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Edition Focus: Pediatric Developmental Disorders

Occupational Therapy and Sensory Integrative Disorders

Kari Kassir, M.D.

Most people are aware of the five basic senses: hearing, sight, taste, touch, and smell. Fewer are aware of two fundamental, and even primitive, senses: vestibular (gravitational) sense and proprioceptive (muscle and joint position) sense. The brain gathers information through all of these senses from the body and the environment, and then organizes and processes it. This sensory integration (SI) leads to an adaptive response.

A Closer Look

Let's take an example. When a child is learning to ride a bicycle, he must rely on information gathered by his visual system, his vestibular system, and his proprioceptive system in order to stay upright and propel himself forward. If any of these sensory systems fail, give him inappropriate information, or do not integrate successfully with each other, he will fall and skin his knee. He may then be more nervous to get back on the bicycle to try again.

In a typical child, the first seven years or so are devoted to sensorimotor development. A solid foundation here supports continued mental and social growth. Integration of incoming sensations is vital to generating appropriate motor responses, the adaptive responses that support future learning and development.

Process Breakdown

When this process breaks down and the brain cannot integrate sensations from one or more of the senses, the child will not adapt to the incoming information. Even though the nerves and muscles are capable, the brain has trouble coordinating everything. This leads to stress and distress in what typically would be considered an everyday activity. Over time, this can lead to avoidance and refusal. Let's go back to the bicycle. If the child always falls off and skins his knee, at some point he will refuse to get back on, maybe even have a tantrum if someone insists. This behavior may then generalize to other activities as well.

Over 40 years ago, Dr. A. Jean Ayres began to study this whole process and its impact on child development, learning, and behavior. Building on the work of Sherrington, she introduced the concept of sensory integration, as well as sensory integration theory. Her groundbreaking research spawned more research in the field of sensory integration than in any other area of occupational therapy and also led to our current understanding of sensory integrative disorders.

Sensory integrative disorders are "a heterogeneous group of disorders that are thought

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to reflect subtle, primarily subcortical, neural dysfunction involving multisensory systems. These disorders affect human behavior in ways that are often difficult to interpret unless seen through the eyes of someone with special training in sensory integration.” (2) Sensory integrative disorders fall within one of four categories: sensory modulation problems, sensory discrimination and perception problems, vestibular-proprioceptive problems, and praxis problems.

Pediatric Occupational Therapy

Pediatric occupational therapy, with its focus on promoting adaptive responses and carrying out the daily activities (or occupations) of childhood, is essential for children with sensory integrative disorders. However, only those with an in-depth understanding of sensory integration theory and intervention strategies must perform assessment and treatment. Because of the abundance of research on sensory processing and integration, the body of literature supporting the efficacy of sensory integration therapy is growing. However, because of the heterogeneity of the patient population, as well as other factors, the published work is predominantly of single-subject or small group case study design.

For example, Dr. Miller and colleagues undertook a randomized, controlled trial of the effectiveness of occupational therapy in 24 children with sensory modulation disorder, demonstrating that children in the sensory integration treatment group made significant gains, as well as positive trends, in the areas studied. Schaaf and colleagues reported on the case of a child with poor sensory processing treated with sensory integration therapy over 10 months, documenting improvement in behavior and goal attainment scales. They concluded: “The findings support the theoretical underpinnings of sensory integration theory that improvement in the ability to process and integrate sensory input will influence adaptive behavior and occupational performance.” (5) Finally, Roberts and colleagues prospectively studied a child using an ABAB design, demonstrating improved behavior regulation following treatment with classical sensory integration therapy.

Children with sensory integrative disorders have unique and complex deficits in the processing of multisensory information. With its focus on developing motor planning skills and self-help skills, developing age-appropriate communication, processing information, and regulating the response to incoming information, occupational therapy is uniquely suited to affect positive change in these children. Sensory integrative therapy, based on Dr. Ayres’ sensory integration theory, is integral to helping these children achieve success in the occupations of childhood.

What to Consider

Case managers should look for both documentation and the therapist’s credentials in sensory integrative disorders. The documentation should include sensory integration and praxis tests (SIPT) results and short- and long-term treatment goals. An SI credential check is important, because in any emerging field some therapists claim expertise, but lack appropriate credentials.

Although the body of literature on the efficacy of therapy is small now, it is growing, providing evidence that occupational therapy, based on sensory integrative theory, will provide the help that these children so desperately need.

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Occupational Therapy and Autism Spectrum Disorder

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Current literature defines autism spectrum disorder (ASD), also known as pervasive developmental disorder (PDD), as a biologically-based neurologic disorder affecting childhood development. ASD has strong genetic underpinnings, but it is a heterogeneous disorder. And although it has been as-

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sociated with a number of medical conditions, disorders and syndromes, the nature of that association is not clear, and its etiology not yet determined. According to recent CDC information, one in 150 children has ASD, and it's four times as common in boys as girls.

Behavioral Characteristics

Four behavioral clusters have been used to characterize autism: disturbances in social interaction, deficits in communication, behavioral abnormalities and disturbances of sensory and perceptual processing. (The latter is observed, but not used in formal diagnosis.)

Communication deficits are one of the core features of ASD. Children may be slow to learn to talk, not learn to talk at all, or lose the ability to talk. Others may learn to produce language, but have difficulty using that language effectively in social interactions. Children with ASD are known for their atypical responses to sensory stimuli. They can be both under- and over-responsive. This behavior shows up in both the autistic population as a whole, and in individual children with ASD. Disturbances in perception of auditory stimulation particularly appear to be common.

“The unusual combination of sensory, communication, and behavioral characteristics seen with ASDs have significant negative effects on a child’s ability to participate in home, school and community activities.” (1) Because of the complex nature of this disorder, a multidisciplinary approach is crucial for these children. “Comprehensive intervention, including parental counseling, behavioral treatment, special education in highly structured environments, sensory integrative therapy, social skills training, speech-language therapy, medications, and family support, constitute the best management for children with autism and other types of PDD [ASD].”(1) With its focus on facilitating development of motor planning skills and self-help skills, development of age-appropriate communication skills (written and functional), processing of information, and regulation of the response to incoming information, occupational therapy can affect positive change in these children.

Using Occupational Therapists

Occupational therapists formulate their interventions based on analysis of the interactions among a child’s skills, challenges and occupations, including the environment in which those occupations occur. These interventions are tailored for the specific needs and personality of the child, to maximize skill acquisition and outcome. “To provide the most effective services and programs for children and adolescents with ASD,

it is important that occupational therapists become informed about the interventions with best evidence of effectiveness.” (3)

Current Thinking

Current research shows other promising treatment options. In addition to the traditional focus on fine and gross motor skills, motor planning, and acquisition of self-help skills, occupational therapists frequently use sensory integration and sensory-based interventions to help autistic children to improve self-regulation and facilitate development of well-organized adaptive responses. These studies show that:

- Sensory integration intervention appears to enhance the child’s ability to modulate behavior and participate in social interaction. However, this requires additional study.
- Massage decreases stereotypic behaviors and improves attention.
- Pairing sensory-based interventions with functional tasks to maximize targeted performance outcomes is the current recommendation.

Research on the use of sensory integration techniques is ongoing. In a recent Turkish study (4), 30 low-functioning children were divided into two groups, a treatment group receiving sensory integration intervention, and a control group regularly attending scheduled special education classes. Sensory problems (as defined by the Sensory Evaluation Form for Children with Autism) improved significantly in the treatment group. Additional small studies suggest benefits in self-stimulating behaviors and task engagement.

Relationship-based Intervention

Occupational therapists frequently use two relationship-based interventions treatments to focus on social and emotional growth in children with ASD:

- The use of adult imitation, involving high levels of positive responsiveness, use of prompting and cueing to facilitate peer interactions, and demonstrating positive effects on social engagement.
- Engaging the child in structured play activities that include cueing, prompting, and reinforcement, are effective ways to enhance turn-taking and social interactions.

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Additional Interventions

Occupational therapists are involved in social skills training for children with ASD. Modeling and practice appear to have positive effects on turn-taking, joint attention, eye contact, nonverbal communication, and language. Social stories are frequently used during therapy sessions to actively involve the child and improve targeted behaviors.

Parent education and family-centered approaches are important components of occupational therapy intervention approaches. In addition, the therapist provides support and consultation to the rest of the team, reinforcing the skills acquired through behavioral approaches.

The philosophy and goals of occupational therapy align well with intervention for children with ASD, making occupational therapists an integral part of the treatment team. While sparse, the literature indeed demonstrates effectiveness of the various occupational therapy interventions and it is likely that ongoing studies will confirm this.

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Pediatric Feeding Disorders

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Successfully feeding infants and small children involves both a complex interdependent series of neuromuscular functions and a psychosocial environment suitable for growth and development. Well-coordinated feedings promote weight gain, overall health and well being, and achieve developmental milestones, including communication. Disrupting these interdependencies causes feeding disorders.

High Percentage of Disabled Children

About 25 percent of all children, and up to 80 percent of developmentally disabled children, exhibit feeding disorders. Severe and persistent feeding disorders occur in three to 10 percent of children, particularly those with chronic conditions. The etiology of feeding disorders is multi-factorial, and includes medical, nutritional, behavioral, psychological, and environmental factors. If not dealt with appropriately, feeding disorders can lead to cognitive decline, malnutrition, growth retardation, increased susceptibility to illness, and even death.

A feeding disorder is an inability to consume adequate and appropriate nutrition by mouth. While feeding disorders may ultimately lead to eating disorders (e.g. anorexia nervosa, bulimia), they are not the same. Feeding disorder symptoms include inadequate fluid intake, food refusal, difficulty swallowing, inability to feed oneself, prolonged feeding time, choking or gagging and emesis, inappropriate mealtime behaviors, and selecting food by its type or texture.

Anatomical Interplay

Feeding involves a very complex interplay of anatomical structures, neuromuscular control, physiological processes including digestion, social interactions and behaviors, and coordination with other bodily functions such as breathing. Disruption of any of these may lead to feeding dysfunction. Causes of feeding dysfunction include:

- anatomical abnormalities such as cleft lip or palate, micrognathia, or esophageal anomalies;
- neuromuscular abnormalities such as cerebral palsy, muscular dystrophy or hypotonia;
- physiologic disruption caused by infections, congenital heart disease, chronic lung disease, digestive problems or other chronic medical conditions;
- inadequate interaction with caregivers due to parental depression or environmental disruption;
- history of invasive procedures such as nasogastric tube or intubation.

Feeding disorders may even appear in children who are developing typically and show up as food refusal, extreme food preference, disruptive feeding behaviors or prolonged feeding times. Although environmental or behavioral factors are frequently to blame, feeding disruption may also represent the initial manifestation of a medical condition such as gastroesophageal reflux or food allergy. Unfortunately, maladaptive feeding behaviors often remain long after the medical issues

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have been resolved.

A comprehensive assessment is integral to the treatment plan. Because feeding disorders are typically multifactorial, an interdisciplinary approach is useful in determining etiological factors. The interdisciplinary team usually consists of a gastroenterologist, nutritionist, behavioral psychologist, occupational therapist, speech and language pathologist, and nursing staff. These specialists tailor the treatment plan to the needs of the child and family.

Role of the Occupational Therapist

“Occupational therapy is the therapeutic use of everyday life activities (occupations) for the purpose of participation in roles and life situations in all settings. OT addresses the physical, cognitive, psychosocial, sensory, and other aspects of occupational performance in a variety of contexts to support engagement in activities that affect health, well being, and quality of life. The focus of occupational therapists is on children’s ability to process sensory information and skillfully use their hands to perform typical life tasks such as self care, play, and school work.” (1)

Assessing the Oral Sensory Response

While speech and language pathologists consider oral motor skills and swallowing dysfunction, the occupational therapist’s focus is primarily on oral sensory responses, muscle tone, positioning, and self-feeding. Children with oral motor and swallowing problems often have abnormal oral sensory responses as well (hypersensitivity or hyposensitivity or a combination of both). This sensitivity may result from neurologic abnormalities, psychosocial dysfunction, oropharyngeal procedures such as intubation, or medical conditions such as gastroesophageal reflux. In such cases, the occupational therapist’s goal is to normalize sensory input using non-nutritive methods first, and then gradually introduce nutritive input to increase the child’s tolerance of tastes and textures.

The occupational therapist also assesses the child’s positioning and postural tone, because postural support and stability are essential for adequate oral motor and swallowing function and overall safety. Adaptive equipment or specialized utensils may be necessary to augment existing skills and create an environment conducive to improving feeding behavior. In addition, the occupational therapist coordinates with other practitioners and family members, optimizing the child’s participation and facilitating eventual transition to self-care. Educating the family and assessing the family’s functioning and capability are extremely important for the therapists’ interventions to

succeed.

Conclusion

Feeding disorders are as unique and individualized as the children who are affected by them. Thus, it is essential to provide a multifaceted approach to treatment because such an approach has the highest likelihood of success. Inadequately treated feeding disorders can unfortunately have long-lasting and debilitating consequences. Occupational therapists are an important part of the treatment team, with the skills necessary for facilitating the transition to a child’s developmentally appropriate feeding behavior.

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