

# AUTISM SPECTRUM DISORDERS

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## **Introduction**

Autism Spectrum Disorder (ASD), also known as Pervasive Developmental Disorder (PDD), is a profound, life-long developmental disability which appears early in childhood. ASD is categorized as a “spectrum” because it encompasses a group of developmental disorders with accompanying symptoms that vary in severity. ASD is considered to be neuro-behavioral in nature and the effects are considered to be severe (Dyches, Wilder, Sudweeks, Obiakor & Algozzine, 2004).

Commonly diagnosed before age three, ASD is shown to cause restricted and repetitive patterns of behaviors (e.g., fixation with specific parts or sensory aspects of an object), impairments in social relatedness (e.g., failure to develop appropriate peer relationships), and impairments in verbal and nonverbal communication (e.g., delay or absence of spoken language) (American Psychiatric Association [APA], 2000). In addition to Autistic Disorder, the autism spectrum includes Asperger’s Disorder, Rett’s Disorder, Childhood Disintegrative Disorder, and Pervasive Developmental Disorder-Not Otherwise Specified (PDD-NOS). While no specific cause for the disorder has yet been established, there is general consensus that ASD is marked by a dysfunction in the central nervous system (Kabot, Masi & Segal, 2003). However, the process by which the dysfunction in the brain is linked to behavioral characteristics is still an area of great controversy. With growing concerns about rapidly increasing prevalence rates for the disorder and no definitive etiology, parents of children with ASD are constantly seeking effective treatment approaches.

## **Prevalence**

ASD, according to current estimates, is more prevalent in the pediatric population than spinabifida, diabetes, cancer, and Down syndrome and is also four times more common in boys than girls (Filipek et al., 1999). In 1966, Lotter noted a prevalence of four to five per 10,000 children as having ASD. By 1979, Wing & Gould reported that one in every 1,000 children was given a diagnosis. More recently, Volkmar et al. (2005) reported that the incidence of ASD has increased to one in 250 children. Other estimates indicate

prevalence to be at one in every 150 across the spectrum of disorders, and one in 500 for children with Autistic Disorder (Chakrabarti & Fombonne, 2001).

In 2006, the U.S. Centers for Disease Control and Prevention (CDC) gathered data to determine the current prevalence rates of ASD. The information discussed in this paragraph is taken from the CDC (2007a). The CDC determined that eight years was a reasonable index age to monitor peak prevalence. Using this peak age, the CDC reviewed evaluation records in the 11 sites participating in the Autism and Developmental Disabilities Monitoring (ADDM) Network. In the 11 ADDM sites in the 2002-2006 surveillance period, the CDC found the identified prevalence of ASD in children in the United States to be an estimated 1% or one child in every 110. Moreover, the average prevalence of ASDs identified among children in ten sites increased 57%. Although improved data collection and identification of ASD was thought to account for some of the prevalence increases documented in the ADDM sites, a true increase in the risk for children to develop ASDs could not be ruled out. The CDC also discovered that ASD was being diagnosed by community service providers at earlier ages in 2006 than in 2002.

A current controversy surrounds rising numbers: whether they indicate an actual upward trend in the actual incidence of the disorder or whether they reflect, rather, changes in diagnoses. Based on a detailed time-trend analysis of 28 studies published since 1987 which indicate prevalence rates of ASD, Fombonne reported that a conservative estimate “for autism is 13/10,000; 21/10,000 for PDD-NOS; 2.6/10,000 for AS; and 2/100,000 for childhood disintegrative disorder,” and concluded that most of the increase is accounted for by improved identification and by changes in diagnostic criteria and concepts (2005). Whether there is an actual increase in incidence of ASD remains an open question.

## Causes and Risk Factors

ASD affects individuals in all racial, ethnic, and social groups. Although the causes of ASD are not yet known, it has been established that ASD is not caused by any psychological factors (National Information Center for Children and Youth with Disabilities [NICHCY], 2001). Much evidence points, however, to a genetic basis for the disorders (Volkmar, Westphal, Gupta & Wiesner, 2008).

Epidemiological findings reveal that ASD is the most strongly genetic of psychiatric disorders, with a heritability factor greater than 90% (Bailey et al., 1995). As stated previously, ASD is seen more commonly in boys than girls (ratio of 4:1) and biological siblings of an affected child run a higher risk of also having the disorder (APA). Genetic studies are far from congruent, and no model has yet explained the gender disparity and variable phenotype across family datasets (Newschaffer & Curran, 2003). In recent years, there has been a focus on searching for potential environmental causal factors, including immunizations, heavy metals, infectious agents, and pharmacological agents (Volkmar, Westphal, Gupta & Wiesner, 2008). For example, non-heritable risk factors, such as chemical exposure and childhood vaccinations, have been widely investigated in recent years as possible causes (Newschaffer & Curran). Pre- and perinatal maternal infections and birth complications associated with ASD have also been reported with some consistency (Newschaffer & Curran). Most recently, attention has focused on a possible association between childhood immunizations and ASD (Newschaffer & Curran). At this time, there is no conclusive evidence to indicate that these factors play any role in the etiology of ASD. This is discussed more fully in the *Vaccines and Autism* paragraphs which follow in this section.

To summarize, as observed by Kabot, Masi & Segal (2003), there is general consensus that the disorder can be classified at three different but interdependent levels:

1. as a neurological disorder related to brain development;
2. as a psychological disorder of cognitive and emotional; and
3. as a relationship disorder impacting behavioral development, or in which there is a failure of normal socialization.

There is no reason to suppose that there is only one pathway or one specific risk factor, but rather that several etiological pathways can lead to ASD.

## Diagnostic Categories

Each ASD has specific diagnostic criteria as outlined in the *Diagnostic and Statistical Manual of Mental Disorders, Fourth Edition, Text Revision (DSM-IV-TR)* (APA, 2000) and are shown with their distinctive diagnostic features in Table 1. There are, however, no clearly established guidelines for measuring the severity of a child's symptoms. In many situations, it is difficult to isolate the characteristics of autism from PDD-NOS (Boyle, as cited by the National Information Center for Children and Youth with Disabilities [NICHCY], 2001). Accordingly, a child may be diagnosed by one practitioner as having Autistic Disorder and

by another as having PDD-NOS. Therefore, it is important for practitioners to understand the diagnostic criteria for each category since treatment will be based on diagnosis.

Table 1

### Categories of Autism Spectrum Disorder

Disorder	Description
Autistic Disorder	The most common ASD, it is characterized by impairment in social interaction, communication, and imaginative play before the age of three years. Behaviors are stereotyped, repetitive, and limited in interest and range of activities.
Asperger's Disorder	Characterized by impairment in social interactions and the presence of restricted interests and activities. There is no significant general delay in language, although there are qualitative impairments and limited ability to have reciprocal social conversations. Differentiated from Autistic Disorder primarily by the relative preservation of linguistic and cognitive capacities in the first three years of life. Cognitive testing usually yields scores in the average to high-average range.
Pervasive Developmental Disorder Not Otherwise Specified (PDD-NOS)	Also referred to as <i>Atypical Autism</i> . Diagnosis of PDD-NOS is made when a child does not meet sufficient criteria for a specific diagnosis but there are severe and pervasive impairments in specific behaviors, language, and social abilities.
Rett's Disorder	Defined as a "progressive disorder" characterized by periods of "normal" development followed by loss of previously acquired skills, as well as the purposeful use of hands. Replacement with repetitive hand movements begins between the ages of one to 4. So far, this disorder has been identified only in females.
Childhood Disintegrative Disorder	Characterized by "normal" or typical development for at least the first two years of age, followed by significant losses in previously acquired skills in the area of cognitive, social, language, and behavioral development.

Source: APA, 2000.

### Comorbidity

According to the *DSM-IV-TR*, ASD coexists with intellectual disability in approximately 75% of those with the disorder (APA, 2000), and an estimated half of those with Autistic Disorder do not have functional speech (Prizant, 1996). ASD has been reported to co-occur with other developmental and behavioral disorders. High levels of depression, anxiety, inappropriate affective responses and occasionally bipolar disorder can be observed in some youth with ASD, particularly older children with high functioning Autistic Disorder or Asperger's Disorder. Behavioral issues, e.g., hyperactivity, attention deficit, obsessive-compulsive-type symptoms, self-injurious behavior, tics and affective symptoms, are also frequently noted in youth with ASD (Volkmar, Cook, Pomeroy, Realmuto & Tanguay (1999).

According to the practice parameters published by Volkmar et al. (1999), recent research has also centered on studying brain abnormalities measured by an EEG (electroencephalogram). While some of these associations appear to be relatively frequent in youth with ASD, other co-morbid conditions appear to be much less common. Although a link between Autistic Disorder and schizophrenia was once suspected, there is no conclusive evidence that the two disorders are fundamentally related in any way (Volkmar et al.).

### Early Warning Signs

The following behaviors were published by the American Academy of Pediatrics (AAP, 2006) as early warning signs which might assist parents and professionals with early identification and, consequently, early intervention:

- not turning when the parent says the child's name;
- not turning to look when the parent points says, "look at..." and not pointing to themselves to show parents an interesting object or event;
- lack of back and forth babbling;
- smiling late; and
- failure to make eye contact with people.

According to the AAP (2006), the following signs warrant immediate attention:

- no babbling or pointing or other gestures by 12 months;
- no single words by 16 months;
- no 2-word phrases by 24 months; and
- regression or loss of language or social skills at any age.

## Screening and Assessment

The American Academy of Neurology (Filipek et al., 2000), the American Academy of Child & Adolescent Psychiatry (AACAP) (Volkmar et al., 1999), and a consensus panel with representation from multiple professional societies (Filipek et al., 1999) have published specific practice parameters for the assessment and screening of ASD. These publications have made a significant contribution because they laid out, for the first time, consensus guidelines for ASD assessment (Ozonoff, Goodlin-Jones & Solomon, 2005).

According to these parameters, screening for ASD calls for two different levels:

Level I screening is a developmental surveillance that should be performed on all children and involves identifying children at-risk for any type of developmental disability. If the Level I screening raises any cause for concern, the child should then be referred to the next level of screening.

Level II screening of children already identified to be at risk for a developmental disorder involves a diagnostic evaluation and more in-depth investigation. At this level, a distinction is made between Autistic Disorder and other developmental disabilities, and includes evaluation by specialists who seek to determine the best means of intervention, based on the child's profile of strengths and weaknesses (Siegel, Pliner, Eschler & Elliott, 1998).

Table 2 presents the available evidence-based Level I screening instruments available to identify children at risk for any type of developmental disability and, in particular, for ASD. Table 3 presents the available evidence-based Level II screeners/diagnostic tools for ASD.

Table 2

### Level I Screening Instruments

General Developmental Disability	ASD-Specific
Ages and Stages Questionnaire, Third Edition (ASQ; Bricker & Squires, 1999)	Checklist for Autism in Toddlers (CHAT; Baron-Cohen, Allen & Gillberg, 1992)
Child Development Inventories (CDIs; Ireton, 1992)	Modified Checklist for Autism in Toddlers (M-CHAT; Robins et al., 2001)
Parents Evaluation of Developmental Status (PEDS; Glascoe, 1998)	Pervasive Developmental Disorder Screening Test II (PDDST-II; Siegel, 2004)
BRIGANCE® Screens II (Glascoe, 2005)	Australian Scale for Asperger's Syndrome (ASAS; Garnett & Attwood, 1997)

Source: Filipek et al., 2000.

Table 3

### Level II Screening Instruments & Diagnostic Tools

Name of Measure	Type of Measure
Autism Diagnostic Interview-Revised (ADI-R; Lord et al., 1994; Rutter, LeCouteur, et al., 2003)	Comprehensive parent-interview with probes for symptoms of autism
Social Communication Questionnaire <i>formerly Autism Screening Questionnaire</i> (SCQ – Berument et al., 1999)	Parent-report based on ADI-R; briefer than ADI-R; yes/no format
Autism Spectrum Screening Questionnaire (Ehlers et al., 1999)	Checklist measure for completion by "lay informants"
Autism Diagnostic Observation Schedule (ADOS; Lord et al., 2000; 2002)	Semi-structured interactive assessment; four different modules, according to language and developmental levels

Source: Rogers & Ozonoff, 2005.

Once a child has been recognized during the screening process as being at risk for an ASD, a detailed assessment should be completed to establish a diagnosis. Several considerations are important to the assessment process:

- A developmental perspective must be maintained. Since ASD is characterized by an unevenness in development that varies over the lifespan (Ozonoff, Goodlin-Jones & Solomon, 2005), studying a child within a developmental framework provides a benchmark for understanding the severity or characteristics of delays and deviances.
- In evaluating a child with ASD, the clinician should use information from multiple sources and contexts, as symptoms of ASD may be dependent on characteristics of the environment (Ozonoff, Goodlin-Jones & Solomon), measures of parent report, teacher report, and child observation across settings, cognitive and adaptive behavior assessments, and clinical judgments may all factor into a comprehensive assessment of ASD (Filipek et al., 1999).
- Assessments of ASD must be multidisciplinary whenever possible, including professionals from psychology, psychiatry, neurology, pediatrics, speech and language (Ozonoff, Goodlin-Jones & Solomon).

## **General Treatment Principles**

Treatment for ASD is determined by the child's individual needs. A combination of three treatment principles can reduce challenges associated with ASD, lessen disruptive behavior, and provide the child with a degree of independence.

### ***Early Intervention***

According to a review published by Simpson, there are 37 intervention strategies identified for ASD (2005). Of these, four treatment approaches are scientifically based, 13 are identified as promising, and the remaining 20 are unsupported by any research. While there is no consensus as to which treatments work best, mounting evidence from various diagnosis and intervention research suggests that early detection of ASD, which leads to early intervention, is key to improving developmental outcomes (Goin-Kochel & Myers, 2005; Dawson & Osterling, 1997). For children with ASD, participation in specialized intervention programs can optimize long-term outcomes (Volkmar, Paul, Klin & Cohen, 2005). Some young children with ASD who receive early intervention have shown more significant improvements in cognitive, social, and language functioning than older children who undergo the same interventions (Rogers, 1998).

### ***Educational Implications***

Early diagnosis and appropriate educational programs are important for children with ASD (NICHCY, 1998). The Individuals with Disabilities in Education Act (IDEA) (Public Laws 94-142, 99-457, and 102-119) mandates that children with a disability receive a free and appropriate education. Children with ASD may have behavior and communication problems which interfere with learning and thus benefit from a structured plan which can be carried out at home and school (Autism Society of America, 2002). Children with a disability from birth through age two are also eligible pursuant to Part C of IDEA, which was expanded to ensure that all children with a disability receive appropriate early intervention services (Infant and Toddler Connection of Virginia, n.d.).

In Virginia, the Department of Behavioral Health and Developmental Services (DBHDS) is the lead agency which administers Part C of IDEA. Virginia's statewide early intervention system is called the Infant & Toddler Connection of Virginia. Services can be home-based, center-based, or some combination of the two. The nature of the services is based on an assessment of the child and the family priorities. The services that are provided in response to this plan may include the identification of appropriate assistive technology, intervention for sensory impairments, family counseling, parent training, health services, language services, health intervention, occupational therapy, physical therapy, case management, and transportation to services (Biasini, Grupe, Huffman & Bray, 1999).

Once the child reaches age three, special education programs established by IDEA are then available for the child and family (NICHCY, 2009). The services provided through IDEA to school-aged children are most often provided as home-based, center-based or in naturally-occurring environments. An Individualized Education Program (IEP) is developed based on results of the team evaluation and parental input. This plan describes the objectives for improving the child's skills and may include family or parent-focused activities. These services must also be provided in the least restrictive setting possible, but must include a continuum of placements that includes instruction in regular classes, special classes, special schools, home instruction and instruction in hospitals and institutions. As the child gets older, the emphasis on special education programs changes to training in daily living skills, as well as academic subjects. Treatment efforts will also include medical care for any comorbid physical conditions and treatment of any psychosocial dysfunction and comorbid mental disorders.



### **Family-centered Approach**

Family involvement is a critical element of the child's educational program. A multi-disciplinary and family-focused approach, where the service providers and the parents work in a collaborative manner to develop appropriate interventions for the child, is considered the most effective method of service delivery for children with ASD and their families (Volkmar et al., 1999). A family-centered approach relies on the family's direct experience to speak to the child's strengths and needs of their child.

### **Evidence-based Treatments**

For this review, treatments for ASD are described as What Works and What Seems to Work. A summary of these treatments is provided in the paragraphs which follow and listed in Table 4.

#### **Applied Behavior Analysis**

In his mental health report for children, the U.S. Surgeon General recognized Applied Behavior Analysis (ABA) as the treatment of choice for ASD (Rosenwasser & Axelrod, 2001). ABA, also called *Behavioral Intervention* or *Behavioral Treatment*, has consistently been recognized as one of the most well-researched and effective intervention techniques, especially for young children with an ASD (Lovaas, 1987; Dawson & Osterling, 1997; Rogers, 1998; Smith, Groen & Wynn, 2004). According to Green (1996), ABA can be used effectively to produce comprehensive and lasting improvements in many important skill areas in most children with ASD, regardless of their age. ABA, however, is most beneficial when intervention starts before three years of age (Dawson & Osterling; Lovaas & Smith, 2003) and the child undergoes intensive behavior therapy for a minimum of 15 to 20 hours a week (Dawson & Osterling).

The goal of treatment, as described by Lovaas (1987), is to minimize the child's failures and maximize successes. ABA methods are based on scientific principles of behavior to build socially-useful repertoires and reduce problematic ones (Cooper, 1989). This behavioral analytic view asserts that ASD is a syndrome of behavioral deficits and excesses that have a neurological basis, but are also amenable to change in response to specific, carefully programmed, constructive interactions with the environment (Green, 1996).

ABA came into focus in 1966 as a treatment option for children with ASD, when Lovaas and colleagues demonstrated that principles of learning could be used to teach speech to young children with ASD. In 1989, Lovaas & Smith observed that children with ASD do not readily learn in typical environments, but can often learn successfully when given appropriate instructions. Using empirically validated behavior modification procedures, like discrete trial instruction, ABA is an extremely structure-based intervention. The emphasis is on reinforcement provided at high intensity, using precise teaching techniques. Skills that are prerequisites to language – such as attention, cooperation, and imitation – are emphasized. Strong emphasis is also placed on acquiring new behaviors, because the belief is that when children acquire a repertoire of constructive behaviors, there is a lesser likelihood of the occurrence of problem behaviors (Green, 1996).

#### **Discrete Trial Teaching or Training**

Discrete Trial Teaching (DTT), which has its basis in ABA therapy, focuses on the principles of operant learning to intervene with children with ASD. In DTT, children learn which responses to make in the presence of specific words and environmental stimuli. DTT may also be called the ABC model, whereby every trial or task given to the child to perform consists of an *antecedent* (directive or request to the child to perform an action), *behavior* (response from child), and *consequence* (reaction from therapist). Teaching trials are repeated many times, initially in rapid succession, until the child performs a response readily, without adult-delivered prompts (Green, 1996). A pause to separate trials from each other, called the *inter-trial interval*, is essential. Data is kept on multiple trials, and the child moves on to additional tasks as the old ones are mastered. The child's responses are recorded and evaluated according to specific, objective definitions and criteria. Timing and pacing of teaching sessions, practice opportunities and consequences delivery are designed precisely for each child's learning pace and style to more nearly ensure success (Green). To maximize those successes, emerging skills are practiced and reinforced in many less-structured situations. For some high-functioning children with ASD, certain skills can, from the outset, be taught entirely in relatively unstructured environments (Green). However, to ensure that these "naturalistic" practices occur frequently, the practice opportunities have to be arranged carefully, with reinforcers given consistently. The overall emphasis is on teaching the child how to learn in a traditional environment and how to act on that environment in ways such that there are consistently positive outcomes for the child, their family, and others (Green; Lovaas, 1987; Lovaas & Smith, 2003).

#### **Learning Experience: An Alternative Program**

The Learning Experience: An Alternative Program (LEAP) is an educational program that embraces the educational and therapeutic value of peer-mediated interventions (Kohler, Strain & Goldstein, 2005). According to Campbell et al. (2008), LEAP provides classroom instruction, parent education, as needed, the

provision of speech and occupational therapy and other services within the classroom setting. The range of activities varies from quiet to active, child- versus teacher-directed, and from small group to larger group. LEAP instruction is data-driven, individualized, and focused on generalizing learning skills through saturation of learning opportunities throughout the day. Family involvement, which is highly encouraged in this model, entails providing classroom support and instruction. In addition, families are asked to participate in curriculum development for the teaching of core behavioral principles which, in turn, increase desirable behaviors and decrease maladaptive behaviors. Peers are also actively involved in the curriculum as intervention agents. According to Campbell et al., through the use of the LEAP curriculum, children on the autism spectrum have shown decreases in autistic symptoms and long-term improvements in educational, cognitive, developmental, and social domains (Hoyson, Jamieson & Strain, 1984; Strain & Hoyson, 2000).

### ***Pharmacological Treatments***

Although pharmacological treatments cannot cure ASD, pharmacologic interventions may be considered for maladaptive behaviors, such as aggression, self-injurious behavior, repetitive behaviors, sleep disturbance, anxiety, hyperactivity, inattention, destructive behavior, and other disruptive behaviors (Myers, Johnson & the Council on Children with Disabilities, 2007). After treatable medical causes and environmental factors have been ruled out, medication may be considered when behavioral symptoms cause significant impairment in functioning. Once the diagnosis of the comorbid disorder is made, the child may be treated with medications typically used to treat these conditions. Modifications of diagnostic criteria may be necessary to account for clinical presentations of psychiatric conditions in children with developmental disabilities. Neuroleptics (e.g., risperidone), selective serotonin reuptake inhibitors (SSRIs; fluvoxamine & clomipramine), antidepressants (e.g., imipramine), and other mood stabilizers have been tested in different clinical studies with some proven benefits. More rigorous, controlled studies are called for to establish the evidence-base of treatment efficacy (Myers, Johnson & the Council on Children with Disabilities).

### ***Pivotal Response Training***

Pivotal Response Training (PRT) is a behavioral-based intervention that has gained increasing empirical support. According to Campbell et al., (2008), the development of PRT in part has resulted from findings from the DTT literature. PRT, developed by Koegel, Koegel & McNerney (2001), is based on the theory that, if improvements in functioning can be achieved in the areas that are most disabling to children, i.e., "pivotal" areas, then treatment effects should extend to other areas (Campbell et al.). Pivotal areas of intervention in PRT include teaching children to respond to multiple environmental cues, and increasing motivation, capacity for self-management, and self-initiations. PRT has gained increasing evidence-based support in recent years (Campbell et al.; Sherer & Schreibman, 2005) and is now considered one of the more effective proven treatments for children with an ASD.

## **Promising Treatments**

Research findings have shown that the following treatments appear to be effective for treating ASD. These treatments are outlined in Table 4 as What Seems to Work.

### ***Educational and Communication Focused Interventions***

The TEACCH (Treatment and Education of Autistic and Communication related handicapped CHildren) approach recognizes differences in the rate and nature of development among children (Ferrante, Panerai & Zingale, 2002). Teaching objectives are based on individual developmental patterns. The guiding principles of the TEACCH program are to provide strategies that support the person throughout the lifespan, facilitate autonomy at all levels of functioning, and accommodate individual needs (Ferrante, Panerai & Zingale).

### ***Natural Language Methods***

The following information is taken from Families for Early Autism Treatment, Inc. (n.d.). Significant gains for teaching language, such as speech intelligibility, have occurred in recent years. Speech and language pathologists often integrate communication training into the child's behavior program to provide a coordinated opportunity for structured and naturalistic language learning. The chief focus of skill development for children with ASD is communication, because it is the most pervasive area of developmental delay. Instruction in communication skills is designed to provide a generative tool that will serve many immediate needs throughout the child's life.

### ***Picture Exchange Communication System***

The following information is taken from Families for Early Autism Treatment, Inc. (n.d.). The Picture Exchange Communication System (PECS) is a communication-training program that helps children with ASD acquire functional communication skills. Children using PECS are taught to give a picture of a desired item to a communication partner in exchange for the item, thus initiating a communicative act for an actual outcome.

Table 4

**Summary of Treatments for ASD**

<b>What Works</b>	<b>Description</b>
Applied Behavior Analysis (ABA)	Behavioral intervention aimed at improving cognitive, language, communication, and socialization skills at the level of specific behaviors; characterized by on-going and objective measurement of behaviors, implementation of individualized curricula, selection and systematic use of reinforcers, use of functional analysis to identify factors that increase or inhibit behaviors, emphasis on generalization of learned skills.
Discrete Trial Teaching (DTT)	Behavioral intervention based on principles of operant learning; incorporates units of instruction used to teach and assess acquisition of basic skills; discrete trial incorporates same sequential components regardless of skills taught.
Pivotal Response Training (PRT)	Focuses on the most disabling areas of the youth's autism. "Pivotal" areas of intervention include teaching children to respond to multiple environmental cues, increasing motivation, increasing capacity for self-management, and increasing self-initiations.
Learning Experiences: An Alternative Program (LEAP)	Peer-mediated interventions with children with autism in an educational setting and typical peer; individualized, data driven, and focused on generalizing learning skills across context through saturation of learning opportunities throughout the day; family involvement is a major element of this intervention.
Pharmacological Treatments	May be considered for maladaptive behaviors and if the behavioral symptoms cause significant impairment in functioning.
<b>What Seems to Work</b>	<b>Description</b>
TEACCH	TEACCH (Treatment and Education of Autistic and Communication related handicapped CHildren) provides strategies that support the individual throughout the lifespan, facilitates autonomy at all levels of functioning, and accommodates individual needs.
Natural Language Methods	Speech and language pathologists often integrate communication training with the child's behavior program to provide a coordinated opportunity for structured and naturalistic language learning. Instruction in communication provides a generative tool that will serve many immediate needs throughout the child's life.
Picture Exchange Communication System (PECS)	Helps children with ASD acquire functional communication skills. Children using PECS are taught to give a picture of a desired item to a communication partner in exchange for the item, thus linking an outcome with communication.
Other Behavioral Interventions	Joint attention behavior training, which may be especially beneficial in young, pre-verbal children, shows promise for teaching children with autism behavioral skills. Social skills groups, social stories, visual cueing, social games, video modeling, scripts, peer-mediated techniques, and play and leisure curricula are also supported by the literature.
Occupational Therapy and Sensory Integration Therapy (SI)	Occupational therapy helps develop self-care skills, such as dressing, using utensils, personal hygiene and academic skills, and shows promise in promoting play skills and establishing routines to improve attention and organization.  SI therapy often is used alone or as part of a broader program of occupational therapy for children with ASD. The goal of SI therapy is to correct deficits in neurological processing and integration of sensory information to allow the child to interact with the environment in a more adaptive way.

Sources: Commission on Youth Graphic of references listed in text.

**Other Behavioral Interventions**

Joint attention training may be especially beneficial in young, preverbal children. A recent study demonstrated that joint attention and symbolic play skills can be taught (Myers, Johnson & the Council on Children with Disabilities, 2007). Because joint attention behaviors precede social language development, joint attention behavior training, which uses a behavior modification approach, shows promise in teaching behavioral skills (Myers, Johnson & the Council on Children with Disabilities). The successes of social skills groups, social stories, visual cueing, social games, video modeling, scripts, peer-mediated techniques, and play and leisure curricula are supported primarily by descriptive and anecdotal literature, but the research-based literature is growing (Myers, Johnson & the Council on Children with Disabilities).



### **Occupational Therapy and Sensory Integration Therapy**

While occupational therapy is helpful in developing self-care skills, such as dressing, using utensils, personal hygiene and academic skills, it also shows promise in promoting play skills and establishing routines which improve attention and organization in children with ASD (Myers, Johnson & the Council on Children with Disabilities, 2007). Sensory integration (SI) therapy may be helpful as part of an overall program that uses desired sensory experiences to reinforce a desired behavior and to assist with transitioning between activities (Myers, Johnson & the Council on Children with Disabilities). While research on the efficacy of occupational therapy in ASD is lacking, SI therapy is often used alone or as part of a broader program of occupational therapy for children with ASD. The goal of SI therapy is to correct deficits in neurological processing and integration of sensory information to allow the child to interact with the environment in a more adaptive way. Studies are being conducted to evaluate its effectiveness.

### **Unproven Treatments**

Table 5 lists complementary and alternative treatment approaches for which there is conflicting data on their effectiveness.

Table 5

#### **Unproven Treatments for ASD**

Auditory integration training	Detoxification; chelation
Facilitated communication	Dietary manipulations, e.g., elimination of gluten, casein
Hyperbaric oxygen	Hippotherapy; dolphin therapy
Secretin	Sensory integration therapy
Vitamin B6 and magnesium	Craniosacral therapy
Dimethylglycine (DMG)	Behavioral optometry
Intravenous immunoglobulin (IVIG)	Steroids
AZT (zidovudine, Retrovir)	Holding therapy
Relationship Development Intervention (RDI)	Music/art therapy
Antifungal medications	

Source: Kallen, R., 2000.

### **Vaccines and Autism**

Concern has been expressed in recent years about vaccines and their role in the development of autism. It was theorized that a link may exist between ASD and the use of thimerosal, a mercury-based preservative once used in the measles-mumps-rubella (MMR) vaccine (National Institute of Mental Health [NIMH], 2007). Although mercury is no longer used in childhood vaccines in the United States, some parents still have concerns about vaccinations (NIMH). Studies conducted to date show no association between ASD and thimerosal (Minnesota Department of Health, 2009). In May 2004, the Institute of Medicine (IOM) released its final report, which stated that thimerosal had no causal relationship with the development of ASD (NIMH). The recommended vaccination course for all children continues to be two doses of MMR vaccine (CDC, 2007b).

In 2008, in response to public concerns, the CDC commenced a study on thimerosal and ASD, using data obtained from managed care organizations in the United States to determine whether exposure to thimerosal in infancy is related to ASD. Recommended by the IOM, this study is the first rigorous, epidemiological study conducted on the thimerosal and ASD. Data from this study should provide the best available scientific information on whether there is a causal association between exposure to thimerosal and the development of ASD. As of July 2010, this study is still in the data collection phase (CDC, 2010).

### **Activities in Virginia**

In recent years, Virginia has responded to rising concerns about the Commonwealth's ability to provide high quality services to children diagnosed with ASD. In 2006, the Department of Behavioral Health and Developmental Services (DBHDS) convened a workgroup to review ways to provide a coordinated response to educating and treating of individuals with ASD. The workgroup continued its work in 2007 and developed recommendations to address services and supports, including one to establish a central agency for ASD.

In 2007, the Joint Commission on Health Care (JCHC) convened the Workgroup Regarding the Commonwealth's Ability to Serve Children and Adults with Autistic Spectrum Disorder. The workgroup's

objective was to recommend a primary agency for developing, coordinating, and overseeing autism services. This agency, as envisioned, would serve as the primary entity to oversee the provision of services for individuals diagnosed with ASD. The JCHC adopted a recommendation to have the Secretary of Health and Human Resources develop a plan to identify the state agency that should be responsible for serving individuals with ASD and a recommendation about whether the agency should serve individuals specifically with ASD or more generally with all developmental disabilities.

The 2008 General Assembly passed House Joint Resolution 105, which directed the Joint Legislative Audit and Review Commission (JLARC) to examine the services available to Virginians with ASD. JLARC compared services provided to individuals with ASD in Virginia to those provided in other states, assessed availability of ASD training for public safety personnel, and identified best practices and ways to improve delivery of services to Virginians with ASD. The findings from this comprehensive review can be accessed on the JLARC website (JLARC, 2009).

## Conclusion

Early intervention is the single most important effort a parent can make to influence the outcomes for a child with ASD. Proper assessment is crucial in the diagnosis and treatment of ASD. With appropriate intervention, many associated behaviors can be modified and effective strategies can be developed to allow the child to cope with ASD.

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**National Organizations/Resources**

**Asperger Syndrome Coalition of the U.S., Inc.**

[www.asperger.org](http://www.asperger.org)

**Asperger Syndrome Education Network (ASPEN)**

<http://www.aspennj.org>

**Association of University Centers on Disabilities**

<http://www.aucd.org>

**Autism and PDD Support Network**

<http://www.autism-pdd.net>

**Autism Research Institute (ARI)**

4182 Adams Avenue – San Diego, CA 92116

<http://www.autismresearchinstitute.com>

**Autism Society of America**

7910 Woodmont Avenue, Suite 300 – Bethesda, MD 20814-3067

<http://www.autism-society.org>

**Autism Speaks**

**National Alliance for Autism Research**

2 Park Avenue, 11th Floor – New York, NY 10016

<http://www.autismspeaks.org>

**MAAP Services**

P.O. Box 524 – Crown Point, IN 46308

<http://www.maapservices.org>

**National Dissemination Center for Children with Disabilities (NICHCY)**

P.O. Box 1492 – Washington, DC 20013-1492

[www.nichcy.org](http://www.nichcy.org)

**National Institute of Medicine of the National Academies (IOM)**

[www.iom.edu](http://www.iom.edu)

**National Network for Immunization Information (NNii)**

<http://www.immunizationinfo.org>

**National Professional Development Center on Autism Spectrum Disorders**

<http://autismpdc.fpg.unc.edu>

**Online Asperger Syndrome Information and Support**

<http://www.udel.edu/bkirby/asperger>

**Pervasive Developmental Disorders Screening**

Test-Stage I (PDDST), Porter Psychiatric Institute

## **U.S. Department of Education**

### **U.S. Office of Special Education and Rehabilitative Services**

400 Maryland Avenue SW — Washington, DC 20202-7100

Individuals with Disabilities Education Act (IDEA) 2004 Regulations

IDEA, 2004 News, Information and Resources

<http://idea.ed.gov>

IDEA 2004 Fact Sheet

<http://www.ed.gov/admins/lead/speced/ideafactsheet.html>

## **U.S. Department of Health and Human Services**

Administration for Children and Families

Mail Stop HHH 300-F - 370 L'Enfant Promenade, SW — Washington, DC 20447

### **Centers for Disease Control and Prevention (CDC)**

Autism Information Center

<http://www.cdc.gov/ncbddd/dd/ddautism.htm>

### **National Institutes of Health (NIH)**

National Institute of Child Health and Human Development

<http://www.nichd.nih.gov>

### **National Institute on Deafness and Other Communication Disorders**

31 Center Drive, MSC 2320 – Bethesda, MD 20892-2320

<http://www.nidcd.nih.gov>

### **National Institute of Mental Health (NIMH)**

<http://www.nimh.nih.gov/index.shtml>

### **Substance Abuse and Mental Health Services Administration (SAMHSA)**

National Mental Health Information Center

Child, Adolescent and Family Branch, Center for Mental Health Services

<http://www.mentalhealth.samhsa.gov/child>

National Registry of Evidence-based Programs and Practices

<http://www.nrepp.samhsa.gov>

## **Wrights Law**

[www.wrightslaw.com](http://www.wrightslaw.com)

## **Virginia Resources**

### **Autism Outreach, Inc.**

<http://www.autismoutreach.org>

### **Autism Society of America**

Central Virginia Chapter

P.O. Box 29364 – Richmond, VA 23242-0364

<http://www.asacv.org>

Northern Virginia Chapter

P.O. Box 1334 – Vienna, VA 22183-1334

[http://www.autism-society.org/site/Clubs?club\\_id=1200&pg=main](http://www.autism-society.org/site/Clubs?club_id=1200&pg=main)

### **Commonwealth Autism Service**

2201 West Broad Street, Suite 107 – Richmond, VA 23220

<http://autismva.org>

### **Parent Educational Advocacy Training Center (PEATC)**

6320 Augusta Drive, Suite 1200 – Springfield, VA 22150

<http://www.peatc.org>

**Virginia Autism Resource Center**

<http://www.varc.org>

Richmond Office

4100 Price Club Boulevard – Midlothian, VA 23112

E-mail: [info@varc.org](mailto:info@varc.org)

Winchester Office

P.O. Box 2500 – Winchester, VA 22604

E-mail: [shamsi@varc.org](mailto:shamsi@varc.org)

**Virginia Commonwealth University Health System**

Virginia Treatment Center for Children (VTCC)

Autism Center of Virginia/Assessment Clinic for Children with Developmental Disorders

515 N. 10<sup>th</sup> Street – Richmond, VA 23219

<http://www.vcuhealth.org/?id=331&sid=1>

**Virginia Department of Behavioral Health and Developmental Services (DBHDS)**

P.O. Box 1797 – Richmond, VA 23218-1797

Infant & Toddler Connection of Virginia

<http://www.infantva.org/ovw-WhatIsPartC.htm>

Office of Developmental Services

<http://www.dbhds.virginia.gov/ODS-Autism.htm>

**Virginia Department of Education**

Office of Special Education and Student Services

P.O. Box 2120 – Richmond, VA 23218-2120

[http://www.doe.virginia.gov/special\\_ed/index.shtml](http://www.doe.virginia.gov/special_ed/index.shtml)

**Virginia Department of Health**

Child & Adolescent Health, Division of Child & Adolescent Health

109 Governor Street, 8<sup>th</sup> Floor – Richmond, VA 23219

<http://www.vdh.state.va.us>

**Virginia Institute of Autism**

1414 Westwood Road – Charlottesville, VA 22903-5149

<http://www.viaschool.org>

**Virginia Joint Audit and Review Commission (JLARC)**

<http://jlarc.virginia.gov>