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Sensory integration theory and intervention techniques were originally developed by A. Jean Ayres, PhD, OTR, beginning in the late 1960s. Her pioneering work integrated scientific information from neuroscience, psychology, occupational therapy, and human development in an effort to help explain the relationship among experience, brain development, and function. Ayres's theory of sensory integration provides a solid foundation for understanding the impact of sensation on occupational performance across the life span. Although much of the existing work related to sensory integration addresses occupational performance issues in children, some believe the theory and framework to be important across the life span. However, given the original emphasis on pediatrics, occupational therapy practitioners who work in other areas of practice likely do not have exposure to or training in sensory integration and, therefore, may not consider dysfunction in sensory integration as a contributing factor when evaluating clients at different ages or stages of life.

This article makes a case that because humans are sensory beings and sensation is inherent in all occupations, the sensory integration framework is relevant to occupational therapy practice beyond pediatrics. Further, we propose that all occupational therapy practitioners should seek to understand the relevance of the sensory integration framework for the specific clientele with whom they work, regardless of age. We believe that the sensory integration framework can be a useful lens for interpreting behaviors and a guide for implementing strategies to enhance occupational performance in clients across the life span. To this end, some of the sensory-based experiences that persons may encounter across the life span are discussed, and the relevance of the sensory integration framework is proposed. We have chosen to present this information according to a developmental progression to express how dysfunction in sensory integration can be manifested across the life span.

Infancy

Motor, cognitive, language, and social skill development in humans highly depends on successful interaction among the sensory systems. For the infant, attainment of developmental milestones occurs as information from the environment is perceived through the senses, sensations are modulated and organized, and adaptive responses are produced. This process of perception, modulation, and response also promotes further growth and development of the nervous system and supports the infant's occupational performance. For example, an organized tactile system, which is one of the first sensory systems to fully develop in the newborn (Fearon, Haines, Muir, & Kisilevsky, 2002), helps the

infant to locate nourishment, assists the infant in calming when gently touched by a caregiver, and allows the infant to interact with the world. Over time, tactile awareness increases and is combined with sensations from the muscles, joints, and visual system to further promote the infant's ability to reach out and grasp an object with accurate aim (Ayres, 2005). The interplay between what the infant feels and sees and how his or her body responds reflects the complexity of interactions that occur among the sensory systems. As Ayres (2005) wrote, without the sensory integration that occurs during the child's first year, he or she would be unable to learn to walk, talk, and plan complex actions effectively. Further, without the continued sensory integration that occurs during the second year of life, "all subsequent development would be difficult" (Ayres, 2005, p. 22).

Conceptualizing child development in this way supports the need for occupational therapy practitioners to use a sensory integration framework when working in early intervention. It is during the first 2 years of life that the foundation for future learning is established. The theory of sensory integration suggests that the child's ability to successfully perceive and integrate sensations through the tactile, vestibular, proprioceptive, olfactory, gustatory, auditory, and visual systems not only allows him or her to develop skills within the environment, but also promotes socialization and emotional well-being. "The integration of sensations provides the foundation for good relations with people" (Ayres, 2005, p. 24), and the child's success in this area depends on his or her ability to respond appropriately to sensation. In addition to providing direct intervention for those infants and toddlers who have special needs, occupational therapy practitioners trained in the sensory integration framework can offer education, support, and training to caregivers and early childhood educators in methods for creating opportunities for enhanced sensorimotor experiences that support the development of all young children.

Early Childhood

During the third through seventh years of life, a child builds on the skills developed in infancy and has an increased ability to make progressively more complex adaptive responses relative to sensory input. This in turn affects the child's ability to do more and learn from these experiences (Ayres, 2005). In this developmental stage, the child learns to use simple tools, perform complex motor skills, and navigate personal interactions. However, if the child experiences dysfunction in processing and using sensory information for function, these abilities may not develop. For example, some children may be unable to use tools such as crayons, scissors, or eating utensils; have difficulty regulating emotions, resulting in frequent, intense, and prolonged outbursts; or be unable to coordinate parts of the body to climb the ladder of a slide, pump a swing, or ride a bike. The possibility of dysfunction in sensory integration can be determined by considering whether the sensations the child experiences support or

inhibit his or her physical, emotional, behavioral, and social abilities. If dysfunction in sensory integration is present, the occupational therapy practitioner who is trained in sensory integration can provide to the child and family intervention designed to improve sensory processing and, ultimately, occupational performance.

Of importance are the recent reports of an increasing number of children between 3 and 5 years of age who are being expelled from preschool programs because of behavior issues (della Cava, 2005). For some of these children, underlying sensory issues may inhibit their ability to follow classroom routines, organize sensory inputs during the day, and interact appropriately with peers. Occupational therapy practitioners could apply a sensory integration framework when intervening with school-age children. This may include (a) educating teachers about the role of sensory integration in modulating behavior, (b) assisting physicians and educators in identifying when a child has a need for sensory-based occupational therapy intervention, and (c) providing direct intervention when appropriate.

Preteen and Adolescence

In the preteen and adolescent years, children typically have more independence from caregivers and are allowed to make many more independent choices. In general, participation in social groups becomes very important, and many adolescents begin driving, working, and dating. As teens move into and through this age of freedom, social pressures, and new responsibilities, they are challenged to effectively and adaptively balance their internal drives and desires with the external pressures of socially appropriate norms, personal responsibility, and adult expectations. Some teens may experience considerable tension in attempting to "fit in" to the social group while simultaneously managing and nurturing their unique nervous system needs. It is possible that for some of these children the tension is due to difficulties in processing and using sensory information. A sensory integration framework can be applied to gain insight into whether sensory processing difficulties are in fact contributing to this tension.

For example, some teens may engage in activities such as extreme sports, party going, or reckless driving or demonstrate impulsivity, aggression, and poor judgment. When these behaviors are present to the degree that they affect participation and performance in educational activities; work, play, and leisure activity choices; and social participation, occupational therapy assessment may be warranted. A sensory integration evaluation may find that the individual exhibits a range of sensory- seeking behaviors indicative of sensory integration dysfunction, which is thought to be associated with high sensory thresholds in the nervous system that drive the individual's desire for intense sensory input (Zuckerman, 1994). Although extreme sports and other intense activities may provide input that meets the teen's sensory needs, risk is involved that at times can be life threatening. Other sensory-

seeking behaviors, such as impulsivity and aggression, may be problematic for the teen as well as for others, especially as the teen grows and becomes both heavier and stronger. Some teens who need intense sensory input may benefit from sensory-based occupational therapy intervention to help them identify their distinct sensory needs and develop safe and appropriate strategies for meeting those needs.

In contrast to teens who engage in sensory-seeking activities are those who avoid social situations, including school events and extracurricular activities; limit social participation; and withdraw, sometimes to the point of isolation. It is possible that these behaviors are related to an increased sensitivity to sensation such that the teen's nervous system perceives typical levels of sensory input as threatening (Dunn, 1997). In this instance, the teen expends excessive energy trying to cope with the constant barrage of sensation, which can lead to fear and anxiety. Often, such emotional responses are manifest as aggression; irritability; controlling behaviors; or avoidance of or withdrawal from certain activities, situations, or materials (Lane, 2002). Such behavior can interfere with school performance, social participation, interpersonal relationships, and employment (Kinnealey, Oliver, & Wilbarger, 1995). Again, a sensory integration framework can guide the occupational therapy assessment to determine whether dysfunction in sensory processing is contributing to the behaviors. When a sensory processing disorder is identified, occupational therapy practitioners can help teens who are sensitive to sensation gain insight into their behavioral responses to sensory input. The therapist also can help the teen develop strategies to increase tolerance for sensation, cope with sensoryladen events, and improve prospects for success in daily occupational performance.

Adulthood

As adolescents move into adulthood, they bring with them their inherent sensory processing characteristics. However, as adults, the stakes of ineffective sensory processing are higher. The adult's capacity to successfully meet the challenges of daily life now has an impact on his or her ability to earn a living, develop or maintain a social support system, care for family members, and establish a position in society. Adults who experience difficulties with sensory processing and integration may display sensory-seeking or sensory-avoiding behaviors similar to those described for teens, have difficulty keeping a job, be generally disorganized, or be unable to form and maintain social relationships (Kinnealey et al., 1995; Pfeiffer, 2002). Further, adults may be more aware of a mismatch between their own sensory integration characteristics and societal norms, leading to low self-esteem, limited social participation, and dissatisfaction with quality of life (Kinnealey et al., 1995; Pfeiffer, 2002). Parham (2002) suggested that occupational therapists can help adults to gain insight

into their unique sensory processing characteristics and design a lifestyle that meets sensory needs while optimizing health and well-being.

The sensory inputs an adult experiences as a part of his or her vocational responsibilities can support or interfere with job performance. For an individual whose nervous system needs frequent and intense sensory input, a job as a businessperson may be unfulfilling because it does not provide a means for meeting the individual's sensory needs. For example, one adult with sensory integration dysfunction stated that he felt something was missing from his life as he described the mismatch between his socially acceptable, lucrative, but low-stimulating office job and his personal need for intense sensory input (Fanchiang, 1996). After learning about sensory integration and the value of regular participation in activities that provided the form, intensity, and duration of sensation needed by his nervous system, this individual left his office job and became a massage therapist, a vocation that allowed him to meet his sensory needs and feel calm, soothed, and organized (Fanchiang, 1996). For the adult whose nervous system requires lower levels of stimulation, the ambient noise, variety of aromas, and busyness of a crowded workplace may be overwhelming. The person may be distracted, uncomfortable, and irritable, leading to poor work performance and ineffective interpersonal relationships in the workplace (Kinnealey et al., 1995).

Unfortunately, adults do not participate in regular medical check-ups or are not monitored as consistently as are school-age children; therefore, identifying adults with a dysfunction in sensory integration is haphazard at best. These individuals may be identified when they encounter health care professionals in association with expressing concerns about a child's development, pursuing treatment for an injury, or seeking intervention for a mental health issue. In any of these situations, an occupational therapy practitioner who is knowledgeable about sensory integration theory and the behavioral manifestations of dysfunction in sensory integration could engage with the adult to determine whether dysfunctional sensory processing is influencing the individual's occupational performance or perceived quality of life.

The Older Adult

As the human system ages, neurobiological processing slows, and there tends to be a lessened sensitivity within all of the sensory systems (Bonder & Wagner, 2001; Hill, 2002; Hooper, 2001; Pohl, Dunn, & Brown, 2003). The older adult is less able to perceive contrast, may have difficulty seeing in dim light, may have lessened sensitivity to smell and taste, may have decreased hearing, and often may demonstrate changes in balance and equilibrium responses over time. Although some of these changes may be due to alterations in the sensory receptors and apparatus themselves, it is important for occupational therapy practitioners to consider whether interventions designed around sensory

integrative concepts could have an impact on functional performance for the older adult. For example, could participation in sensory-based intervention enhance the vestibular and visual system functions necessary to support balance and postural control abilities?

Functionally, overall reduced sensitivity to sensation in the older adult may increase the likelihood of falling; lead to difficulty driving or an inability to drive safely; increase the risk of burns or physical injuries; and limit the ability to engage in lifelong enjoyable activities and leisure pursuits, such as needlework, golf, cooking, or gardening. The occupational therapist with an increased knowledge of the sensory integration framework may draw on the greater understanding of sensation to develop innovative therapy programs that assist the older adult in safely continuing daily activities and leisure pursuits, while honoring his or her sensory preferences and needs. As yet, empirical data support the use of sensory-based occupational therapy intervention with the older adult; however, the reports of successful use of these strategies with other adults (Pfeiffer, 2002) suggest that a trial of sensory-based intervention may be warranted for some individuals.

For Further Consideration: The Impact of Sensation on Mental Health

Some health care professionals and researchers have hypothesized that sensory integrative dysfunction may play a role in mental illness and have identified schizophrenia (Fish, 1977; King, 1974), traumatic history (Champagne, 2005), anxiety disorders (Champagne, 2005), and social disorders (Dunn, 2001) as conditions that may have sensory components. An inability to successfully interpret and use sensory inputs can lead to disorganization; poor state regulation; and, in some cases, self-injurious behavior. Among persons with mental illness, misinterpretation of information also has been linked to irrational thoughts, emotional swings, cravings, and anxiety (Champagne, 2005). These behaviors can exacerbate symptoms of mental illness, leading to disruption in engagement and an inability to participate in occupations. Occupational therapy practitioners have suggested that sensory integrative treatment techniques may be helpful in intervention for persons with mental health concerns, specifically citing the effect of sensory input to increase or decrease arousal state (Champagne, 2005).

Conclusion

Since Ayres's original work in the late 1960s, occupational therapy has been the leading profession in evaluating and treating persons with sensory integration difficulties and improving their ability to engage in meaningful occupations within a variety of contexts. Though much of the occupational therapy literature related to sensory integration has focused on children, occupational therapy practitioners are uniquely qualified to address sensory-based occupational performance deficits across

the life span. Our hope in writing this article is two-fold. First, we hope that it stimulates scholarly thinking and discussion about applying the sensory integration theory and framework across the full scope of occupational therapy practice and that these discussions lead to scientific investigation of topics related to sensory integration across the life span. second, we hope that occupational therapy practitioners in areas of practice outside of pediatrics consider the possibility that the sensory integration framework may be important to their clientele and pursue postprofessional training in this intervention approach.

References

Ayres, A. J. (2005). Sensory integration and the child: Understanding hidden sensory challenges. Los Angeles: Western Psychological Services.

Bonder, B. R., & Wagner, M. B. (2001). Functional performance in older adults. Philadelphia: F. A. Davis.

Champagne, T. (2005, March). Expanding the role of sensory approaches in acute psychiatric settings. Mental Health Special Interest section Quarterly, 28, 1-4.

della Cava, M. R. (2005, September 21). Out-of-line preschoolers increasingly face expulsion. USA Today, p. Al.

Dunn, W. (1997). The impact of sensory processing abilities on the daily lives of young children and their families: A conceptual model. Infants and Young Children, 9(4), 23-35.

Dunn, W. (2001). The sensations of everyday life: Empirical, theoretical, and pragmatic considerations. American Journal of Occupational Therapy, 55, 608-620.

Fanchiang, S. C. (1996). The other side of the coin: Growing up with a learning disability. American Journal of Occupational Therapy, 50, 277-285.

Fearon, I., Hains, S., Muir, D., & Kisilevsky, B. (2002). Development of tactile responses in human preterm and full term infants from 30 to 40 weeks postconceptional age. Infancy, 3, 31-51.

Fish, B. (1977). Neurobiologic antecedents of schizophrenia in children: Evidence for an inherited congenital neuro-integrative defect. Archives of General Psychiatry, 34, 1297-1313.

Hill, G. A. (2002). The changing realm of the senses. In C. B. Lewis (Ed.), Aging: The health care challenge (4th ed., pp. 83-103). Philadelphia: F. A. Davis.

Hooper, C. R. (2001). Sensory and sensory integrative development. In B. R. Bonder & M. B. Wagner (Eds.), Functional performance in older adults (pp. 121-136). Philadelphia: F. A. Davis.

King, L. J. (1974). A sensory integrative approach to schizophrenia. American Journal of Occupational Therapy, 28, 529-536.

Kinnealey, M., Oliver, B., & Wilbarger, P. (1995). A phenomenological study of sensory defensiveness in adults. American Journal of Occupational Therapy, 49, 444-451.

Lane, S. J. (2002). Sensory modulation. In A. C. Bundy, S. J. Lane, & E. A. Murray (Eds.), Sensory integration theory and practice (2nd ed., pp. 101-122). Philadelphia: F. A. Davis.

Parham, L. D. (2002). Sensory integration and occupation. In A. C. Bundy, S. J. Lane, & E. A. Murray (Eds.), Sensory integration theory and practice (2nd ed., pp. 413-434). Philadelphia: F. A. Davis.

Pfeiffer, B. (2002, March). The impact of dysfunction in sensory integration on occupations in childhood through adulthood: A case study. Sensory Integration Special Interest section Quarterly, 25, 1-2.

Pohl, P. S., Dunn, W., & Brown, C. (2003). The role of sensory processing in the everyday lives of older adults. Occupational Therapy Journal of Research, 23, 99-106.

Zuckerman, M. (1994). Behavioral expressions and biosocial bases of sensation seeking. New York: Cambridge University Press.

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