Sensorimotor Theme Groups:

A Review of the Literature

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Introduction

Children entering preschool and kindergarten must display various skills and abilities in order to adequately participate in school. During this developmental period, teachers use activities to enhance sensory and motor performance. However, some students may display abnormal behavior due to sensorimotor deficits, which interfere and impact occupational performance. According to Shasby and Schneck (2005), sensorimotor theme groups (SMTG) are a form of intervention developed to improve academic and sensorimotor skills in all children through experiences in their natural environment and in conjunction with school curriculum. SMTG are based on Jean Ayer’s sensory integration frame of reference and are aimed at the development of sensory, perceptual, and motor skills through the use of children’s occupations (Shasby & Schneck, 2005). They are focused around a central theme and the activities are based on not only sensorimotor skills, but also socialization and skill acquisition. This literature review is written in conjunction with the development of sensory motor theme groups for a special project and discusses child development and occupations, school-based occupational therapy, sensory terminology, and different sensorimotor interventions currently being used.

Child Development and Occupations

Before implementing sensorimotor interventions it is important for occupational therapists to understand early childhood development so that they may effectively assess, evaluate, and develop intervention techniques. Sensorimotor interventions usually occur in school-based occupational therapy in preschool and kindergarten classrooms. Many developmental milestones occur during this age including physical, cognitive, language and emotional changes. Milestones occurring between ages 3-4 years include: improved coordination
in running and jumping, beginning of drawing skills, sustained attention, an increase in interactive play, and an improvement in emotional self-regulation (Berk, 2004). Between the ages of 5-6 years the typical child develops more abilities such as: writing name, tying shoes, skipping, improvement in memory, vocabulary reaching approximately 10,000 words, and an improvement in the ability to interpret and predict others reactions. According to Parham and Mailloux (2005) early childhood is a time of rapid improvement in sensorimotor skills and a crucial period for sensory integration. At this age children have a strong desire to meet sensorimotor demands and begin interaction with peers. They orient play toward peers in a manner in which their interactions appear to be as important as the goal of the activity. Children at this age are extremely active and often engage in rough-and-tumble play, which provides strong sensory input (Case-Smith, 2005). Their motor function improves greatly as they develop a mature running pattern, improve their balance, and develop a coordinated skipping pattern. In school, the children participate in activities such as crafts, painting, drawing, and playing with blocks. Their valued occupations can include group games, imaginary play, role-playing stories, dress up, ball play, and organized play in groups. As their fine motor skills and in-hand manipulation improve they become familiar with tools such as pencils, buttons, zippers, forks, and knives (Parham & Mailloux, 2005). Children in this age range also begin to sequence events, learn daily routines, and begin to anticipate actions (Case-Smith, 2005). Most children become competent in these areas, but some experience sensory or motor problems. These children can struggle with daily occupations such as getting dressed, eating lunch, and participating in class. A child will often be referred to an occupational therapist if behavioral, social, academic, or motor control concerns arise.
School-Based Occupational Therapy

When implementing school-based occupational therapy interventions, therapists must also have an in-depth knowledge of the education system and the laws and regulations that guide practice. School-based occupational therapy was formed around federal legislation. It is this legislation that shapes the way occupational therapy is practiced in the school system. The most influential is IDEA Part B, which “mandates occupational therapy as a related service for those children with disabilities, 3-21 years old, who need it to benefit from special education” (American Occupational Therapy Association, 2004, p.682). IDEA regulations also affect interventions as it requires that services be educationally relevant and are provided in the least restrictive environment. Case-Smith (2005) suggested that the model for implementing the least restrictive environment significantly affects the delivery of OT services.

Research has been conducted to determine if inclusion in the classroom versus pull-out is the best way to provide OT services. A study by Case-Smith and Cable (1996) found that occupational therapists felt that students received the best service when OT interventions were complimented by in-class interventions and consultation with teachers. Another study by Rea, Mclaughlin, and Walther (2002) found that students placed in inclusive programs earned higher grades, received higher or comparable grades on standardized tests, and had better school attendance. Despite the evidence supporting inclusion in the classroom, a study by Spencer, Turkett, Vaughn, and Koenig (2006) found that 105 school-based occupational therapists practicing in Colorado reported pull-out treatment 61% of the time. These results suggest that occupational therapists are still pulling out students for interventions the majority of the time despite opposing research.
Two initiatives that are allowed by IDEA and that support the education achievement of all students are, Early Intervening Services (EIS) and Response to Intervention (RtI). EIS was developed to reduce the number of students struggling academically and who experience academic failure (Cahill, 2007). The goal of the initiative is to identify students early so that interventions can be provided to enhance learning and possibly reduce the number of referrals to special education. RtI works in conjunction with EIS in that its intent is to support students at risk of academic failure within the general education curriculum. Interventions based on the model include three tiers: 1.) interventions involving the entire school or classroom, 2.) interventions with a small group of students, 3.) individual interventions. RtI allows student support teams to address the needs of at risk students before a special education referral is made. This initiative also allows OT to expand its role and provide services to students who may not be a part of their caseload (Cahill, 2007).

A key component in occupational therapy school-based practice is the collaboration between the therapist and the classroom teacher. It is the occupational therapist’s responsibility to inform the education team of how a child’s performance skills affect their learning and their participation in school activities. The education and training of not only teachers, but other team members is important for occupational therapy referral and interventions (AOTA, 2004). The collaboration between the teacher and therapist can lead to adaptations in the classroom and strategies to improve the child’s overall learning (Shasby & Schneck, 2005). Barnes and Turner (2001) conducted a study to describe the collaborative practices between teachers and occupational therapists. The study also explored the relationships between team practices and teacher’s perceptions of the benefits of occupational therapy to student skill development. The results of the study indicated that collaboration was often done informally, as it was hard to
schedule formal meetings with the occupational therapists. Findings also indicated that as collaboration increased, teacher’s perceptions about occupational therapy’s contributions to student skill development increased. The results of the study suggested that frequent and regular team meetings are beneficial to achieving a student’s outcomes, indicating that collaboration is an important component of occupational therapy in the school system.

Another component to consider is the preparedness of occupational therapy practitioners for school-based practice. A study conducted by Brandenburger-Shasby (2001) researched the perception of occupational therapists regarding their preparedness for school-based practice and their entry-level and continuing education needs. The results concluded that 80% of participants felt they were not prepared for school-based practice with an entry-level education only. All of the participants identified a need for continuing education in intervention techniques, writing Individualized Education Program (IEP) goals, and evaluating for assistive technology. It is important that therapists be prepared and educated on a variety of intervention techniques and strategies so that they can ensure that the child is provided the best services in their natural environment.

*Sensory Terminology*

Although there has been progress made in the school system, it is evident that there is confusion between clarity of sensory terminology. According to Ayers (1963), it is imperative that occupational therapists understand the different types of sensorimotor disorders in order to provide effective treatment. The major disorders listed in her lecture were dyspraxia, form and position in space, crossing the mid-line and right-left discrimination, visual-ground perception, and tactile defensiveness. In addition, children may present with several of these disorders, and not just one. Dunn (2007) suggested that professionals working with children who have sensory
processing disorders and families with those children need to understand the definition and theory of sensory processing. By understanding this concept, professionals and families will be able to help these children adapt and function within their natural contexts. Miller, Anzalone, Lane, Cermak, and Olsten (2007) created a new nosology to clarify sensory integration terminology for diagnostic purposes. According to Miller et al., Sensory Integration (SI) is the theory and sensory processing disorder (SPD) is the diagnosis. Under SPD are three subcategories: sensory modulation disorder (SMD), sensory-based motor disorder (SBMD), and sensory discrimination disorder (SDD). Thus, comprehending and differentiating sensory disorders is vital to effective intervention planning and educating families and teachers.

When designing an intervention for sensorimotor activities, therapists must consider supportive evidence. First, Sensory Integration (SI) is based on Ayers’ belief of underlying neurobiological mechanisms that affect sensory processing (Schaaf & Miller, 2005). Key principles for providing occupational therapy sensory interventions for children with developmental delays or disorders are based on adapting the environment and or desensitization. However, there is need for more empirical evidence to support these interventions. According to Baranek (2002), there is little evidence supporting the use of sensorimotor interventions for children with autism. Nevertheless, Baranek believed that interventions for children with autism need to be focused on structured physical and sensory environments and developmentally appropriate sensorimotor experiences. Despite the lack of empirical evidence with sensorimotor interventions, children with sensory processing disorders experience challenges in occupational performance (White, Mulligan, Merrill, & Wright, 2007). Furthermore, Miller, Coll, and Schoen (2007) concluded that occupational therapy intervention for children with sensory modulation disorder was more effective than no treatment provided to this population. Although many
therapists use sensorimotor strategies, there is a great need for empirical evidence to support these interventions.

*Play*

One major sensorimotor intervention used by occupational therapists is play. Play develops in children in stages beginning with sensorimotor (exploratory) around 2 to 4 months of age. Next, relational play (relating objects without regard for conventional use) emerges around 6 to 10 months of age. Around 10 to 12 months of age, functional play (relating objects for conventional purposes) appears. And lastly, symbolic play becomes evident around 12 to 18 months of age and continues throughout early childhood and into kindergarten (Casby, 2003). In addition, assessments should be guided by the developmental model of play. Thus, play is a primary occupation of children. According to Bundy, Shia, Qi, & Miller (2007), children with sensory processing dysfunction have difficulty participating in play. The authors found that most children with sensory modulation disorders use compensatory methods or need assistance with certain activities. Uys, Alant, and Lloyd (2005) developed a play package consisting of a Daily Multiple Measurement Instrument (DMMI) and different play activities for developmental domains (including sensorimotor). The study concluded that the measurement is reliable and valid and the play package facilitated the developmental behaviors. Hermes (2007) believes that using sensory-rich play experiences will assist in brain development. She also believes that collaborating with teaching staff and incorporating sensorimotor strategies in an inclusive environment helps foster brain development. Tortura (2004) found that using multisensory-based activities (i.e. movement, dance, music, play, touch, and body awareness exploration) are effective when working with children with autism, pervasive developmental disorders (PDD), communication and language delays, sensory integration disorder, attention deficit hyperactivity
disorder (ADHD), and attachment issues. Using play groups is another intervention strategy used by occupational therapists. Glovak (2007) concluded that using activities such as songs, theme boxes, and rubbing lotion allow children to become actively engaged with their peers. In addition, the author mentioned that children who have autism are easier to engage using sensorimotor activities. Lust and Powell (1993) found that a sensorimotor half-day summer camp for pre-kindergartners was an effective approach because the camp provided group play experiences, developmentally appropriate sensorimotor activities, recreational activities, and activities of daily living. Therefore, play is an effective sensorimotor strategy for occupational therapy intervention.

**Music**

Another effective sensorimotor strategy is music. Hall and Case-Smith (2007) investigated the effects of a sensory diet and therapeutic listening (modified CDs via high and low pass filters to alter sound frequencies) on children with sensory processing disorders (SPD) and visual-motor delays. Overall, the authors concluded that parents reported improvements in their children’s behaviors and that therapeutic listening combined with a sensory diet proved effective in improving behaviors in this population. Modifying music causes flexibility of middle ear muscles in order to transmit sensory information to the sensory processing centers in the brain (Frick & Hacker, 2001). Rose (2004) found that introducing music to children with sensory issues can significantly impact their behavior and can possibly help them excel on musical aptitude tests. And lastly, Tanner (1980) concluded that an elementary school music program focused on enhancing poor perceptual motor coordination can improve hand-eye, eye-hand development, and figure-ground perception. Thus, incorporating music into sensorimotor interventions can be effective.
**Motor-based Interventions**

In conjunction with sensorimotor methods, an occupational therapist can also focus on motor-based interventions. According to Croce and DePaepe (1989), occupational therapists can base their rationale of motor-based interventions on theories of motor control and learning. The authors argued that repetition, correctly performed practice of functional skills, and sufficient learning time is crucial to facilitate skill retention and transfer. However, there has been a debate regarding motor-based intervention. After completing a literature review, Sugden and Dunford (2007) argued that theoretical, empirical, and experiential concepts regarding motor-based interventions contradict, which caused confusion between rehabilitation professionals and the efficacy of intervention methods. Seidler (2004) tested current motor learning theory using a joystick task to determine generalization skills. The results concluded that generalization skills can improve using task related motor-learning interventions. Nevertheless, occupational therapists must use good judgment to determine appropriate interventions for certain populations.

Despite the former information, several methods are available to help guide occupational therapists in intervention planning. Valvano and Rapport (2006) developed a three-step activity-focused motor model to help guide rehabilitation professionals working in early intervention. The three steps are as follows: 1.) Use guidelines based on principles from motor-learning and motor development, 2.) adapt these guidelines when necessary to address young children’s individual strengths and needs, and 3.) integrate impairment-focused interventions with activity focused interventions within the context of everyday routines and activities. Whinnery and Whinnery (2007) discussed the Mobility Opportunities Via Education (MOVE) model, which is based on functional outcomes and activity-based interventions. The authors recommended rehabilitation professionals use this model as a guide to develop motor interventions based on the
motor-learning theory. In 2007, Schott and Rhode conducted a study on ball handling skills with children who had developmental coordination disorder (DCD). The authors believed that ball handling skills are imperative for social interaction on the playground and physical participation in physical education class because these skills are the foundation to many games. According to the results, children with DCD struggle controlling a ball. They also concluded that children with DCD need individualized motor interventions to participate in physical activities.

Sensorimotor Theme Groups

A creative and interactive method for applying sensorimotor concepts is using stories and themed activities for group interventions. According to Johnson (2007), understanding child development and applying that concept to selecting appropriate stories, teaching, and children’s learning skills is beneficial and promotes optimal child development. The author also emphasized the importance of understanding the interaction between children’s social, cognitive, emotional, linguistic, and literacy development. Marr, Mika, Miraglia, Roering, and Sinnott (2007) conducted a study that examined the effectiveness of sensory stories on circle time behaviors in preschool children with autism. They concluded that using sensory stories improves positive behaviors in preschool children with autism. Shasby and Schneck (2005) suggested that occupational therapists within the school setting should use Sensorimotor Theme Groups (SMTG) to improve a child’s academic and social performance. Furthermore, SMTG not only enhance developmental skills within a child’s natural environment, but may be effective in reducing referrals to special education. Thus, using stories and themed activities prove beneficial.
Conclusion

Overall, sensorimotor development is an imperative skill that enables a child to participate and learn in school. In addition, it is evident that many children display problems with sensorimotor activities, which support the need for therapeutic intervention. However, occupational therapists need to use current and effective evidence and understand the domain of school-based occupational therapy when developing sensorimotor theme groups.
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