorimotor activities, utilizing oral, visual, and manual sensory stimulation. The results concluded a significant difference in pre- and post test scores using the Vulpe Assessment Battery. Twelve of the fourteen children demonstrated improved performance in all areas of development, with the greatest gains noted in language and social-emotional development (Sparling, Walker, & Singdahlsen, 1984).

In a study conducted by Cross and Coster (1997), symbolic play was the focus. During symbolic play, children develop competencies by practicing their skills in a safe environment; they generate coping strategies to deal with real-life encounters; their egos are reinforced in the sense that imaginative play allows for the expression and integration of opposing realities by providing an alternative route for expressing needs and emotions (Cotton, 1984). During this study, symbolic play language was used during sensory integration treatment with young children between the ages 4 years, 0 months, and 9 years, 9 months with sensorimotor difficulties, as evaluated using the Southern California Sensory Integration Tests (SCSIT) (Ayres, 1972), the Sensory Integration and Praxis Tests (SIPT) (Ayres, 1989), or the Miller Assessment for Preschooler (MAP) (Miller, 1988). The purpose of this study was to investigate the rate of occurrence of play behavior as it was used by the child and the therapist during sensory integration therapy. The study also investigated the association among frequency of symbolic play language, features of the therapeutic interaction, the management of challenge, and the child's age.

Videotaped sessions were reviewed to analyze therapist-child interactions on the basis of the presence or absence of several actions: manipulation of the environment, decision making, symbolic play language, use of directives, help seeking, positive feedback, requests for clarification, and reactions using the Challenge Coding System (CCS) (Coster, Tickle-Degnen, & Armenta, 1995). Results of the study suggested that the use of symbolic play language may frequently support children in sensory integrative therapy in order to successfully accomplish activities. The study showed that symbolic play language was a major trait of one form of occupational therapy-sensory integration treatment with young children (Cross & Coster, 1997).

Another study involved children between the ages 4 years, 0 months and 5 years, 3 months, both male and female, with aphasia. Three out of the four received either individual speech therapy, special education specific to aphasia, or both, before being enrolled in occupational therapy. One child started individual speech therapy and special education services pertaining to aphasia after occupational therapy had started. Each child was administered the Southern California Sensory Integration Tests (SCSIT) (Ayres, 1972) and the Southern California Postrotary Nystagmus Test (SCPNT) (Ayres, 1975) to determine their sensory integrative characteristics. A variety of instruments were used to assess language comprehension. Further baseline data on receptive language was obtained by administration of the Test for Auditory Comprehension of Language (Carrow, 1973) once there was a referral for occupational therapy. One child was able to complete the Weiss Comprehensive Articulation Test (Weiss, 1978) to assess articulation skills. The children received speech therapy, special education services, and occupational therapy

which focused on active participation by eliciting adaptive responses and using activities providing controlled vestibular and somatosensory input. Results using the Test for Auditory Comprehension of Language both at baseline and periodic testing throughout the year of therapy, showed that the children demonstrated an increase in the rate of language comprehension once sensory integrative therapy was initiated (Ayres & Mailloux, 1981).

Another group of children that appear to benefit positively from sensory integrative therapy are those within the autistic spectrum. A study by Case-Smith and Bryan (1999) investigated the use of sensory integration with five preschool-aged boys with autism. No control group was used in this study. The occupational therapist provided one-on-one sessions for 10 weeks for approximately 30 minutes per session with each child in a room adjacent to the classroom and consulted with the teachers. Consultation included recommending sensorimotor activities for the children, offering specific therapeutic sensory input throughout the child's play time, and encouraging teachers to use equipment available in the classroom for vestibular, tactile, and proprioceptive stimulation for the children. The recommendations were routinely implemented by the preschool teachers. A baseline was taken during the third week of the preschool program following winter break. Occupational therapy began after the third week. Baseline measures were taken again during the 8th week of intervention. Videotapes were analyzed using the Engagement Check (Parsons, McWilliam, & Buysee, 1989) which measures both spontaneous and responsive behaviors in the preschool environment. Results supported the evidence suggesting positive behavioral changes in children with autism when involved in intervention incorporating a sensory integrative

approach (Case-Smith & Bryan, 1999).

Ayres and Tickle (1980) conducted a study which included children with autism who were either hyper-responsive or hypo-responsive to touch. The children ranged from ages 3 ½ to 13 years. Each child received sensory integrative therapy that provided somatosensory and vestibular stimulation and elicited adaptive responses to these stimuli twice a week for a year. A test which measured hypo-, hyper-, or normal reactions to sensory input was administered to each child. Most test procedures were administered on two separate occasions by the same evaluator to enhance the accuracy of the observations. Results suggested that the therapeutic procedures applied were more effective for the children who displayed a hyper-reactive response than the ones displaying a hypo-reactive response. This difference may be "interpreted to mean that therapy as provided was more effective in modulating sensory input than in helping the brain to register or orient to it" (Ayres & Tickle, 1980, p.381).

Another controlled research study (Patterson, 1998) was completed using two subjects with autism during speech-language therapy. Two school-aged boys were given squeeze balls during a receptive/expressive language comprehension activity. The squeeze balls were given either at the beginning of the session or during the midpoint of the activity. Frequency of task-related behaviors were recorded, as judged by the number of off-task behaviors and extraneous physical behaviors when the tactile stimulation was provided or not present The frequency of appropriate and inappropriate utilization of tactile stimulation was also recorded. Results showed a significant difference in the boys' off-task behavior when squeeze balls were not provided during therapy activities

(Patterson, 1998).

An additional group of children who have been reported to benefit from sensory integrative therapy are children with articulation disorders. "Articulation of words requires all three of the basic sensory systems" (Ayres, 1995, p.64). Many children with sensory integrative dysfunction cannot feel exactly where their tongues are and/or how their lips are touching; therefore, their words may be hard to understand (Ayres, 1995). For example, the child may say "tool" for "school" because he has difficulty positioning the muscles necessary for correct articulation (Kranowitz, 1998). Strengthening and stimulating the muscles during speech-language therapy is termed oral motor therapy. The orofacial sensory perceptions (i.e., tactile sensitivity and proprioception) provide feedback to the oral-sensory system to refine and coordinate movement. The goal in therapy is for a client to produce purposeful, meaningful, and functional speech movements. Touch supplies the basic sensations needed to stimulate the movements that are the foundation for functional oral motor development (Boshart, 1995).

A study conducted by Creed and Spiegel (1998) involved 133 subjects. All individuals included evidenced some type of articulation disorder, such as apraxia, weakness in coordination of oral motor function, or poor stimulability for production of the following phonemes /p,b,f,v,w,wh,l,r/. Out of 133 subjects, only 47 were available for evaluation. Facial Flex appliances were utilized for mechanical assistance to provide dynamic resistance to the circumoral muscles to help strengthen the muscles in order to assist in daily treatment during this oral motor treatment program. All children improved in oral motor strength, and eight children demonstrated a significant improvement in

articulation following the eight week study (Creed & Spiegel, 1998).

Anecdotal examples have also been reported. Richard (2000) reported on a child with oral apraxia. Consultation with an occupational therapist resulted in incorporating sensory integrative techniques into therapy. Over time, the child was able to produce meaningful verbal expression.

The methodology of sensory integrative therapy is inconclusive in relation to speech-language therapy, however, the proposed Scope of Practice includes providing "sensory awareness related to communication, swallowing, or other upper aerodigestive functions" (ASHA, 2001, I-28). According to Mauer (1999), there have been documented studies in which sensory integrative therapy did not target cognitive, language, or academic skills; however, notable improvements were observed in these higher level skills following sensory integrative treatment (Ayres & Mailloux, 1981; Ottenbacher, 1982). Mauer (1999) also stated that "Sensory integrative therapy is intended to result in the normalization of sensory processing, and thus, enhance the development of higher, dependent, cortical functions, such as oral and written language" (Mauer, 1999, p.389). Mauer (1999) concluded that further research needs to be conducted in the area of language learning to identify which disorder areas could benefit from sensory integrative treatment.

Griffer (1999) believed that other factors needed to be considered when determining the efficacy of sensory integrative treatment. For example, speech-language pathologists need to consider the measures used to assess language functioning when evaluating the sensory integrative efficacy studies. Most studies assess language in

isolated, unnatural contexts. The measures should be chosen to be ecologically sensitive and assess language learning in naturalistic and functional contexts in order to better evaluate sensory integrative efficacy. The definition of a language disorder must also be explained. In studies reviewed, it was difficult for researchers to determine exactly what constituted a language disorder when investigating the effectiveness of sensory integrative treatment. Some studies led readers to guess at the exact nature of subjects' language weaknesses and strengths. The language abilities need to be better explained in studies (Griffer, 1999). "Based on this review, it can be concluded that the empirical research supporting the effectiveness of sensory integrative therapy with children who have language-learning disorders is not only limited, but inconclusive at best" (Griffer, 1999, p.397). According to Damico (1988), since speech-language pathology is a scientifically based discipline, clinicians are accountable for the effectiveness of their intervention programs. Therefore, more statistically powerful and methodologically sound empirical studies and outcomes are needed before a clinician can endorse such an intervention approach (Griffer, 1999).

Research has suggested that sensory integrative therapy is effective with a variety of disorders (Ayres & Mailloux, 1981; Ayres & Tickle, 1980; Case-Smith & Bryan, 1999; Creed & Spiegel, 1998; Cross & Coster, 1997; Ottenbacher, 1982; Patterson, 1998; Richard, 2000). However, critics of the treatment also exist (Griffer, 1999; Mauer, 1999). Most reports are anecdotal (Richard, 2000) but suggest positive benefits.

To further investigate the role of sensory integrative therapy within speech-language pathology, the following questions will be addressed:

1.) To what extent are speech-language pathologists aware of advantages in using sensorimotor therapy techniques?

2.) To what extent do speech-language pathologists have training in sensorimotor therapy techniques?

3.) To what extent do speech-language pathologists incorporate sensorimotor techniques into their speech-language therapy services?

4.) To what extent do speech-language pathologists co-treat or consult with occupational therapists when incorporating sensorimotor techniques into treatment?

5.) What is the difference between the work settings of speech-language pathologists in regard to the extent to which they are aware, have training, incorporate, and co-treat with occupational therapists?

6.) What is the correlation between speech-language pathologists who have training in sensorimotor techniques and the incorporation of sensorimotor techniques in treatment?

CHAPTER 3

Methods

Instrument

A 28-item questionnaire was designed, including a Likert-type rating scale to evaluate the effectiveness of sensorimotor treatment in therapy. The questionnaire was printed on an ob-scan form to be completed by participating speech-language pathologists. Questions addressed knowledge regarding advantages of sensorimotor techniques, and the techniques were rated according to the scale provided, 1 being great advantage and 5 being great disadvantage. General background questions pertaining to whether or not the respondent incorporated sensorimotor techniques into therapy services, whether or not training for such techniques was provided, and whether or not the respondent co-treats or consults with occupational therapists when utilizing sensorimotor techniques into treatment were included. The survey could be completed in approximately 5-10 minutes. A copy of the survey is attached (Appendix A).

Procedures

The examiner mailed 500 questionnaires to randomly selected Illinois Speech-Language-Hearing Association (ISHA) members. The names and addresses used for the mailing process were acquired from the organization (ISHA). A systematic sampling method was used to obtain a random sample. The first step attempted to eliminate speech-language pathologists who did not work with children using the ISHA Directory. Then, every third name was selected to participate in the study until 500 individuals had

been chosen. Questionnaires were sent with a cover letter (Appendix B) explaining the objective of the survey (Appendix A) and a postage-paid return envelope. Three of the surveys were returned "address unknown". Respondents were given four weeks from the day questionnaires were mailed to return the surveys.

Subjects

Questionnaires were mailed to 500 randomly selected members of the Illinois Speech-Language-Hearing Association. Attempts were made to identify speech-language pathologists who worked with infants, preschool, and elementary school aged children for participation in the study. Of the 500 surveys mailed, 232 were returned for an overall return rate of 46%. Fifteen surveys were unable to be used due to a notation citing work only with adults or non-completion of the survey. There were four additional surveys eliminated because they were returned after survey analyses had been completed.

Respondents were asked to state their work setting, level of educational training, and years of experience in the field. Tables 1-3 summarize respondents' demographic characteristics as indicated on the returned questionnaires.

Table 1 Demographic Characteristics of Work Setting

Work Setting	Number	Percentage
1. School	134	62.2
2. Hospital	12	5.6
3. Private Practice	29	13.6
4. Rehabilitation	8	3.7
5. Other	16	7.5
6. Combination of settings	15	7.0

Speech-language pathologists working in the school setting were among the highest to respond to the survey with a percentage rate of 62.2%. The second highest, with a percentage of 13.6%, were speech-language pathologists in private practice. The third setting was the "other" category at 7.5%. The fourth was a combination of settings in which speech-language pathologists work, at 7.0%. The fifth work setting was the hospital setting at 5.6%. The lowest percentage to respond were speech-language pathologists working in a rehabilitation setting, with 3.7%.

Table 2 Demographics on Years of Education

Years of Education	Number	Percentage
1.B.S.	4	1.9
2.M.S./M.A.	89	41.6
3.M.S./M.A.$^+$	113	52.8
4.Ph.D	6	2.8

The majority of speech-language pathologists who responded to the survey held a M.S./M.A.$^+$ degree with 52.8%. Speech-language pathologists with an M.S/M.A. responded with 41.6%, and those with a Ph.D. at 2.8%. Only 1.9% of the speech-language pathologists held a B.S. degree. Two of the respondents did not complete this question.

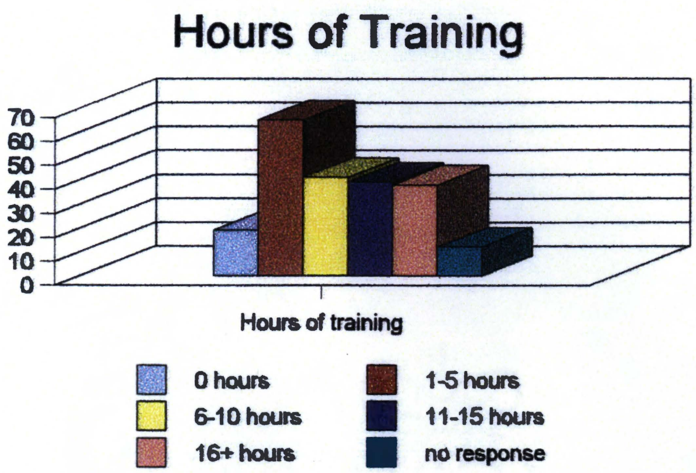
Table 3 Demographics on Years of Professional Experience

Years of Professional Experience	Number	Percentage
1. 1-5 years	32	15
2. 6-10 years	36	16.8
3. 11-15 years	26	12.1
4. 16^{+} years	118	55.1

The majority of the speech-language pathologists who responded to the survey had 16^{+} years of experience in the field, with a percentage of 55.1%. Those with 6-10 years of experience were 16.8%. Fifteen percent had 1-5 years of experience, and 12.1% had 11-15 years of experience. Two of the respondents did not complete this question.

Figure 1 identifies how much training in sensorimotor techniques the respondents had received. Respondents could respond from 0 hours of training to 16^{+} hours of training in sensorimotor techniques.

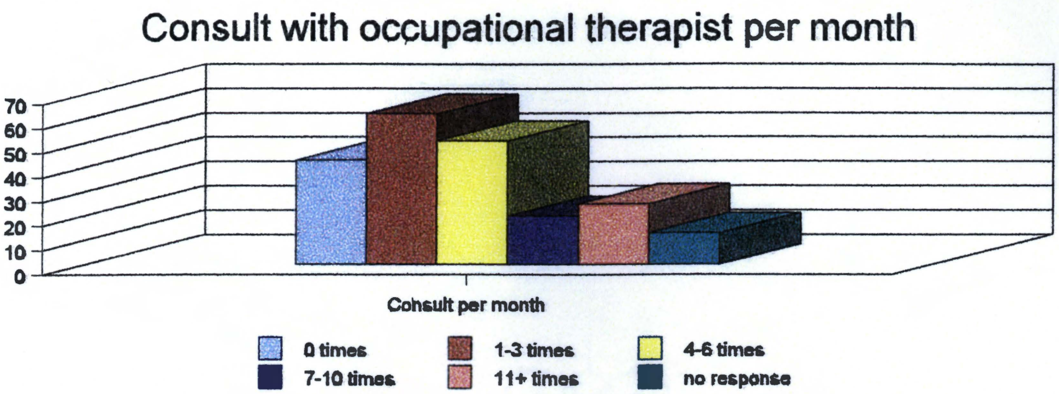
Figure 1 Hours of training in sensorimotor techniques



The majority of speech-language pathologists (N= 65) who responded reported that the number of hours of training in sensorimotor techniques was between 1-5 hours. Forty one speech-language pathologists stated that they had received between 6-10 hours of training, and 39 reported 11-15 hours of training. There were thirty eight who responded with 16^{+} hours of training in sensorimotor techniques. Nineteen reported no training, and twelve did not respond to this question.

Speech-language pathologists were also asked to estimate how many times per month they co-treat or consult with occupational therapists. Figure 2 identifies how many times per month consultation occurred with occupational therapists.

Figure 2 Consult with occupational therapist per month



The majority of speech-language pathologists (29.0%) reported that they consult with occupational therapists between 1-3 times per month. Those who consult 4-6 times per month consisted of 23.8% of the speech-language pathologists. Several (20.1%) responded as not consulting at all with occupational therapists, and 6.1% did not respond to the question. There were a few who responded as consulting 7-10 times per month (9.3%) and 11^{+} times per month (11.7%). Some speech-language pathologists reported that there was not an occupational therapist in their district, therefore, consultation did not take place.

Statistical Design

The dependent variables of the study were the respondents' answers to the survey questions. To analyze the data from the survey, mean, standard deviations, and percentages of responses were calculated for each question on a Likert scale. A one-way ANOVA was calculated to determine if there were any differences between work setting and the awareness, training, incorporating, and co-treating with occupational therapists.

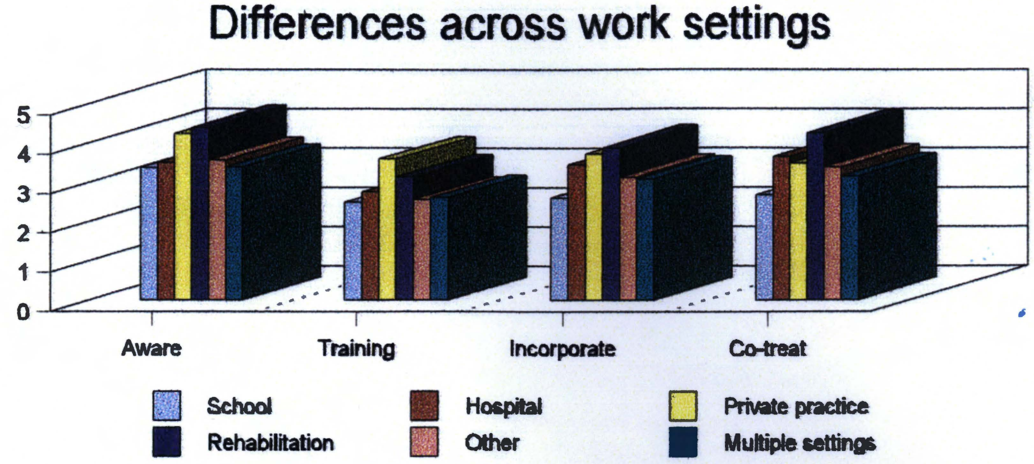
Spearman correlations were calculated to determine any existing association between participants use of sensorimotor techniques and training in sensorimotor techniques.

CHAPTER 4

Results

Analysis of the data was completed using the SPSS program. The first four research questions were assessed by calculating means across different work settings identifying the level of 1.) awareness of sensorimotor techniques, 2.) training in sensorimotor techniques, 3.) incorporation of sensorimotor techniques into speech-language therapy, and 4.) co-treat or consultation with occupational therapists. Respondents were asked to answer to what extent they were aware of sensorimotor techniques, extent of training in sensorimotor techniques, extent of incorporating sensorimotor techniques in therapy, and extent of co-treating or consulting with occupational therapists using the following rating scale: 1= not at all, 2= minimally, 3= somewhat, 4= moderately, 5= extremely/extensively. Figure 3 summarizes results to these questions.

Figure 3 Extent of awareness, training, incorporation, and co-treat



The mean level of awareness was 3.7 across all groups, however, rehabilitation had the highest mean of 4.38, indicating that in the rehabilitation setting, speech-language pathologists were moderately to extremely aware of sensorimotor techniques. The lowest mean was in the school setting, with a mean of 3.37 suggesting that speech-language pathologists in the schools were somewhat to moderately aware of sensorimotor techniques.

The level to which speech-language pathologists had training resulted in a mean of 2.7 across all speech-language pathologists. However within various work settings, speech-language pathologists in private practice had a mean of 3.59, indicating a somewhat to moderate level of training in sensorimotor techniques. The lowest mean was 2.49 in the school setting, suggesting that speech-language pathologists in the schools have been minimally trained in sensorimotor techniques.

The rehabilitation setting demonstrated the highest level of incorporating

therapists somewhat. The highest level for co-treating was in the rehabilitation setting, with a mean of 4.25 indicating a moderate level of co-treating with occupational therapists. The lowest level for co-treating was in the school setting with a mean of 2.67, suggesting that speech-language pathologists in the schools minimally co-treat with occupational therapists.

A one-way ANOVA was calculated to determine if there were significant differences between the work setting groups in their awareness, training, incorporation, and co-treating with occupational therapists. Table 4 summarizes results of the one-way ANOVA.

Table 4 Differences across work settings

		Aware	Training	Incorporate	Co-treat
School (1)					
	Mean	3.37* [1+3, 1+4]	2.49*	2.62* [1+3, 1+4]	2.67* [1+3, 1+4]
	N	134	134	133	134
	StdDev	.99	1.01	1.00	1.36
Hospital (2)					
	Mean	3.50	2.75	3.45	3.64
	N	12	12	11	11
	StdDev	1.09	.87	1.21	1.43
Private Practice (3)					
	Mean	4.24*	3.59* [3+1, 3+5, 3+6]	3.72*	3.48*
	N	29	29	29	29
	StdDev	.79	.91	.96	1.27
Rehabilitation (4)					
	Mean	4.38*	3.13	3.88*	4.25*
	N	8	8	8	8
	StdDev	.74	.99	.99	.89
Other (5)					
	Mean	3.56	2.56*	3.13	3.38
	N	16	16	16	16
	StdDev	1.09	1.03	1.20	1.67
Multiple settings (6)					
	Mean	3.38	2.62*	3.08	3.15
	N	13	13	13	13
	StdDev	1.19	1.26	1.19	1.34
p value		<.001	<.001	<.001	=.001

* + numbers indicates groups that were significantly different.

A one-way ANOVA indicated there was a significant difference between the work setting groups in their awareness of sensorimotor techniques $F(5, 206) = 5.04$; $p < .001$. A Tukey post hoc analysis indicated that speech-language pathologists who worked in the school setting felt less aware of sensorimotor techniques ($M = 3.37$) than speech-language pathologists who worked in private practice ($M = 4.24$; $p < .001$) and speech-language pathologists who worked in the rehabilitation setting ($M = 4.38$; $p < .001$).

There was a significant difference between work setting groups in their training for

sensorimotor techniques $F(5, 206) = 6.08$; $p < .001$. A Tukey post hoc analysis suggested that speech-language pathologists who worked in the school setting ($M = 2.49$), other setting ($M = 2.56$), and combination of settings ($M = 2.62$) received less training in sensorimotor techniques than speech-language pathologists who worked in private practice ($M = 3.59$; $p < .001$).

There was also a significant difference between work setting groups and the extent to which speech-language pathologists incorporated sensorimotor techniques $F(5, 204) = 7.85$; $p < .001$. A Tukey post hoc analysis indicated that speech-language pathologists who worked in the school setting ($M = 2.62$) incorporated sensorimotor techniques less than speech-language pathologists who worked in private practice ($M = 3.72$; $p < .001$) and speech-language pathologists who worked in the rehabilitation setting ($M = 3.88$; $p < .001$).

The last one-way ANOVA indicated that there was a significant difference between the work setting groups in co-treating with occupational therapists $F(5, 205) = 4.38$; $p = .001$. A Tukey post hoc analysis suggested that speech-language pathologists who worked in the school setting ($M = 2.67$) co-treat less with occupational therapists than speech-language pathologists who worked in private practice ($M = 3.48$; $p = .001$) and speech-language pathologists who worked in the rehabilitation setting ($M = 4.25$; $p = .001$).

A Spearman correlation was calculated to determine if there was a correlation between speech-language pathologists with training in sensorimotor techniques and incorporation of sensorimotor techniques into therapy. Table 5 illustrates the results.

Table 5 Correlation between training and incorporation of sensorimotor techniques

	Incorporate	Training
Incorporate		
Correlation Coefficient	1.000	.743*
Sig. (2-tailed)	.	.000
N	214	212
Training		
Correlation Coefficient	.743*	1.000
Sig. (2-tailed)	.000	.
N	212	212

Results indicated that there was a significant correlation ($r = .74$) between training and incorporation of sensorimotor techniques into therapy. This suggests that if speech-language pathologists have training in sensorimotor techniques, then they incorporate sensorimotor techniques into therapy.

Respondents were also asked to rate each type of sensorimotor technique (tactile, vestibular, sensorimotor play, visual, auditory, multimodality, and oral-motor) as being effective according to the following scale: 1= not effective, 2= minimally effective, 3= somewhat effective, 4= moderately effective, 5= significantly effective. Mean, standard deviations, and percentages were calculated along with a one-way ANOVA to see if there was a difference between the effectiveness of the different types of sensorimotor techniques. A Tukey post hoc was calculated to determine where the difference was

between the different sensorimotor techniques. The survey asked respondents to leave the question blank if they did not know, consequently, not all respondents responded to rating the effectiveness of the sensorimotor techniques. Table 6 displays the results of the calculations.

Table 6 Effectiveness of sensorimotor techniques

Sensorimotor Technique	Mean Effectiveness	% not effective	% minimally effective	% somewhat effective	% moderately effective	% significantly effective
Tactile (1)		.9	7.0	25.7	29.4	26.6
Mean	3.82					
N	192					
StdDev	.98					
Vestibular (2)		1.9	2.8	24.3	31.8	22.4
Mean	3.84					
N	178					
StdDev	.94					
Sensorimotor play (3)		1.4	1.9	28.0	28.0	18.7
Mean	3.78					
N	167					
StdDev	.90					
Visual (4)		4.2	16.8	26.2	14.0	7.9
Mean	3.07*$^{4+1, 4+2, 4+3, 4+5, 4+6, 5+7}$					
N	148					
StdDev	1.07					
Auditory (5)		.9	6.1	26.6	32.2	18.2
Mean	3.72*$^{5+6, 5+7}$					
N	180					
StdDev	.92					
Multimodality (6)		.5	2.8	15.9	25.2	33.2
Mean	4.13					
N	166					
StdDev	.90					
Oral-motor (7)		.5	4.7	17.8	31.3	36.4
Mean	4.09					
N	194					
StdDev	.92					

p value= <.001
* + numbers indicates groups that were significantly different.

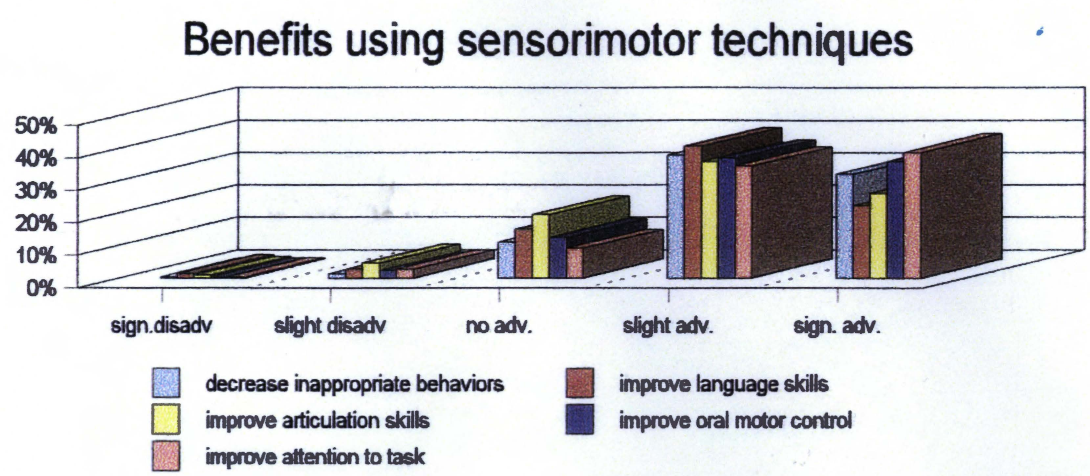
Results indicated that speech-language pathologists (36.4%) rated oral motor techniques as significantly effective with a mean of 4.09. They also rated the multimodality technique high, with 33.2% reporting that the multimodality technique was significantly effective with a mean of 4.13. Only .5% rated oral motor and multimodality techniques as not effective. Tactile techniques were rated by 26.6% as significantly effective with a mean of 3.82. Vestibular techniques were rated as significantly effective by 22.4% with a mean of 3.84. Auditory and sensorimotor play were rated about the same with sensorimotor play having a mean of 3.78 (18.7% significantly effective) and auditory having a mean of 3.72 (18.2% significantly effective). Visual techniques were rated lower with a mean of 3.07 and only 7.9% reporting a significant effectiveness.

A one-way ANOVA indicated that there was a significant difference between the sensorimotor techniques $F(6, 1218) = 21.40$; $p < .001$. A Tukey post hoc analysis indicated that visual techniques were less effective ($M = 3.07$) than tactile ($M = 3.82$; $p < .001$), vestibular ($M = 3.84$; $p < .001$), sensorimotor play ($M = 3.78$; $p < .001$), auditory ($M = 3.72$; $p < .001$), multimodality ($M = 4.13$; $p < .001$), and oral-motor ($M = 4.09$; $p < .001$). There was also a significant difference between auditory techniques ($M = 3.72$) being less effective than multimodality ($M = 4.13$; $p < .001$) and oral-motor ($M = 4.09$; $p < .001$).

The last set of questions asked respondents to rate the benefits of sensorimotor techniques when used for the following developmental areas: decrease in inappropriate behaviors, improvement in language skills, improvement in articulation skills, improvement in oral motor control, and improvement in attention to task.

The following rating scale was used: 1= significant disadvantage, 2= slight disadvantage, 3= no advantage, 4= slight advantage, 5= significant advantage. The respondents were asked to leave the answer blank if they did not know how to answer appropriately. Figure 4 illustrates the results to this question.

Figure 4 <u>Benefits using sensorimotor techniques</u>



The results indicated that improvement in attention to task was rated as having the most benefit when using sensorimotor techniques with 34.6% reporting slight advantages and 38.8% reporting significant advantages, with a mean of 4.3. The next developmental area that reported benefits was in oral motor control with 36.9% reporting slight advantages and 36.0% reporting significant advantages and a mean of 4.2 when using sensorimotor techniques. The third area was improvement in inappropriate behaviors with 37.9% of the speech-language pathologists reporting slight advantages and 32.2% reporting significant advantages, with a mean of 4.2 for using sensorimotor techniques. Language skills also benefitted from sensorimotor techniques with 40.7% reporting slight

advantages and 22.4% reporting significant advantages with a mean of 4.0. Respondents also reported benefits in articulation skills with 36.0% stating slight advantages and 26.2% reporting significant advantages with a mean of 3.9 for using sensorimotor techniques. There were only a few respondents who reported significant to slight disadvantages when using sensorimotor techniques (.5%- 4.7%) in all developmental areas. There were some that reported no advantage to sensorimotor techniques (9.3%- 19.6%) across all developmental areas.

CHAPTER 5

Discussion

Sensory integrative therapy has been associated with occupational therapy in the past, with most of the literature generated within occupational therapy professional journals. According to ASHA (ASHA, 2001, I-28), speech-language pathologists' Scope of Practice will include "sensory awareness related to communication, swallowing, and other upper aerodigestive functions". Since the Scope includes sensory awareness, the present study was designed to assess the awareness, use, and training of speech-language pathologists in the area of sensory integration techniques.

Results indicated that the majority of speech-language pathologists in Illinois working with children were aware of sensorimotor therapy techniques, but the degree of awareness varied across speech-language pathologists. The work setting in which respondents were employed was also a factor in awareness of sensorimotor techniques.

The extent of training for speech-language pathologists in sensorimotor techniques also varied considerably, ranging from no training to extremely/extensively trained. The majority of respondents evaluated themselves as minimally to somewhat trained in the area of sensorimotor techniques. Comments from some of the speech-language pathologists stated that their only training had occurred on the job or by closely working with occupational therapists. One respondent stated that there needs to be in-service available in this topic area that is convenient to attend. Another commented that training programs lack this type of education for speech-language pathologists. The cumulative results and

narrative comments suggest that training in sensorimotor therapy is deficit in speech-language pathology. Since sensory awareness is part of the Scope of Practice, opportunities to introduce knowledge in the area need to be reviewed.

Speech-language pathologists varied on the extent to which they incorporate sensorimotor techniques into therapy. Most of the time they minimally to moderately incorporate these techniques. Again, work settings influenced whether or not respondents incorporated these techniques. Rehabilitation and private practice speech-language pathologists reported incorporating sensorimotor techniques the most, with school speech-language pathologists incorporating the techniques the least.

Those who reported using sensorimotor techniques commented that oral motor therapy works well. A review of the literature suggested that strengthening and stimulating muscles during speech-language therapy can help a client produce purposeful, meaningful, and functional speech (Boshart, 1995). A study completed by Creed and Spiegel (1998) stated that using the Facial Flex appliances helped to strengthen the muscles of children to improve oral motor strength for articulation. There have also been anecdotal examples reported that sensory integrative techniques incorporated into therapy helped a child with oral apraxia (Richard, 2000).

There was a comment included on a returned survey that whole body movement worked well. According to Hannaford (1995), when the body moves, more oxygen flows to the brain allowing the brain to become alert for incoming stimuli. If a child has difficulty with sensory integration and does not have movement to stimulate the brain, then the individual may need help on maintaining oxygen flow to the brain to establish

alertness to incoming stimuli. Consultation with an occupational therapist can help establish a therapy plan that incorporates sensorimotor techniques.

Another respondent stated that when children are identified with sensory needs, such as autism, then sensorimotor techniques make a great difference. Research has shown that children with autism benefit from sensory integrative therapy (Case-Smith & Bryan, 1999; Ayres & Tickle, 1980; Patterson, 1998). According to Case-Smith and Bryan (1999), there were positive behavioral changes in children with autism when involved in intervention incorporating a sensory integrative approach. In a controlled research study completed by Patterson (1998) using two subjects with autism during speech-language therapy, results showed a significant difference in the boys' off-task behavior when squeeze balls were not provided during therapy activities.

Another comment was that a trial/error basis is needed to see what works best for each child. Sensorimotor therapy techniques may not be best for every child, but for those who do benefit from this type of therapy, the techniques should be incorporated into their therapy program. According to Mauer (1999), further research needs to be conducted in order to identify which disordered areas could benefit from sensory integrative treatment.

The present study results suggested that co-treating or consulting with an occupational therapist was beneficial for the speech-language pathologist, however, not all speech-language pathologists had access to an occupational therapist. Some speech-language pathologists (19.6%) who responded did not co-treat or consult with occupational therapists at all. One respondent commented that occupational therapists were not accessible in that school district, while, in a different setting, occupational

therapists could be consulted as often as needed. The accessibility to occupational therapists seemed to play a significant role in whether or not speech-language pathologists co-treated or consulted with them. When using a remedial approach for sensory integrative dysfunction, it is necessary to consult with an occupational therapist who is typically the professional in charge of generating a therapy plan. Research has shown that consultation with an occupational therapist can make a difference. According to Richard (2000), consultation with an occupational therapist resulted in incorporating sensory integrative techniques into therapy so that over time, the child was able to produce meaningful verbal expression. Another study conducted by Case-Smith and Bryan (1999) revealed consultation with a classroom teacher in which the classroom teacher implemented the recommendations made by the occupational therapist. Results of this study supported the evidence suggesting positive behavioral changes in children with autism when involved in intervention incorporating a sensory integrative approach.

Significant differences were noted between work setting groups in awareness, training, incorporation, and consultation with occupational therapists. Results from the present study suggested that more training needs to be conducted. School speech-language pathologists ratings were the lowest on awareness, training, incorporation, and consultation with occupational therapists. This could be due to the fact that speech-language pathologists in the public schools have not been exposed to the benefits of sensory integration for the types of disorders in their caseloads.

A correlation was indicated between speech-language pathologists with training in sensorimotor techniques and actual incorporation of sensorimotor techniques into therapy,

suggesting the need for more training opportunities. The present study demonstrated that when speech-language pathologists were trained in sensorimotor techniques, they were more likely to incorporate these techniques into their programs. Research has suggested that sensory integrative therapy is effective with a variety of disorders (Ayres & Mailloux, 1981; Ayres & Tickle, 1980; Case-Smith & Bryan, 1999; Creed & Spiegel, 1998; Cross & Coster, 1997; Ottenbacher, 1982; Patterson, 1998; Richard, 2000). Therefore, providing additional training would likely result in more speech-language pathologists incorporating these techniques when serving children with disabilities.

Respondents who incorporated sensorimotor techniques into their services were asked to evaluate the effectiveness of the different types of sensorimotor techniques. Results indicated that most of the techniques were somewhat to significantly effective. This suggests that further studies need to be completed to evaluate the efficacy of each technique.

Respondents who incorporated sensorimotor techniques were also asked to rate the benefits of utilizing these techniques. Results demonstrated a benefit in all developmental areas (decrease in inappropriate behaviors, improved articulation skills, improved attention to task, improved language skills, and improved oral motor control). For the most part, the benefits ranged from a slight advantage to a significant advantage. This finding suggests that when sensorimotor techniques are incorporated, children benefit from the use of the techniques.

Results of the present study demonstrated that speech-language pathologists are aware of sensorimotor techniques, but inconsistency was present in those with actual

training in the area. Since sensory awareness is mentioned as part of the Scope of Practice, training needs to address sensorimotor techniques to ensure that speech-language pathologists are adequately prepared to utilize the techniques. Training opportunities are necessary for speech-language pathologists to be able to provide the appropriate services for children identified as needing sensorimotor therapy to intervene on their specific disorder.

Limitations of the Study

Within the present study, there were limitations that could have affected results. The subjects in the study represented the views and knowledge of a sample of only Illinois speech-language pathologists, therefore, there was not a national representation.

Second, even though, guidelines were used to try to target speech-language pathologists working with children, some of the surveys reached professionals who only worked with adults. Therefore, those surveys (i.e., who worked only with adults) could not be analyzed as part of this study.

Third, some of the group comparisons involved unequal numbers in the groups as well as small group numbers.

Finally, a few of the respondents questioned the definition of sensorimotor techniques. A definition should have been included in order to help clarify what was meant by sensorimotor techniques.

Implications for Future Research

Based on the data obtained and conclusions drawn from this study, implications for future research have been formulated.

1. The design of the present study appears to be appropriate for replication with a larger and more diverse geographic sample.
2. Subsequent research should evaluate the effectiveness of sensorimotor therapy techniques utilized specifically by speech-language pathologists.
3. Research needs to be conducted on the different types of sensorimotor techniques to evaluate their effectiveness and examine which types would be more appropriate for incorporation into speech-language services.
4. Research should be conducted to evaluate which types of sensorimotor therapy technique(s) are most beneficial for specific types of disorders.
5. A survey should be conducted to determine the extent of information on sensorimotor techniques that is being included in the curriculum of communication disorders and sciences training programs to address the inclusion of sensory awareness into the Scope of Practice.

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Appendix A

Background Information

1. Work Setting: 1=School, 2=Hospital, 3=Private Practice, 4=Rehabilitation, 5=Other 1 2 3 4 5
2. Level of Education Training: 1=B.S., 2=M.S./M.A., 3=M.S./M.A.+, 4=Ph.D.
3. Years of Professional Experience: 1=1-5, 2=6-10, 3=11-15, 4=16+

Presently provide service to (darken all that apply) Y N

4. Early Intervention 0-3
5. Preschool 3-6
6. Elementary 7-12
7. Secondary 13-18
8. Adults 19+

Please rate the following questions on a scale from 1-5.

1=not at all, 2=minimally, 3=somewhat, 4=moderately, 5=extremely/extensively 1 2 3 4 5

9. To what extent are you aware of sensorimotor therapy techniques?
10. To what extent have you had training in sensorimotor techniques?
11. To what extent do you feel competent in recognizing the signs demonstrated by a child who needs sensorimotor techniques incorporated into his/her intervention program?
12. To what extent do you incorporate sensorimotor therapy techniques in your therapy?
13. To what extent do you co-treat or consult with an occupational therapist when you incorporate sensory integrative techniques?
14. To what extent do you believe sensorimotor techniques improve the effectiveness of your therapy in young children?

Please rate the following on a scale from 1-5 evaluating the effectiveness of each type of sensorimotor technique.

1=not effective, 2=minimally effective, 3=somewhat effective, 4=moderately effective, 5=significantly effective. If you do not know, please leave it blank. 1 2 3 4 5

15. Tactile stimulation (e.g., brushing, massage, deep pressure)
16. Vestibular stimulation (e.g., swinging, jumping, walking)
17. Sensorimotor-play activities (e.g., water tables, finger painting, play-doh, balls)
18. Visual stimulation (e.g., lava lamp, computer games, fans)
19. Auditory stimulation (e.g., singing, headphones, music, rain stick)
20. Multimodality approach (e.g., stimulating more than one sensory modality- touch + sight, auditory + sight + touch)
21. Oral-motor techniques (e.g., bite block, bubbles, blowing toys, nuk toothbrush, tongue depressors)

On a scale of 1-5, rate the benefits experienced in these developmental areas when sensorimotor techniques are used.

1=significant disadvantage, 2=slight disadvantage, 3=no advantage, 4=slight advantage, 5=significant advantage. If you do not know, please leave it blank. 1 2 3 4 5

22. Decrease in inappropriate behaviors
23. Improvement in language skills
24. Improvement in articulation skills
25. Improvement in oral motor control
26. Improvement in attention to task
27. Estimate the hours of training you have received in sensorimotor techniques.
    1=0, 2=1-5, 3=6-10, 4=11-15, 5=16+
28. Estimate how often per month you consult with an occupational therapist.
    1=0, 2=1-3, 3=4-6, 4=7-10, 5=11+

Additional comments:

Appendix B

October 1, 2001

Dear Survey Respondent:

My name is Patricia Finley. I am currently a graduate student in Communication Disorders and Sciences at Eastern Illinois University and am conducting a master's thesis with Dr. Gail J. Richard. I am interested in determining the extent to which speech-language pathologists utilize sensorimotor techniques in therapy and if they have received any training in this area. I am also interested in exploring how speech-language pathologists implement sensorimotor techniques, independently or in collaboration with an occupational therapist.

Sensory integration has primarily been a component of occupational therapy, however, speech-language pathologists are beginning to use some of the techniques. Research has been inconclusive regarding its' benefits. I am looking forward to summarizing the impressions of speech-language pathologists who work with young children regarding their impressions of sensorimotor techniques.

I truly appreciate you taking approximately five minutes to complete the enclosed survey. All returned surveys will be kept anonymous. The completed survey should be returned in the enclosed pre-addressed stamped envelope by November 1, 2001.

Thank you for participating in this project. I hope to present preliminary results at the 2002 ISHA Convention.

Sincerely,

Patricia A. Finley, B.S.
Graduate Student

Gail J. Richard, Ph.D.
Professor

Enclosures