

Autism Spectrum Disorders

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Synopsis of Clinical Condition

According to the fourth edition of the *Diagnostic and Statistical Manual of Mental Disorders—Fourth Edition (DSM-IV)* (American Psychiatric Association [APA], 1994), pervasive developmental disorders include autism, pervasive developmental disorder—not otherwise specified (PDD-NOS), Asperger’s disorder, Rett’s disorder, and childhood disintegrative disorder. These disorders have similar diagnostic criteria, but certain characteristics vary and symptoms range from mild to severe. The varying degrees of symptoms have led to the use of the term *autism spectrum disorder (ASD)*, which typically describes the three most common conditions—autism, PDD-NOS, and Asperger’s disorder—all of which are addressed in this chapter. These three have commonalities in their diagnostic criteria and share many clinical features and interventions.

Prevalence and Etiology

The Centers for Disease Control and Prevention (2007), after completing a multi-site study in the United States, identified ASD prevalence estimates at approximately 1 in 150 children and determined that it is 3 to 4 times more prevalent in boys than in girls. It is now a common developmental childhood condition.

Comorbidity is the co-occurrence of conditions that may or may not be causally related (Ghaziuddin, 2002). Individuals with ASD commonly develop comorbid conditions throughout the course of a lifetime. The most common of these are attention-deficit/hyperactivity disorder, obsessive–compulsive disorder, anxiety and mood disorders, tic disorders, seizure disorders, and sleep disorders (Tsai, 2000).

There is no known single cause for ASD, although there are well-documented associations with abnormalities in brain structure or function. Many studies

identify neuropathologies in both the temporal lobe and the limbic system (Bauman & Kemper, 1985, 1994). These two systems work together to mediate social-emotional functioning, a primary area of concern for individuals with pervasive developmental disorders. Specifically, abnormalities were found in the size and density of tissue in the temporal lobe and limbic system. The limbic system includes the structures of the amygdala and hippocampus (Lundy-Ekman, 1998), both of which are located in the temporal region. Abnormalities in the amygdala are of particular interest and importance in individuals with ASD. It is strongly believed that the amygdala “plays a critical role in emotional arousal, assigning behavioral significance to environmental stimuli, and attaching emotional relevance to stimuli” (Schultz, Romanski, & Tsatsanis, 2000, p. 187). Social-emotional problems and abnormal responses to environmental stimuli are all characteristics of ASD.

The cortical and subcortical frontal lobe region is also associated with ASD. Two studies have identified decreased frontal lobe perfusion in individuals with autism (George, Costa, Houris, Rang, & Ell, 1992; Zilbovicius et al., 1995). One section of the frontal lobe, the orbital-medial prefrontal cortex (PFC), has a key role in social-emotional functions. This section is interconnected with limbic areas, such as the amygdala. It is speculated that a faulty connection between the amygdala and the orbital-medial PFC could contribute to the inappropriate emotional and social behavior associated with ASD (Schultz et al., 2000).

Research has also explored myelin in the brains of individuals with ASD (Koul, 2005). Results identified that myelin is not fully mature in individuals with ASD. This may have a significant impact on the developing brain and contribute to the abnormalities identified in the brains of individuals with ASD.

It has been theorized that ASD etiologies are genetic and environmental. Recent research has identified that genetic factors increase the risk of ASD (Glessner et al., 2009; Ma, 2009; Wang et al., 2009). These studies revealed that there are many genes that contribute to an increased risk and that the interaction of genes and environmental factors is often the cause of ASD. Research has indicated that ASD aggregates in families. There is an extremely high rate of concordance of ASD in identical versus fraternal twins and a higher rate of siblings with the condition (Miller-Kuhaneck & Glennon, 2001). Chromosomal studies have identified further support for genetic links. Chromosomal alterations are present in a fairly large number of individuals with ASD, although the alterations are not consistent. More recent research (Glessner et al., 2009; Ma, 2009; Wang et al., 2009) has identified variants of genes involved in cell adhesion in individuals with ASD. The National Institutes of Health (2009) stated that “in the developing brain, cell adhesion proteins enable neurons to migrate to the correct places and to connect with other neurons” (para. 11). This connects genetic factors to abnormal brain structures and development identified in ASD.

There have been various speculations about the environmental etiology of ASD, and further research is warranted. Some believe that prenatal exposure to toxins—in particular, pesticides and polychlorinated biphenyls—is the cause of

abnormal brain development in children with ASD. Researchers have explored the possibility that an abnormal immune system response to vaccinations leads to the regression in skills that children with autism and PDD-NOS often present with around ages 2 to 3 years (Miller-Kuhaneck & Glennon, 2001), and viruses have been researched as a possible etiology. Initial animal models of virus-induced autism have been supported (Pletnikov & Carbone, 2005), although further research is needed.

Autoimmune disorders are more common in the family members of children who have ASD (Comi, Zimmerman, Frye, Law, & Peedan, 1999), and there are documented autoimmune abnormalities in certain individuals with ASD (Miller-Kuhaneck & Glennon, 2001). Gastrointestinal issues were suspected in many individuals with ASD, although research has not identified an increased prevalence when compared to neurotypical populations (Fombonne & Chakrabarti, 2001; Taylor et al., 2002). Much of the research in these areas is inconclusive, and therefore the etiologies of ASD continue to be speculative in nature. Based on the current research, it is thought that ASD is a complex disorder with multiple interactive etiologies, including both genetic and environmental factors.

Common Characteristics and Symptoms

For a child to be diagnosed with autism, he or she must present with delays in social interactions, social communications, or symbolic or pretend play prior to 3 years of age. The child must meet a total of six or more items from three main areas in the *DSM-IV*, with at least two from Category 1 and one each from Categories 2 and 3 (APA, 1994). The three main areas include a qualitative impairment in social interactions; a qualitative impairment in communication; and restricted, repetitive, or stereotyped patterns of behavior, interests, and activities.

Qualitative impairments in social interactions include impairments in the use of nonverbal behaviors, limitations in peer relationships, a lack of social or emotional reciprocity, and a lack of spontaneous initiative to share enjoyment, interests, or achievements with others. Qualitative impairment in communication includes a delay or lack of development of spoken language, impairment in the ability to initiate or sustain conversations with others (for those that do speak), stereotyped and repetitive use of language, and limitations in pretend or social imitative play for their age. Restricted, repetitive, or stereotyped patterns of behavior include a restricted interest of abnormal intensity and focus (preoccupation), inflexibility in certain rituals or routines, motor patterns that are stereotypical or repetitive, and a preoccupation with parts of objects.

For a child to meet the criteria for PDD-NOS, certain criteria for autism must be met, but not the full criteria (APA, 1994). These children have features of autism that are not due to other disorders. Asperger's disorder also has many features of high-functioning autism disorder, but such children differ in cognitive and language functions. An individual with Asperger's disorder has average to above-average cognitive abilities and often develops expressive language within

normal developmental ranges (Attwood, 1998). Social interactions and functioning are significantly impaired in all three disorders. There is ongoing controversy in diagnosing ASD because of the overlap and the high rate of comorbidity with other childhood conditions. Professionals have recently expanded the terminology to include the term *autism phenotype*, which identifies a group of individuals who have characteristics that are nontypical in the areas of personality, language, and social skills but who do not meet the criteria for ASD. Research has identified that family members of individuals with ASD are more likely to have characteristics of these broader autism phenotypes (Piven, Palmer, Jacobi, Childress, & Arndt, 1997).

A child with an ASD may or may not have verbal language delays, but non-verbal language delays are almost always present (Attwood, 1998). Individuals with autism or PDD-NOS frequently experience delays in expressive language development, although this characteristic is absent in Asperger's disorder. Social development does occur but is often qualitatively different. Deficits in communication contribute to delays in social development. Eye contact and responsiveness to another person may be decreased, as well as an understanding of the pragmatic aspects of communication (i.e., the practical ability to use language in social situations). Children with ASD have a decreased interest in interacting with others and prefer isolated activities. They often have a limited range of representational play activities, along with restricted interests (Miller-Kuhaneck & Glennon, 2001). For example, they may be resistant to change and insist on certain routines and rituals. They may also engage in stereotypical or self-stimulatory behaviors.

Although it has been estimated that 75% of individuals with autism demonstrate some level of intellectual disability (Huebner & Dunn, 2001), it is likely that this estimate is extremely high. Intelligence often differentiates autism and Asperger's disorder, as there are no cognitive deficits associated with Asperger's disorder. As individuals with autism have difficulty completing standardized IQ measures because of characteristics not related to intelligence, the results of many of these tools may be questionable and therefore misrepresent the true intellect of the person.

Although not yet part of the diagnostic criteria for ASD according to the *DSM-IV*, sensory processing and integration issues are common (Mayes & Calhoun, 1999; Ornitz, 1974). Kientz and Dunn (1997) compared the sensory processing of children with autism to that of children without autism and identified significant differences in their patterns of processing sensory information. The children with autism demonstrated significant tactile sensitivity compared with the control group. Other researchers have also supported these findings. In one study, as many as 70% of children diagnosed with pervasive developmental disorders demonstrated disturbances in sensory modulation (Ornitz, 1974). Another study showed that 100% of children diagnosed with pervasive developmental disorders demonstrated somatosensory (tactile, vestibular, and proprioceptive) disturbances and 50% demonstrated hyper- or hyposensitivity to sensory input (Mayes & Calhoun, 1999).

Motor problems vary in individuals with ASD. Clumsiness and incoordination are identified as common characteristics in individuals with Asperger's disorder (Volkmar et al., 1994), and issues in motor planning can be found across the autism spectrum. It is important to note that characteristics and degree of symptoms can vary significantly among individuals.

Target Areas for Intervention

The role of an occupational therapist working with an individual with ASD varies depending on contextual factors such as age, intervention setting, and the primary reason for referral. Pervasive developmental disorders suggest multiple areas of focus. Over the course of a person's lifetime, an occupational therapist may focus interventions on almost all areas of occupation, including activities of daily living, instrumental activities of daily living, education, work, play, leisure, and social participation. For the person with ASD, treatment interventions may focus on sensory processing and integration, sensorimotor function, and social-emotional development.

One of the interventions most widely used by occupational therapists in the treatment of ASD is sensory integration (Watling, Deitz, Kanny, & McLaughlin, 1999). Used in combination with other interventions, including behavioral and developmental approaches, a primary focus is frequently on the modulation of sensory input, as many individuals with ASD tend to under- or overrespond to sensory input or demonstrate a mixed reactivity. This, in turn, affects behavior, communication, and functional skills. Other areas of specific occupational therapy interventions include improving the motor planning necessary for play and daily living activities, as well as interventions focused on promoting social skills.

Contextual Considerations

Clinical

Autism spectrum disorders are pervasive developmental disorders that frequently affect many areas of functioning. To clarify/identify the diagnosis, the *Pervasive Developmental Disorders Screening Test—Second Edition* (PDDST-II; Siegel, 2004) can be useful. An evaluation must address the primary concerns of the referral source and the family and could include many domains of occupational therapy practice. A top-down evaluation process promotes occupationally based interventions. Using this approach, evaluation must initially collect information on the occupational profile of the individual through interviews and observations (Fisher, 1998). Along with identifying relevant and meaningful occupations, this involves collecting information about the individual's or family's concerns, problems, and priorities. Observing the individual engaging in targeted occupations is important for identifying the discrepancies between the demands of the task and

the skills of the individual. After identifying the primary problems and priorities, the next stage involves using assessment tools that focus more specifically on areas of occupation, performance skills, and client factors. Pervasive developmental disorders affect many areas of function, and there are a variety of assessment tools that are appropriate for individuals with ASD. Because many individuals are not able to complete standardized assessments, caregiver interviews or questionnaires and clinical observation are sometimes the most appropriate assessment measures for people with ASD. A number of individuals with ASD can complete more formalized assessment procedures, and therefore both kinds are discussed.

Adaptive behavior measures provide a method for evaluating many areas of occupational function. Frequently, the general areas of social, self-help, motor, and communication skills are assessed. The *Vineland Adaptive Behavior Scales—Second Edition* (Sparrow, Cicchetti, & Balla, 2005) specifically measures the areas of communication, daily living skills, socialization, motor skills, and maladaptive behaviors. It is appropriate for use with individuals from birth to 18 years 11 months and for low-functioning adults. There are norms based on all of these age groups. The scales are completed through an interview with the parent or caregiver.

The *Adaptive Behavior Assessment System—Second Edition* (ABAS-II; Harrison & Oakland, 2003) uses a rating form to assess the areas of communication, community use, functional academics, school living, health and safety, leisure, self-care, self-direction, social skills, and work. There are parent, teacher, and adult versions of the ABAS-II. Caregivers or the adults themselves can complete the adult rating scale. It is a norm-referenced test for individuals from school age through adulthood. Adaptive behaviors are highly correlated with cognitive deficits, although these scales also provide important information regarding the function of individuals with ASD who do not have cognitive deficits.

General developmental scales, such as the *Hawaii Early Learning Profile* (Furuno, O'Reilly, Hosaka, Zeisloft, & Allman, 1984) and the *Early Learning Accomplishment Profile* (Glover, Preminger, & Sanford, 1988), are helpful in assessing overall development in young children from birth to 5 years of age. These types of general developmental scales are often used to determine eligibility for early intervention services and can be completed through observation and parent/caregiver interview.

There are documented differences in play in children with ASD. Restricted representation play is a common characteristic of ASD. As play is the main occupation of preschool children, the *Revised Knox Preschool Play Scale* (Knox, 1997) provides an observational measure assessing space and material management, pretense/symbolic aspects of play, and participation in play. This is a tool that has a history of use with preschool children diagnosed with ASD.

If a child is referred for a school-based assessment, the *School Function Assessment* (SFA; Coster, Deeney, Haltiwanger, & Haley, 1998) can guide intervention planning for children with ASD who are in elementary school. The SFA has

three main parts assessing participation in school-related settings, the task supports needed for participation, and activity performance. Activity performance has 21 separate scales measuring a variety of functions necessary for optimal school performance. These include functional communication, written work, clothing management, school travel, and behavioral regulation, to name only a few. This is a questionnaire that can be completed in sections, by one individual who is familiar with the child or by a team of professionals.

Social-emotional measures are particularly relevant to the ASD population because of the nature of the condition. The *Functional Emotional Assessment Scale* (Greenspan, DeGangi, & Wieder, 1996) is an observation assessment looking at the infant's or young child's social-emotional functioning with parents or caregivers. It also provides information on the related motor, sensory, language, and cognitive capabilities.

The *Social Responsiveness Scale* (Constantino & Gruber, 2005) is a rating scale completed by a parent or caregiver for children between the ages of 4 and 18 years. It measures social impairments, including the components of social awareness, social information processing, capacity for social communication, social anxiety/avoidance, and autism preoccupations and traits. It was specifically developed for use in assessment of children with ASD.

Dysfunction in sensory processing and integration is prevalent in individuals with ASD. Some of the most helpful tools for providing insight into sensory processing in relationship to everyday functioning and behavior are the *Infant/Toddler Sensory Profile* (Dunn, 2002), the *Sensory Profile* (Dunn, 1999), the *Sensory Profile School Companion* (Dunn, 2006), and the *Adolescent/Adult Sensory Profile* (Brown & Dunn, 2002). These four profiles cover the ages from birth to adulthood and a variety of settings, including home, school, and community. For each profile, with the exception of the *Adolescent/Adult Sensory Profile*, the caregiver, parent, or teacher completes standardized questionnaires. For the *Adolescent/Adult Sensory Profile*, the individual completes the questionnaire, unless he or she is unable to do so, in which case a caregiver can do so.

The *Sensory Processing Measure* is a rating scale that assesses sensory processing issues, praxis, and social participation in children from the ages of 5 to 12 years (Parham & Ecker, 2007). There is a Home Form, completed by the parents, and a Main Classroom and School Environments Form, completed by school personnel.

The *Test of Sensory Function in Infants* (TSFI; DeGangi & Greenspan, 1981), the *DeGangi-Berk Test of Sensory Integration* (TSI; Berk & DeGangi, 1983), and the *Sensory Integration and Praxis Test* (SIPT; Ayres, 1989) are all standardized tests assessing sensory integration. These require the child to participate in more formal testing procedures. The TSFI is a criterion-referenced rating scale intended to be a screening tool for sensory integration dysfunction in infants between 4 and 18 months of age. The TSI is a norm-referenced test designed to assess sensory integration dysfunction in preschoolers. The SIPT is a battery of

17 tests specifically assessing sensory integration and praxis for children between the ages of 4 years and 8 years 11 months. Administration and interpretation of the SIPT requires specialized training and certification.

The *Peabody Developmental Motor Scales–Second Edition* (PDMS-2; Folio & Fewell, 2000) and the *Bruininks–Oseretsky Test of Motor Proficiency–Second Edition* (Bruininks & Bruininks, 2005) are helpful tools for assessing overall motor function. The *Quick Neurological Screening Test–Second Edition* (Mutti, Martin, Sterling, & Spalding, 1998) assesses certain motor and perceptual functions related to neurological integration.

The *Developmental Test of Visual Perception–Second Edition* (Hammill, Pearson, & Voress, 1993) and the *Beery–Buktenica Developmental Test of Visual–Motor Integration–Sixth Edition* (Beery, Buktenica, & Beery, 2010) may also help identify underlying performance deficits in the areas of visual–motor and perceptual skills. Finally, clinical observations are an essential part of the evaluation process.

Family

Intervention strategies for the child need to be supplemented with ongoing family education. Parents, siblings, and caregivers require information regarding the nature of the child's conditions, the ramifications of the condition on functional behavior, the scope and purpose of occupational therapy, and other components of the intervention program. They also require guidance regarding additional supportive services and resources that are available in the local community (Galvin, 2001). This could include referrals for other services, including speech and language therapy, physical therapy, psychologists, developmental pediatricians, nutritionists, and neurologists. ASD support groups frequently meet in community settings and serve as both a support system and a place for families to acquire knowledge.

Collaboration with a multidisciplinary team that includes families is essential for the most effective interventions. Recent law and policies promote the involvement of the parents in the intervention process. For example, laws guiding early intervention services mandate family-focused interventions. Due in part to these laws, parents are becoming more educated in the service delivery systems and often serve as advocates for their children. Being provided resources and education allows parents to be more successful advocates. With education, families can also implement important interventions in the context of the home and community settings. For example, a child with a sensory processing dysfunction often benefits from a sensory diet implemented into daily routines. Education is essential in helping the family successfully integrate and modify these interventions.

As mentioned previously, many children with ASD are unable to attend or participate fully in formalized assessment procedures; therefore, families serve as important informants for their children. Inclusion of the family in all evalu-

ation procedures encourages an understanding of the family's priorities, culture, and dynamics, along with the development of viable and relevant intervention plans.

Practice Setting

Individuals with ASD can receive occupational therapy services in a variety of settings, including early intervention services in the home or community, schools, outpatient rehabilitation or private practice facilities, and community living centers or adult day programs. They may receive services in more than one setting at a time.

Early intervention services are for children primarily between the ages of birth through 5 years. Children who qualify for occupational therapy from birth through age 3 years typically receive these services in their homes or in community settings, such as day care centers. The occupational therapist's role is to provide family-focused intervention, which often involves family education. Occupational therapy is considered a primary service for children from birth to 3 years and is most commonly provided directly and individually. In many states, intervention funding switches to the school system when a child turns 3 years old. Typically, a child will enter into a preschool program. The family continues to be an important component of the service delivery process, which focuses on the development of school readiness skills and the facilitation of school participation. Direct services can be provided individually or within a group setting. Consultation may also be provided to the classroom teacher or other professional working with the child. Typically, the treatment of ASD is guided by a developmental model focused on sensorimotor development, play skills, social-emotional development, and self-help skills.

School-based occupational therapy is one of the largest practice areas in the profession. Many children and adolescents with ASD will receive occupational therapy services in the school system in order to support successful performance and participation. Services can be provided in varying forms, including consultation, monitoring, and direct intervention, both in groups and individually. The occupational therapist, in consultation with other professionals, such as teachers, physical therapists, and speech therapists, may provide suggestions on how to improve a child's writing, attention span, and/or social skills.

Children and adults with ASD can receive private therapy through outpatient pediatric rehabilitation facilities or private practice therapy clinics. Certain clinics may specialize in an area of practice, such as providing sensory integration therapy specifically for individuals with ASD. Adults with ASD sometimes receive services within community living centers or adult day programs. These services often focus on helping the individual develop the ability to modulate and regulate sensory input, in order to improve attention and decrease secondary behaviors, and engage successfully in self-maintenance and vocational training.

Sociopolitical

Legislation significantly influences intervention funding for children with ASD. The Individuals With Disabilities Education Improvement Act (IDEIA; 2004) is probably the most influential legislation regarding the provision of services for children and adolescents with ASD. Part C of IDEIA defines services for children between the ages of birth and 2 years 11 months. Part B defines services for children and adolescents in special education from 3 to 21 years of age (U.S. Department of Education, 2009). Part B of IDEIA stipulates that a child must fall under one of the categories of disability identified in IDEIA. Autism is included as a category of disability.

The legislation further identifies services as either *primary* or *related*. A service that is considered primary may be provided in the absence of other services. Occupational therapy is a primary service under Part C of IDEIA, but it is a related service under Part B. In the latter case, the child must be receiving special education with an Individualized Education Program (IEP) in order to be eligible for occupational therapy. Funding is provided from both federal and state governments in order to implement programs under IDEA and IDEIA. IDEA was reauthorized and renamed the Individuals With Disabilities Educational Improvement Act, and the changes enable schools to help students make progress in the general education curriculum. One of the most significant additions to the act was “Response to Intervention,” which influences both assessment and how interventions are provided in school settings. Response to Intervention (RTI) allows schools to identify students at risk for failing and provide learning support through monitoring progress, providing science-based interventions, and adjusting the intensity and nature of intervention depending on the student’s needs and response to the intervention. Occupational therapists are legally required to implement evidence-based practice and document the progress of the students we treat.

Other legislation influencing the provision of services for individuals with ASD includes the Rehabilitation Act of 1973 (revised 1986) and the Americans With Disabilities Act of 1990. The Rehabilitation Act requires reasonable accommodations to be made in schools so that the needs of individuals with disabilities can be met as adequately as those of individuals without disabilities (deBettencourt, 2003). Children with ASD who do not qualify for services under the Individuals With Disabilities Education Act (IDEA) can sometimes qualify for occupational therapy services under Section 504 of the Rehabilitation Act. Under this law, a child does not need to receive special education services to qualify for occupational therapy.

Funding for outpatient rehabilitation or services conducted in private practice settings often comes from family resources or medical insurance. Certain medical insurance providers identify ASD as a developmental disorder and thus will not cover occupational therapy interventions for it. Although this is not the case for all medical insurance, education continues to be necessary when working with

insurance providers concerning the roles and scope of occupational therapy. Some states have recently approved legislation requiring that insurance companies cover occupational therapy services for children with ASD.

Lifestyle/Lifespan

ASD is considered a lifelong condition, but intensive services provided in childhood and adolescence appear to have resulted in a large population of individuals with ASD integrating into their communities and living productive and functional lives (Howlin, 2000). Occupational therapists are often involved in the development of programs that assist the transition of a child with ASD from early intervention to school and, finally, to the world of work. Transitions can be particularly challenging for both the child and the family, and consistent professional support and ongoing education is paramount. As the child progresses from early intervention settings to adulthood, the focus of service and intervention changes from the home or community environment to a school and community environment. It also often changes from direct and individual treatment to primarily indirect or group treatment.

The role of the occupational therapist is to prepare and educate the family and the child and to promote the skills necessary for optimal performance when making the transition into each setting. For instance, parental separation issues may emerge as the child moves from early intervention to preschool, while the move to elementary school requires a transition from a part-time to a full-time program. Another major school transition is into the junior high or high school environment, where the student may be expected to function more independently and often with less structure. Preparations for transitions from the school setting to adult life in the community start as early as elementary school, in terms of preparation for future adult roles. For example, a focus on independent daily living activities provides an individual with ASD a foundation for participation in future adult roles. Encouraging families to have children participate in household chores and take on other responsibilities is important for future transitions (Miller-Kuhaneck & Glennon, 2001).

IDEIA requires that the IEP address formal postschool transition planning, which must begin when the child turns 16 years old and must be readdressed annually and include goals addressing transition based on transition assessments. These often include goals focused specifically on life after high school and services required in the transitional process. The student, along with professionals and the family, is involved in setting goals and identifying priorities. Community involvement, social skills, behavioral concerns, and vocational skills are often the primary focus of occupational therapy in the high school years. Occupational therapy interventions may continue into adulthood, addressing similar issues in order to further promote independence.

Along with transition planning, it is important to understand family dynamics and supports across the lifespan of the individual. For instance, the sibling of

a child with ASD may face certain challenges. Families may have difficulty managing the balance of care between the child with ASD and his or her siblings. In certain communities, support groups are available for siblings of children with disabilities or, more specifically, with ASD. Obtaining necessary services and resources for a child with ASD can inflict financial stress on the family.

Along with occupational therapy, individuals with ASD may benefit from speech and language therapy, physical therapy, special education, psychological services, behavioral interventions, and dietary interventions. Interventions often involve complementary approaches. A list of alternative and complementary approaches (Lerner, 2001) is identified in Table 4.1. Some of these approaches are considered controversial because limited research has been conducted, while others are supported by solid effectiveness research.

Clinical Decision-Making Process

Defining Focus for Intervention

The focus for home-based treatment may include promoting optimal interactions with family members, modulating responses to sensory stimulation, and fostering developmentally appropriate skills. For example, treatment interventions may focus on correcting feeding and eating issues related to oral hypersensitivity or decreasing self-stimulatory behaviors interfering with play and interactions. In the school environment, treatment interventions might focus on the development of social skills for peer interaction and sensorimotor skills for computer usage, handwriting, and physical education.

In adolescence and adulthood, treatment interventions often focus on promoting independence in activities of daily living, vocational skills, and the social skills necessary to live in the community. In general, treatment interventions can vary greatly and must be determined by individual needs, family priorities, and cultural beliefs. As pervasive developmental disorders occur on a spectrum, children can vary greatly in their individual needs.

Establishing Goals for Intervention

Goals are established based on the results of the evaluation and the reason for referral. It is also important to consider the priorities of the individual and the family. Including the individual and the family in the goal-writing process can promote successful outcomes. The service delivery model has a significant impact on the goal-writing process. Goals for a child receiving services through early intervention are developed by the family or caregivers during the Individualized Family Service Plan meeting. The parents or caregivers identify the goals toward which they would like to see the child work, and these are documented in the exact language presented. The role of the occupational therapist in this process

Table 4.1 Common and Alternative Treatment Interventions for Individuals With Autism Spectrum Disorders

Intervention	Types or methods
Structural therapy	Osteopathy Cranial-sacral therapy Chiropractic
Treatments to boost immune system	Dietary modifications Feingold diet Gluten- and casein-free diet Yeast-decreasing diet Nutritional supplements Vitamins and minerals Amino acids Essential fatty acids Probiotics and antifungals Immunotherapy Intravenous immune globulin therapy (often used when children have high titers believed to be related to vaccines) Secretin
Treatments addressing sensory processing	Sensory integration Vision therapy Auditory integration training
Facilitated communication	A facilitator provides physical support to the hand, arm, or wrist while the child or adolescent points to a picture or letter or types
Medication	Psychostimulants Antidepressants Hypertensives Anticonvulsants Antipsychotics
Applied behavioral analysis/discrete trial training	Repetitive teaching trials based on providing a stimulus and reinforcing the response; structured curriculum of skill-based tasks
Floortime/Development, Individual and Relationship-Based (DIR) intervention	Focused on affective and relationship-based interventions to address social, communication, cognitive, play, sensory, and motor planning issues
Miller method	Teaches communication and cognition while focusing on physical organization
Treatment and Education of Autistic and Related Communication Handicapped Children (TEACCH)	Structured teaching approach focused on provision of environmental modifications, concrete visual presentation of information, and use of routine

is to educate the family in goal development and to identify strategies and objectives that support the goals identified by the family. In contrast, goals established in the school setting are developed by the occupational therapist with input from the family and educational professionals. These goals need to be measurable and relate to school performance.

ASD can affect many areas of functioning, including social skills, communication, motor skills, cognition, sensory processing, and activities of daily living. These may all be areas of concern identified during the evaluation process, but the goal-writing process needs to focus on the most significant areas of concern, and goals may have to be prioritized. Sociopolitical factors such as funding sources also impact the goal-writing process. For example, insurance companies may require that goals be written in a specific format and that they address only those areas relevant to medical intervention, such as activities of daily living or motor skills. However, all goals should be functional and promote participation in the occupation and roles of the individual.

Designing Theory-Based Intervention

In general, multiple theoretical frameworks are used to guide intervention planning. The developmental theory is particularly applicable to this population. It is based on the premise that individuals develop certain life skills in both a parallel and sequential fashion that promotes adaptive functioning (Walker & Ludwig, 2004). For example, children simultaneously develop motor and cognitive skills but learn to sit before they learn to walk. ASD can delay the development of skills in many areas, including psychosocial, cognitive, language, motor, sensory processing, and daily living. Using developmental theory to inform treatment, an occupational therapist might structure situations that require parallel play and progress to more active interaction with peers.

Sensory integration theory is also widely used to design interventions for individuals with ASD. It is well documented that individuals with ASD are more likely to experience dysfunctions in sensory integration and modulation (Kientz & Dunn, 1997; Mayes & Calhoun, 1999; Ornitz, 1974). This theory is based on the assumption that meaningful registration of sensory input must occur for an individual to make an adaptive response. Another assumption is that the brain has plasticity and, therefore, intervention can change the way the brain responds to sensory input. Dysfunction in sensory integration and modulation is manifested in hypersensitivity to touch and/or sound, avoidance behaviors, sensory-seeking activities such as self-stimulation or self-injurious behaviors, attention disorders, and an inability to make effective adaptive responses. Modulation of sensory responses through structured sensory motor experiences is often the focus of intervention.

The acquisitional frame of reference is used to teach functional skills. It assumes that the learning of functional skills is based on reinforcement (Royeen & Duncan, 1999). Another assumption is that learning a skill results in the belief that one has competence and can influence the environment. This approach is often used in skill-based learning programs and in programs designed to modify behavior. Applied behavioral analysis and discrete trial training are popular approaches with this population.

The psychosocial frame of reference has its theoretical base in developmental theories related to temperament, attachment, social skills, play, and coping abilities (Olson, 1999). It focuses on peer and family interactions. By addressing and understanding those areas (e.g., temperamental qualities, attachment relationships, interactional patterns, play skills), intervention focuses on promoting optimal interactions between peers and family members. One example is the developmental, individual difference, and relationship-based (DIR) model. This is particularly relevant to the ASD population, as communication and social abilities are frequently areas of concern.

Evaluating Progress

Observations and interviews are very important aspects of identifying progress in individuals with ASD. In some instances, progress cannot be measured by more formal assessment procedures but can only be observed or identified by caregivers. For example, after treating an individual with ASD for sensory modulation dysfunction, there may be changes in flexibility and less need for control. Such changes involve the overall quality of life and are not typically addressed in formal assessment procedures.

Documenting progress and, essentially, the effectiveness of interventions is not only ethical but also a legal requirement by some of the largest funding sources for occupational therapy. The IDEIA of 2004 requires practitioners to document the effectiveness of interventions and adjust interventions accordingly. As standardized assessments are often difficult to administer validly to many children with ASD, measurable goals are essential. Goal attainment scaling (GAS) is a method that can be very helpful in the reassessment process and in identifying progress for children with ASD. In GAS, individualized goals are established for the child in collaboration with either the parents or a professional who knows the child well. Each goal is then graded as *below expectations*, *expected level of achievement*, or *above expectations* and provided a number from -2 to $+2$. Total scores can be converted into a standard score to determine progress. GAS is able to depict functional and meaningful outcomes that are often challenging to assess using standardized measures (Mailloux et al., 2007).

Evaluation of progress is ongoing and based on established goals and the treatment plan. In most practice settings, anecdotal records are kept along with more formal documentation methods. For example, 3-, 6-, and 9-month progress notes are often required, as are formal annual reviews, for the early intervention population. The service delivery model (along with funding sources) determines the specific guidelines for documenting progress.

Determining Change in or Termination of Treatment

Change in treatment is warranted if the primary concerns for the individual have deviated, if there is minimal progress toward goals, or if goals have been achieved.

For example, a transition to a community living arrangement may signal the achievement of goals for self-care independence but may also signal the need for new goals, such as the use of public transportation.

Termination of treatment occurs when the individual has met his or her goals or if there has been a plateau of progress over time. It is also important to identify when there is a plateau in progress and reevaluate whether changes in intervention strategies or a continuation of occupational therapy services are warranted. At this point, a referral to other professionals for alternate interventions may be appropriate. Once again, both the service delivery model and the funding sources help to determine termination or changes. For example, a family may need to discontinue services after 30 treatment sessions if that is all that is covered by the insurance company.

Case Study

Description

JT is a 4-year-old boy who has been diagnosed with PDD-NOS. He lives with his mother, an older sister, and a younger brother. For half a day 5 days a week, JT attends a special education program, where he receives 1 hour of speech therapy a week in the classroom setting. He received occupational therapy in his home at the age of 2 years through an early intervention program but no longer qualified when he turned 3 years old and transitioned into a preschool setting. JT's teacher is concerned with JT's unusual responses to sensory activities and his delayed play and motor skills, and she recently referred him for an occupational therapy evaluation. She reported that he also has a difficult time attending to sit-down group activities. JT was evaluated through clinical and classroom observations and interviews with his mother and classroom teacher. He also completed the PDMS-2.

JT does not like to be touched by other people and will often pull away when someone attempts to touch him. He prefers to play by himself away from the other children during free-play time and engages in limited reciprocal play. JT frequently cries during messy play and insists on washing his hands immediately. During snack time, he will only eat crunchy or chewy foods and avoids all foods that have soft textures or varying consistencies. JT's mother reported that he has a very limited food repertoire at home and that he is extremely fussy during grooming tasks, such as brushing his teeth and hair. He refuses to have his hair cut by anyone other than his mother. JT is easily distracted by sensory stimuli in the environment and often is unable to attend for more than a few minutes during group activities because of sensory distractions. Sensory defensiveness appears to be influencing JT's ability to participate fully in his classroom setting.

Along with this, motor planning difficulties appear to further impact JT's play skills. He engages in very little symbolic play with other children and tends to use the same play schemes with most of his toys. JT will imitate a simple symbolic play scheme when one is introduced by an adult, but he does not come up with these schemes on his own. He prefers to stack or line up objects. Motor planning deficits also impact JT's overall motor skills. On the PDMS-2, JT performed fine motor skills in the 25th percentile and gross motor skills in the 30th percentile for his age range.

Long- and Short-Term Goals

The long-term goal of intervention for JT is to help him participate in classroom activities with other children for the designated activity time. The short-term goals of intervention for JT are as follows:

1. Attend to group activities in the classroom setting 80% of the time.
2. Initiate and participate in reciprocal play activities with other children in the classroom during 70% of the free-play time.
3. Expand play skills in order to sequence five or more ideas during symbolic play.
4. Eat and enjoy a variety of foods with varying textures during snack time 80% of the time.

Therapist Goals and Strategies

The therapist's goals include the following:

1. Decrease JT's sensory defensiveness.
2. Increase JT's body awareness for motor planning.
3. Educate the family and professionals on techniques to expand play skills.

The therapist's strategies include the following:

1. Engage in activities that provide calming and inhibitory sensory input, including deep pressure, proprioception, and slow linear vestibular sensory input to decrease hypersensitivity.
2. Provide home instruction and classroom in-service on floortime techniques to foster reciprocal and symbolic play skills.
3. Engage in activities that provide proprioceptive and vestibular feedback to increase the body awareness necessary for motor planning.
4. Provide consultation on classroom modifications in order to decrease extraneous sensory stimuli.
5. Provide opportunities for play time initially with one other child in a safe and structured format and then in less structured play settings.
6. Model appropriate play schemes.
7. Implement an oral sensory-stimulation program.

Activity

JT will choose activities to complete in an obstacle course during free-play time. The choices will include equipment that provides deep pressure tactile, proprioceptive, or inhibitory vestibular sensory input. He will then help set up the course, to expand motor planning schemes and participate in the obstacle course on his own. Eventually, he will be asked to choose a doll or toy to maneuver through the course with him, to expand pretend and symbolic play schemes with objects such as a doll, a stuffed animal, or a toy car/truck. He will also choose one other child to participate in the obstacle course with him and then expand this to a group of children. Suggestions will be made to parents and teachers on games that can be carried out at home and school, as well as toys that foster symbolic and reciprocal play.

This activity was chosen because it addresses multiple areas of needs and allows for the integration of other children into the activity when appropriate. JT's involvement in the development and choice of equipment to be included fosters ideational and motor planning aspects of praxis. The equipment and toys that are available for the obstacle course all provide some form of enhanced tactile, proprioceptive, and/or vestibular sensory input to decrease sensory hypersensitivity and increase body awareness, which is necessary for improved motor planning. Symbolic toys are incorporated into the activity to provide opportunities to model pretend play and for JT to practice the modeled play. The modeling can be done by either the therapist or another child involved in the activity. Throughout the session, the therapist can grade and adapt the activity to promote a challenge that will enhance praxis while allowing the child to be successful. Including other children in the play activity will provide opportunities for JT to expand his social skills with support as needed. As with any skill, if it is not practiced and generalized, participation across settings is limited. Therefore, it is essential to provide suggestions to the teachers and parents on what interventions would benefit JT across settings for enhanced occupational performance and participation in the home, school, and community settings.

Treatment Objectives

1. JT will complete four new motor schemes with minimal assistance as needed.
2. JT will participate in symbolic play, requiring the sequence of at least two new play schemes.
3. JT will interact with at least one other child to successfully guide that child through the obstacle course he developed.

Resources

Internet Resources

The National Autism Association: www.nationalautismassociation.org

Autism Society: www.autism-society.org

Print Resources

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