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ABSTRACT

Six children with multiple disabilities (ages 5 to 8) participated in this evaluation of the effect of sensory integration treatment on sensorimotor function and academic learning. The children had cognitive abilities ranging from sub-average to significantly sub-average, three were non-ambulatory, one had severe behavioral problems, and each displayed characteristics of sensory integrative dysfunction including tactile dysfunction, proprioceptive dysfunction, and vestibular dysfunction. The sensory integration treatment, developed with an occupational therapist, included individual activities (such as daily massage), group activities, and individual seat work. Treatment was provided for 50 minutes daily for 9 weeks. Although a statistically significant gain on a measure of sensorimotor function was found, these gains did not result in notable improvement in academic learning or sensorimotor function as observed by the teacher. (Contains 23 references.) (DB)

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The Effect of Sensory Integration Treatment on Children with Multiple Disabilities

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Abstract

Whether the sensory integration therapy was effective in improving the sensorimotor function and learning of young children with multiple disabilities was investigated in this case study. Six children (5 to 8 years old) with multiple disabilities participated. A pretest, treatment and posttest design on measuring sensorimotor functioning, and a continuous measurement during the treatment phase on learning and behavior were utilized. The treatment lasted for 9 weeks in a school setting. A Dependent t test was conducted on the pretest and posttest data. Statistically significant gain on sensorimotor function was found. However, no notable improvement on sensorimotor function and learning of the children was found.

The Effect of Sensory Integration Treatment

on Children with Multiple Disabilities

In an effort to address the needs of individuals with sensorimotor problems, researchers and professionals have developed a variety of intervention programs to improve their motor and sensory integration function. The commonly used treatment programs include (1) the neurodevelopmental treatment (Bobath & Bobath, 1967), which emphasizes the components of posture and movement that constitute motor control and functional motor performance; (2) the perceptual-motor strategies (Radler & Kephart, 1960), which focus on practice of specific perceptual and motor components of skill development; and (3) the sensory integration (SI) therapy (Ayres, 1972, 1979), which is based on a theory about the relation between the neurological process and motor behavior (Fisher, Murray, & Bundy, 1991). The SI therapy, in theory, is intended to help individuals with mild to moderate problems in motor and academic learning improve motor functioning and academic learning (Chan, 1995; Fisher & Bundy, 1992).

A number of studies investigated the relationship between SI treatment and learning (various types of learning) of children with learning disabilities (LD). In examining the effect of SI therapy on academic achievement, motor performance and self-esteem of children with LD, Polatajko, Law, Miller, Schaffer and Macnab (1991) randomly assigned a sample of 67 children into either the SI treatment group or the perceptual motor therapy treatment group. The Woodcock-Johnson Psychoeducational Battery, the Bruininks-Oseretsky Test of Motor Proficiency, the Behavioral Academic Self-Esteem Rating Scale, and the Personality Inventory for Children were administered before, after and at 3-month follow-up. The treatment lasted for 6 months. No group differences were found on any of these measures.

Negative results were reported in several studies of SI treatment on children with LD, who were also considered to have sensory integration problems. With respect to the facilitative effects of SI treatment on postrotary nystagmus of children with LD, negative results were reported in a group of studies (Humphries, Wright, McDougall, & Vertes, 1990; Humphries, Wright, Snider, & McDougall, 1992; Wilson, Kaplan, Fellowes, Gruchy, & Faris, 1992). As to the effects of SI therapy on hyponystagmus of children with LD, no significant "Age x Group x Time of Test" effects were found in the study conducted by Carte, Morrison, Sublett, Uemura and Setrakian (1984). With regard to the effects of SI treatment on sensorimotor, perceptual and motor functioning, significant effects were found for both the treatment group and control group in the Carte et al. study; with a similar experiment, Morrison and Sublett (1986) found no significant effects of SI treatment on two measures of vestibular and proprioceptive functioning: equilibrium reactions and visual-motor integration. Regarding the effects of SI therapy on self-esteem/self-concept, attention and behavior, the results from three studies were negative (Humphries et al., 1992; Polatajko et al., 1991; Wilson et al., 1992). Furthermore, in terms of the treatment effects of SI on cognitive, language and academic abilities of children with LD, all the above studies (except the Morrison and Sublett study, which did not include such measures) reported negative results as to the existence of the facilitative effects specific to SI therapy.

Sensory integration therapy was also provided to a group of adults (N=30, 23 to 50 years old) with severe learning disabilities to test its effectiveness (Soper & Thorley, 1996). A pretest and posttest with control group design was used in the study. There were 15 participants in each group. They lived in an institution, had no speech, had minimal attention and concentration, showed tactile defensiveness and aversive response to movement. The experimental group

received a weekly SI treatment, and the control group received a weekly sensory stimulation session. Sessions varied from lasting for a few minutes to 1 hour. Three types of checklists were used for pretest and posttest. Analysis of the data from 28 participants who completed the treatment showed that the experimental group showed significant improvement in some areas only, and no negative correlation between age and improvement was found in either group. The authors concluded that SI-based treatment could benefit those with severe LD.

With a similar focus, to answer the question on whether SI treatment was effective on children with learning problems, Kaplan, Polatajko, Wilson and Faris (1993) compared two studies (29 children in one study, 67 children in the second study). The results from each study and the results from the combined study indicated no differences across the groups in IQ, gross motor skills and reading skills. The therapeutic effect of SI treatment on children with learning deficits was not greater than traditional methods of intervention. The literature on SI treatment of children with LD on different problems seems to show inconsistent, mostly negative results (see also Hoehn & Baumeister, 1994; Vargas & Camilli, 1999).

In addition to the studies of SI treatment on individuals with LD, a body of literature, published in the 1990', focused on the effect of SI treatment for improving sensorimotor function of children and adults with various disabilities. In one study, DeGangi, Wietlisbach, Goodin and Scheiner (1993) compared the functional performance of 12 preschool children with sensorimotor dysfunction in two types of interventions: 1) an approach emphasizing child-initiated sensory and motor exploration during play interactions; 2) a structured developmental approach focusing on therapist prescribed sensorimotor activities. The children received a pretest, a 1-hour weekly intervention for 8 weeks, and a posttest. Results showed that gross motor skills responded better

to therapist-directed therapy, and fine motors skills seemed to improve more as a result of child-centered activity. These findings suggest that different therapeutic strategies may be needed to promote gross motor and fine motor skills.

A touch therapy treatment was provided to 22 children with autism, and their post-treatment behaviors were examined (Bowling et al, 1997). The children were divided into two groups: One group received touch therapy, the other served as a control group. The touch therapy consisted of body massage with moderate pressure for 15 minutes a day, 2 days per week, for 4 weeks. The two groups did not differ in baseline measures. Results showed that both groups showed decreased touch aversion, off-task behavior, orientation to irrelevant sounds and stereotypic behaviors. The touch therapy group improved more in stereotypic behaviors and orientation to irrelevant tasks.

Another group of children with autism also participated in an SI treatment study. Using a single-subject research design, Case-Smith and Bryan (1999) examined the effects of sensory integration with 5 preschool children with autism. Nonengagement, mastery play, and interaction were measured via the videotape clips of each child's free play in a preschool. A 3-week baseline data were compared with the 10-week treatment data. Four children demonstrated decreased frequency of non-engaged behavior, 3 showed increased frequency of mastery. Improvements in interaction were minimal. The findings indicate that the behaviors of autistic children could change when they participate in interventions using a sensory integration approach.

The efficacy of an SI treatment program on the functioning behaviors of inpatients with dementia (N = 40, mean age of 78.4 years) was studied by Robichaud, Hebert and Desrosiers (1994). There were 22 participants in the treatment group, 18 in the control group. Participants in

the treatment group received three 45-minute sessions per week for 10 weeks. The outcomes were measured with the Revised Memory and Behavior Problems Checklist, and the Psychiatric Scale of Basic Activities of Daily Living. It was found that the SI treatment program had no significant effect on the behaviors of the treatment group.

Shuman (1996) used the SI techniques to reduce the maladaptive behaviors that interfered with the learning of 9 high school students with mental impairments. The maladaptive behaviors included rocking, toe walking, echolalia, resistence to change, compulsive behaviors, aggression, tantrums, monotone speech, and gagging. The intervention included use of techniques such as auditory/vestibular, visual, olfactory, gustatory, tactility, speech/communication, behavior, and balance. After the intervention, the students' maladaptive behaviors decreased and their enjoyment of the activities increased.

The above brief review of literature seems to show that findings on the effectiveness of SI treatment on sensorimotor function and learning are inconsistent. Research on SI treatment of children with multiple disabilities is limited. Further studies on the applicability of the SI treatment to children with multiple disabilities remain necessary. The purpose of the study was to investigate whether the sensory integration treatment was effective in improving sensorimotor function of children with multiple disabilities and also their academic learning.

Method

Participants

A class of 6 children, 5 to 8 years old, participated in the study. The children attended a private special school (located in the northeast region) for children with multiple disabilities. Their cognitive abilities ranged from sub-average to significant sub-average level. Out of the 6 children,

3 were non-ambulatory, 1 had severe behavioral problems. They each displayed one or two types of the characteristics of sensory integrative dysfunction to varying degrees: tactile dysfunction, proprioceptive dysfunction, and vestibular dysfunction. They were all from lower socioeconomic families and had limited life experience.

A special education teacher (female) whose expertise was in developmental disabilities and 2 teaching assistants (female) participated in the program. The teacher had 5 years of teaching experience, and the assistants received on-the-job training with the teacher.

Treatment

The SI treatment program was created with the help of an occupational therapist. The program included the following:

A. Individual Activities.

1. The teacher (the special education teacher and/or the 2 teaching assistants) sits in front of a child, faces him/her, massages the child's arms and hands with body lotion.

2. The teacher sits in front of the child holding a mirror in front of his/her face, and sings the "Hello Song." The teacher completes this activity alone.

Here is the song:

Hello, how are you?

Hello, how are you?

Hello, how are you?

How are you today?

It's good to see _____!

It is good to see _____!

It is good to see _____!

It is good to see _____!

The child will respond to the question "How are you today?" say his/her name after "It is good to see_____!" This individual treatment lasts for approximately 10 minutes each session.

B. Group Activities (The 6 children sit in a circle for 30 minutes.).

1. The group will play "Hot Potato" using textured balls, apples, potatoes, chalk, bean gags or other objects of varying textures and weights. The teacher starts the game by playing music and passing the object to the child sitting next to her, and the child will pass the object to the next child. They will continue to pass the object until the music stops. When the music stops, the child holding the object will have to say what it is, then the music will play again. When it stops, the child holding the object will have to describe it by color, size, shape, texture. The game continues until all children have a turn. They will receive both physical and verbal assistance whenever necessary during the whole process.

2. The teacher will pass around a medium-sized parachute and have the children hold on to the handles and play the song "The Freeze" by Greg and Steve on "The Kids in Motion" tape. While the music is playing, the children will wave the parachute up and down to the rhythm of the song.

3. The teacher will pass around numbers from 1 to10 and play the song "Count Bounce" by Greg and Steve. While the song is playing, the children have to listen to hear when the number that they are holding is called, they hold it up. Children will sing and count with the song.

4. The teacher will help move the children to the middle of the circle, and she will play

the songs "Body Rock," "Animal Action," and the "Beanbag Boogie" to give the children a chance to listen to music, move their body to the music rhythm, identify body parts, imitate actions and move around to the beat of the music.

When the circle time ends, the children return to their seats at the table.

C. Daily Individual Seat Work.

In addition to the above treatment, to maximize sensory input, an individual child has a chance to select an activity from: playing texture puzzles, sand, rice, sandpaper, cotton, foam, shaving cream, salt, water; writing with chalk; using scissors, tracing shapes or lacing beads and so forth. The teacher and the teaching assistants will rotate and work with each of the children.

During activity transitions, a 5 to10-minute break in play-games (e.g., 'Simon Says' or using music and singing songs that involve action) was incorporated. These group activities involved the children in gross motor exercises, and provided them the opportunities to explore their body and environment, which presumably gave them some sensory input.

Design and Procedure

The main treatment lasted for 50 minutes daily for 9 weeks. Each staff member administered massage to 2 children each school day.

The study utilized a pretest, treatment and posttest design. The children were measured with the "Clinical Observations of Sensory Integration Screening" test (Occupational Therapy Associates). The Dependent t test was conducted to analyze the raw scores of individual items on the test from the pretest group data and posttest group data.

Individual child's behavior (both positive and negative) was observed and recorded on the Daily Incident Report, and included in the overall individual and program assessment. A

continuous measurement of individual child' academic learning progress was also used by the teacher.

Results

Analysis with the Dependent t test indicated the following: the mean for pretest data of the group was 1.97; the mean for the posttest group data was 2.25; $t = -2.46$; $p < .01$ (2-tailed).

The records on individual child's behavior in the Daily Incident Reports did not show notable improvement of the children. No notable improvement could be seen in academic learning and sensorimotor function of those participating children. Basically, according to the teacher, those with higher cognitive and physical abilities made some improvement as they did so prior to this treatment, and those with lower cognitive and physical abilities did not make progress with this SI treatment program.

Discussion

This study constitutes an effort to search for an effective way to help children with multiple disabilities improve in the sensorimotor function and academic learning. Even though an SI therapy was provided daily to each of the children with multiple disabilities for 9 weeks, and the data analysis showed statistically significant improvement in the children's sensorimotor function at the end of the program, the size of difference did not seem to be notable. As it was discussed previously, the SI therapy was designed based on a theory, which presumably helps individuals with sensory integration dysfunctions improve sensorimotor function and learning (Fisher & Bundy, 1992). Numerous studies have been conducted on individuals with various types of physical and learning problems, mostly inconsistent results were reported with respect to its efficacy in improving sensorimotor function and learning. The findings from this study, once

again, raise the question on whether sensory integration is a right or an appropriate technique for treating children with multiple disabilities (see also Hoehn & Baumeister, 1994; Vargas & Camilli, 1999). Based on the final results from this case study, the authors do not recommend to fellow special education teachers the application of SI therapy on young children with multiple disabilities.

Conclusion

Although the gain this group of children with multiple disabilities made in sensorimotor function through SI therapy was statistically significant, it was not notable. No notable improvement in academic learning of the children with multiple disabilities was found, either.

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