Autism Spectrum Disorders – Part 2 Diagnosis and Treatment

DIAGNOSIS

Differential Diagnosis
Diagnosing ASD is no easy task, particularly since ASD may mimic other disorders, and vice versa. Hence, what is required of practitioners is making a differential diagnosis, or differentiating between conditions that share symptoms. One such example is ASD and ADHD, which look remarkably similar.

The CDC [138] has released a handout outlining differences to allow practitioners to make a differential diagnosis between ASD and commonly confused conditions. These conditions are as follows:

*Developmental delays and intellectual disabilities:* Those with intellectual disabilities or developmental delays may display autistic features but may not meet the criteria for ASD. Those with ASD may have an intellectual disability or be of normal intelligence. Those with intellectual disability generally have better social and communication skills than do those with ASD who are of the same cognitive level.

*Fetal alcohol syndrome disorders:* There is an increase in risk of ASD as well as other neurodevelopmental disorders in those children who were exposed to alcohol in utero.

*Genetic syndrome:* There may or may not be a family history, although this is dependent upon the specific disorder. Should dysmorphic features be present, genetic disorders should be considered. There are certain neurogenetic disorders that tend to be associated with ASD; and, these include the following:

- Fragile X – this includes intellectual disability, large ears, macrocephaly, large testicles, hyptonia, and joint hyperextensibility.
• Tuberous sclerosis – this includes hypopigmented macules, seizures, central nervous system hamartomas, and intellectual disability.

• Angelman syndrome – this includes developmental delays, wide-based ataxic gait, progressive spasticity, hypotonia, and seizures.

• Rett syndrome – this is a disorder mainly seen in girls. There is an apparently normal development over the first 5 – 48 months of life that then results in microcephaly. The child then loses the previously acquired hand skills and often develops hand wringing stereotypies. Frequently seizures develop.

Hearing impairment:
Often this can be due to a history of fluid or recurrent otitis media. Those with hearing impairments frequently have speech delays but typically may use a compensatory nonverbal type of communication. These children will make eye contact and utilize facial expression. Those with ASD however can sometimes be described as having selective hearing (they may not respond if someone calls their name, but they become overly sensitive to other noise). Those with hearing impairments are generally under-responsive to all noises, although this may be somewhat variable dependent upon the degree of hearing loss.

Mental Health Disorders:
Mental health disorders is a fairly broad category of differential diagnoses with variable symptomology that depends upon the specific diagnosis. Some of the diagnoses not uncommonly seen in individuals with ASD are outlined below:

• Obsessive compulsive disorder (OCD) – The obsessive thoughts and repetitive actions seen in obsessive compulsive disorder may appear very similar to the kinds of ritualistic behaviors and motor stereotypies seen in ASD.
• Anxiety disorders – those with anxiety problems may be hesitant to interact with other people. They may have problems with change or transitions. Those with anxiety are still socially related, however, and they still have appropriate social insight, whereas someone with ASD does not.

• Depression – Depression may present in a variety of ways, and particularly in children. Children may be withdrawn or they may isolate themselves from others. They may display a blunted affect and avoid eye contact, which are all signs of ASD as well.

• Attention deficit hyperactivity disorder (ADHD) – Those with ADHD can have impairments in social skills as a result of hyperactivity or impulsivity. They may have a hard time sustaining a conversation as a result of inattention. Those with ASD also often have issues with hyperactivity, impulsivity, and inattention.

• Oppositional defiant disorder (ODD) – The behavioral problems seen in those children with ODD are generally intentional. Many children will have temper tantrums at some point; however, children who have ASD are more likely to have tantrums that are associated with anxiety that results from transitions or tantrums that appear to be for no reason.

• Tourette syndrome - The tics seen with Tourette syndrome may appear to be similar to some of the motor stereotypies seen with ASD. Those with Tourette syndrome will generally not have the social or communication problems seen with ASD though. However, there may still be some isolation due to embarrassment or avoidance of peers, which should be taken into account.

Psychosocial factors are important to consider when evaluating individuals with ASD and co-occurring mental illness, for example, issues of abuse and neglect. Those who have a history of psychosocial factors such as neglect or abuse may be very withdrawn or hesitant to interact with other people. They may also
display skills regression, such as a loss of language, or they may display behavioral problems.

*Sensory problems:*
Those with ASD often times have sensory issues such as being hypersensitive to loud noises or avoiding certain textures in foods. A person without ASD but who has sensory impairments will not have the accompanying social and communication impairments.

*Speech and language disorders:*
Those with speech and language disorders will compensate with nonverbal forms or communication. These nonverbal compensations include pointing and gestures. There is a lack of severe social deficits, although there may be some social impairment that results from communication difficulties. In a person with ASD, nonverbal communication and social skills is often lacking.

**Level 1 Screening**
Evidence based recommendations for routine Level 1 developmental screening for ASD are important in the evaluation and treatment planning phases [139]. Providers and nurses need to be knowledgeable and consistent about the following when caring for the individual with ASD:

- Developmental observation should be conducted at all well child visits from infancy on through school age and at any age thereafter if there are concerns that are aroused regarding social interactions, learning, or behavior.

- The recommended developmental screening tools include: Ages and Stages Questionnaire, BRIGANCE(R) Screens, the Child Development Inventories, and the Parents’ Evaluations of Developmental Status.

- Further evaluation is needed should a child fail to meet any of the following milestones:
- Failure to babble by 12 months
- Failure to gesture – such as pointing or waving goodbye by 12 months
- Failure to speak in single words by 16 months
- Failure to speak in two word spontaneous phrases by 24 months
- Loss of language or social skills at any age

- Siblings of those children who have ASD must be carefully monitored for acquisition of social, play, and communication skills as well as the occurrence of maladaptive behavior. Screenings should be conducted not only for ASD related symptoms but also for learning difficulties, language delays, social problems, and anxiety and depressive symptoms.

- ASD screening should be conducted on all children who have failed routine developmental screening procedures utilizing one of the validated instruments: the Checklist for Autism in Toddlers (CHAT) or the Autism Screening Questionnaire.

- Laboratory investigations that are recommended for all children with developmental delays or ASD include audiological assessments and screening for lead exposure. Early referrals for assessments should include behavioral measures, assessments of middle ear function, and electrophysiological procedures. Lead screening should be conducted in any child who has developmental delay and pica, and additional periodic screening should be conducted if the pica (an abnormal craving for non-food substances, i.e. dirt, paint or clay) persists.

**Level 2 Evaluation**

Evidence based recommendations for routine Level 2 diagnosis and evaluation for ASD involve the following [139]:

- Genetic testing in children with ASD, in particular high-resolution chromosome studies and DNA analysis for Fragile X should be performed
should there be a presence of mental retardation or if there is a family history of Fragile X or an undiagnosed mental retardation, or if there are dysmorphic features present.

- Selective metabolic testing should be performed if the following are present: lethargy, cyclic vomiting, or early seizures, or if evidence of mental retardation is evident or cannot be ruled out.

- There is no evidence at the moment to indicate that routine clinical neuroimaging can assist in evaluating or diagnosing ASD. Additionally, there is not sufficient evidence to support the idea that hair analysis, celiac antibodies, allergy test, thyroid function tests, or erythrocyte glutathione peroxidase studies can assist in evaluation or diagnosis.

Another important consideration in the evaluation and treatment of individuals with ASD relate to Consensus Based Principles of Management [139]. There are some recommendations that are based on consensus agreement, and, these are listed below.

**Surveillance and Screening:**
In the United States, states are required to follow Public Law 105-17, the Individuals with Disabilities Education Act Amendments of 1997-IDEA ’97, which orders “immediate referral for a free appropriate public education for eligible children with disabilities from the age of 36 months, and early intervention services for infants and toddlers with disabilities from birth through 35 months of age” [139].

**Diagnosis:**
The diagnosis of ASD should include the usage of an instrument that has at the least a good specificity for ASD and a moderate sensitivity. Sufficient time should be allotted for standardized parental or caregiver interviews regarding concerns and child behavioral history, as well as time given to direct and structured observation or social and communication interactions and play.
Recommended instruments include the use of rating scales and diagnostic parental interviews; examples are outlined below:

- **The Gilliam Autism Rating Scale:**
  This is an instrument that assists both parents/caregivers and practitioners in identifying and diagnosing ASD by examining stereotyped behaviors, communication, and social interaction in individuals. This assessment consists of 42 items that describe behaviors characteristic of individuals with ASD. The assessment is utilized for identification of ASD in individuals, of the ages 3 through 22 years.

- **The Parent Interview for Autism:**
  This assessment was designed to measure ASD symptom severity across a wide range of behavioral domains. The main point of this assessment is to assess behavioral change in young children.

- **The Pervasive Developmental Disorders Screening Test – Stage 3:**
  This assessment may actually screen for several ASD disorders in children as young as 18 months. This assessment is designed to be a parental reporting measure, and the assessment facilitates early identification in order to offer parents, caregivers, and practitioners the opportunity to implement early intervention methods.

- **The Autism Diagnostic Interview-Revised:**
  This assessment is a structured interview that is utilized for diagnosing ASD as well as distinguishing ASD from other developmental disorders and planning treatment. The assessment is designed for children and adults with a mental age above 2 years.

- **Diagnostic Observation Instruments (these are differentiated further as):**
  - The Childhood Autism Rating Scale:
This is a behavioral rating scale frequently utilized to diagnose ASD. The scale rates children on a scale of 1 through 4 on various criteria and comes up with a composite score that rates the child from non-autistic to severely autistic.

- The Screening Tool for Autism in Two-Year-Olds:
  The STAT is an empirically based, interactive measure developed to screen for autism in children between 24 and 36 months of age. It is designed for use by community service providers who work with young children in assessment or intervention settings and who have experience with autism.

- The Autism Diagnostic Observation Schedule-Generic:
  This assessment is observation based and examines the social and communication based behaviors that are frequently delayed in those that have ASD. The assessment consists of four 30-minute observational sessions that contain communication, socially interactive, play, and imaginative elements to test the child.

Medical and neurologic evaluation of the individual with ASD should include the childhood developmental history and milestones. Also, the history should reflect if there was regression in early childhood or later on in life; encephalopathic events, attention deficits, seizure disorders, depression or mania, behaviors such as irritability, self-injury, sleep or eating disturbances, or pica. A neurologic and physical examination in the child should include: longitudinal measurements of the circumference of the head as well as examination of the head for unusual features that may suggest a need for a genetic evaluation, neurocutaneous abnormalities, gait, reflexes, tone, cranial nerves, and a determination of mental status that includes verbal and nonverbal language and play.

Evaluation and monitoring of ASD involves multivariate considerations and approaches, as well as interdisciplinary ASD specialists to ensure best
outcomes. Both the immediate and long term evaluative and monitoring approach of those who suffer from ASD requires a multi-disciplinary approach which may include one or more of the following professionals: psychologists, speech-language therapists, neurologists, audiologists, pediatricians, occupational therapists, child psychiatrists, and physical therapists. In addition, educators or special educators may also be involved. Those individuals who have mild ASD must also receive adequate assessment and diagnosis.

Re-evaluation within 1 year of the initial diagnosis and continual monitoring is one expected aspect of clinical practice. While there is not a need to repeat extensive diagnostic tests, follow-up visits may be helpful when it comes to addressing behavioral, environmental, and developmental concerns. Common and helpful evaluations and developmental tests for ASD are highlighted below:

- **Speech, language, and communication evaluation:**
  A speech, language, and communication evaluation should be conducted on all children who fail a language developmental screening conducted by a speech-language therapist who is trained in evaluating children who have developmental disabilities. Comprehensive assessments of pre-verbal and verbal individuals should take into account such factors as age, cognitive level, and socio-emotional ability. These assessments should examine receptive language and communication, expressive language and communication, voice and speech production, and the collection and analysis of spontaneous language.

- **Cognitive and adaptive behavioral evaluations:**
  A psychologist or other trained practitioner should conduct cognitive evaluation on all children with ASD. Cognitive instruments must be appropriate for both the chronological and mental age and provide a full range of standard scores and current norms that are independent of social ability, include independent measures of both nonverbal and verbal abilities, and provide a full index of ability. A measure of adaptive
functioning must be collected for any child who has been evaluated as having an associated cognitive handicap.

- **Sensorimotor and occupational therapy evaluations:**
  An evaluation of sensorimotor skills should be considered. A qualified professional such as an occupational therapist or physical therapist should conduct this assessment. The assessment should include an examination of both gross and fine motor skills, sensory processing abilities, praxis, unusual and stereotyped mannerisms, and the impact of all of these on the individual’s life.

  An occupational therapy evaluation is suggested when the deficits that are present exist in functional skills or in the areas of leisure/play, self-maintenance in daily living activities, or in productive school or work tasks. Sensory Integration and Praxis Tests may be utilized on a case-by-case basis to detect certain patterns of sensory integrative dysfunction, although these are not always routinely warranted in all evaluations of those children who suffer from ASD.

- **Sensory Integration and Praxis Test (SIPT):**
  This assessment is a battery of 17 subtests that require children to perform a variety of motor tasks, either visual, tactile, kinesthetic, or motor, to assess sensory integration. The assessment is intended for ages 4 years through 8 years, 11 months [139].

- **Neuropsychological, behavioral, and academic assessment:**
  These types of assessments should be performed on an as needed basis in addition to cognitive assessments. These assessments should include relationships and social skills, educational functioning, learning style, problematic behaviors, sensory functioning, self-regulation, motivation and reinforcement.
There should also be an assessment of family resources performed by a qualified psychologist or other professional to include an assessment of the parent or caregiver’s understanding of their child’s condition as well as familial strength and talents, stressors and adaptations, and supports and resources. This also offers the practitioner the opportunity to offer the family the proper counseling and education.

**Psychological Assessment Tools**

*Autism Diagnostic Interview – Revised (ADI-R)*

The Autism Diagnostic Interview – Revised (ADI-R) is a clinical diagnostic tool utilized to assess autistic disorder in both children and adults [140]. The ADI-R offers a diagnostic algorithm for autism that is described in the ICD-10 and in the DSM. This diagnostic tool focuses on autistic behaviors in 3 primary areas: qualities of reciprocal social interactions; communication and language, and; restricted and repetitive stereotyped interests and behavior. The ADI-R is appropriate for use in with children and adults who have a mental age of 18 months and older.

The tool contains 93 items. Beyond the three main areas of focus the tool also includes other areas relevant for treatment planning; for example, self-injury or over-activity. Responses to items are scored by a clinician, which is based on the parent or caregiver description of the child or adult individual behavior. Items are organized around content area, with definitions of behavioral items being provided. For example, in the area of communication, “Delay or total lack of language not compensated by gesture” [140] is broken down further into behavioral items that are specific, such as pointing to items or expressing interest, nodding or the head, or expressing conventional gestures.

All items in the ADI-R ask about current behavior. The exception to this is found with a few behaviors that only occur within specific age periods. In these items, specific age limitations are given. For instance, items that ask about group play are referring only to behavior displayed between ages 4 and 10. In addition to inquiring about current behavior, items focus on time periods in which behaviors
are likely to be pronounced – this is generally between the ages of 4 to 5 years of age.

The tool begins with an introductory question that is followed by questions about the participants’ early development. After the introductory question, the following 41 questions regard verbal and nonverbal communication. Questions 50 – 66 specifically regard social development and play. There are included questions that regard interests and behaviors; and, there are 14 questions that regard “general behavior”. The final 14 questions in the ADI-R include questions about motor skills, memory skills, over-activity and fainting.

The ADI-R tool generates scores in each of the three main content areas as stated above. Elevated scores are indicative of problematic behavior in that particular area. Scores are based on a clinicians’ judgment, with a clinician giving a score of 0 – 3 for each item: a score of 0 is awarded when “behavior of the type specified in the coding is not present”; a score of 1 is awarded when “behavior of the type specified is present in an abnormal form, but not sufficiently severe or frequent to meet the criteria for a 2”; a score of 2 is indicative of “definite abnormal behavior”, and; a score of 3 indicated “extreme severity” of the behavior in question [140]. Additionally, there are also scores of 7, which indicates “definite abnormality in the general area of the coding, but not of the type specified; scores of 8, which indicates “not applicable”, and; scores of 9, which indicates “not known or asked” [140]. All of these scores are converted to 0 in the algorithm.

A child is classified as autistic when the scores in all three main content areas meet or exceed certain specified cutoffs and the onset of autistic spectrum disorder is evident by 36 months of age. The same algorithm is utilized for children who have mental ages of 18 months through adulthood, with 3 versions that contain minor modifications, which are:
A life-time version
Version that is based on current behavior
Version utilized for children under age 4

This algorithm specifies a minimum score in each main content area to lead to a diagnosis of autism.

There are some practical issues to consider when utilizing this diagnostic tool; such as, this interviewer-based tool requires quite a bit of training in both administration and scoring. The test, however, when administered by a well-trained professional, only takes approximately 90 minutes for children and slightly longer for adults. The test has a strong background of internal validity as well as inter-rater and test-retest reliability [140].

**Autism Diagnostic Observation Schedule (ADOS)**

The Autism Diagnostic Observation Schedule (ADOS) is a semi-structured assessment tool that examines communication, social interaction, and play in individuals who are suspected of having autism spectrum disorders [141]. ADOS consists of four different modules, each of which is appropriate for use for testing on children and adults of different developmental and language levels.

The ADOS is a standardized testing tool and is comprised of standardized activities that allows the administrator to observe the presence or non-presence of behaviors that have been determined to be important to extending a diagnosis of ASD. The test is administered through the administrator selecting the module that is most appropriate for the individual’s language level and chronological age. The participant’s response is then recorded within each module and overall ratings are made at the end of each schedule. The ratings may then be utilized to formulate a diagnosis by way of utilizing an algorithm for each module.

The ADOS basically provides a 30 – 45 minute observation period in which the administrator of the test presents the participant with a number of opportunities to exhibit typical ASD behaviors by pressing the individual to communicate through social interaction and language skills [141]. The modules offer social-
communicative sequences that unite a series of both unstructured and structured situations, each of which offers a different combinations of the above-mentioned presses for social behaviors.

Module 1 is designed for individuals who do not regularly utilize “phrase speech” [141]. Materials in this module have been selected for younger children, although materials from other modules may be substituted if the administrator so desires. Module 2 is designed for individuals who have some phrase speech but do not possess verbal fluency. Module 3 is designed for individuals who are verbally fluent, which is defined as “having the expressive language of a typical four-year-old child” [141]. Module 3 also includes tasks such as playing with age appropriate toys – this typically encompasses up to ages 12 – 16. Module 4 is much the same as module and includes many of the same tasks; and, Module 4 is intended primarily for verbally fluent adolescents and adults. The biggest difference between module 3 and module 4 is in whether information about social communication is more suitably acquired during playtime or during a conversational interview.

The four modules overlap in terms of activities and together they contain a variety of tasks. These tasks range from observing the way a young child requests that the administrator continue to blow up a balloon in Module 1 to a conversation about a social relationship in Module 4. Modules 1 and 2 are frequently conducted whilst moving about different places in a room whereas Modules 3 and 4 are frequently conducted whilst sitting at a table and consist of more conversation and language that do not come along with physical context. The superficial appearance of each of the different modules may seem quite varied; however, the general principles involved in the deliberate variation of the administrator’s behavior when it comes to utilizing a hierarchy of both structured and unstructured behavior remain the same. Standardization lies in this hierarchy of behavior that is employed by the administrator and the types of behaviors that are taken into consideration in each activity during the ratings. The activities work to structure the interaction.
The ADOS offers practitioners the opportunity to observe social and communication behaviors in standardized and well documented contexts, and the primary goal of the ADOS is to provide a standardized context in which to observe social and communicative behaviors of participants across the life span in order to aid with diagnosis. For diagnostic purposes, use of the ADOS should also be accompanied by other information, in particular a detailed observational history from parents or caregivers when possible.

Other questionnaires
There are a number of other developmental and behavioral screening tools available. These include the following:

- Ages and Stages Questionnaire (ASQ-3):
  The ASQ-3 covers ages 1 month through 66 months. There are 21 questionnaires and scoring sheets for the following childhood ages: at 2, 4, 6, 8, 9, 10, 12, 14, 16, 18, 20, 22, 24, 27, 30, 33, 36, 42, 48, 54, and 60 months of age. The ASQ-3 screens several different areas, which include communication, fine motor, gross motor, personal and social skills, and problem solving. The ASQ-3 is completed by parents and caregivers and is scored by a professional or clerical worker trained at scoring the assessment [142].

- Ages and Stage Questionnaire: Social-Emotional (ASQ:SE):
  The ASQ:SE covers ages 3 through 66 months. There are 8 questionnaires for use at 6, 12, 18, 24, 30, 36, 48, and 60 months of age. The ASQ:SE screens several different areas, including self-regulation, communication, autonomy, interaction with people, compliance, adaptive behaviors, and affect. The ASQ:SE is completed by parents or caregivers and is scored by a professional [143].

- Brief-Infant-Toddler Social-Emotional Assessment (BITSEA):
The BITSEA covers ages 12 months through 36 months. The BITSEA is a social emotional screener that may be administered by a parent or caregiver and is scored by a professional with a minimum qualification of a Master's degree in a related field [144].

- Child Development Inventory
  The Child Development Inventory covers ages 0 through 6 years and is a 300-item questionnaire that parents may complete either in the home or in a professional's office. The purpose of this assessment is to record observations of the child's behavior. This assessment screens several different behavioral areas, including social, gross motor, fine motor, self-help, language comprehension, expressive language, numbers, and letter.

  The assessment also includes a General Development Scale as well as 30 items designed to identify a parent or caregiver's concerns about their child's growth, health, hearing, vision, behavior, and general development [145].

- CSBS DP Infant-Toddler Checklist:
  The CSBS DP Infant-Toddler Checklist is designed to assess children ages 6 months through 24 months. Components include a 1 page Infant-Toddler Checklist, a 4 page Caregiver Questionnaire, and a Behavior Sample, which is conducted while the parent and child interact. The CSBS DP Infant-Toddler Checklist screens several different language predictors, including emotion and eye gaze, gestures, words, object use, communication, sounds, and understanding. Caregivers or professionals who are trained to assess young children, such as speech language therapists or early interventionists, conduct the assessment; a professional scores the results [146].

- Parents Evaluation of Developmental Status (PEDS):
PEDS is an assessment designed for children ranging in age from 0 through 8 years. PEDS is considered one of the most brief, yet accurate, methods for early detection of ASD. The screening consists of 10 short questions that parents complete. PEDS helps parents decide the following:

- If a child needs a developmental or mental health assessment, and if they do, then a determination is made of the kind of testing needed.
- If parents need advice, a determination is made on what topics for which advice is required.
- If a child needs to be watched over time to offer prompt attention for emerging potential problems.
- Whether or not reassurance and monitoring is what is required or if there is something more that is required.

All children at high risk on PEDS should be referred and monitored. PEDS takes only approximately 2 minutes to complete and may be completed even in practitioners' waiting rooms. There is a high specificity to this assessment. Further, PEDS is an assessment that may be administered online [147].

- **Parents Evaluation of Developmental Status-Developmental Milestones (PEDS:DM):**
  The PEDS:DM is an assessment designed for children from 0 to 7-11 years of age. This assessment may be used either with the original PEDS assessment or on its own. Each item assesses a different developmental domain, including fine motor and gross motor skills, expressive and receptive language skills, self-help, social-emotional skills, and for those children who are older, skills such as reading and math. If there is failure on an item it often predicts difficulties in that domain.

  The assessment is designed with a high specificity and to provide clear criteria regarding when to refer. There is value in utilizing the PEDS and
PEDS:DM together, as the two assessments combined have only 16 to 18 questions to answer per visit. The assessment is designed to address parental or caregiver concern as well as focus the visit. It also helps ensure collaboration between the parent and the practitioner in that it puts the two together on the same page in terms of where treatment is headed [148].

- **Social-Emotional Growth Chart**
  The Social-Emotional Growth Chart takes approximately 10 minutes to administer and is appropriate for ages 0 through 42 months. The assessment consists of a questionnaire that is to be completed by the parent, caregiver or educator in order to help the practitioner come to an understanding about how the child utilizes all of his or her capacities to deal with feelings, meet needs, think, and communicate with others. The questionnaire contains 35 items that are ordered developmentally and according to the age at which the item is usually mastered. The items are rated utilizing a 5-point scale. This assessment is given as a preliminary step and is utilized for early identification of ASD. It may be utilized to determine if further assessment or a referral is needed and may also help in monitoring growth or in planning intervention [149].

- **Modified Checklist for Autism in Toddlers (M-CHAT):**
  The M-CHAT is designed for children ages 16 through 30 months. This assessment is administered to assess a toddler’s risk of development of ASD and may be administered by parents, caregivers, or practitioners. The main fault of the M-CHAT is that it has a high rate of false positives; this stems from the fact that one of the main goals of the assessment is to maximize specificity. Therefore, not all children who score as being at risk for ASD will actually be diagnosed with ASD. To adequately address this issue, a structured follow-up interview should be conducted following the administration of this test [150].
• Autism Spectrum Screening Questionnaire (ASSQ):
The ASSQ is a 27-item checklist that may be completed by parents or caregivers that is designed to assess children ages 7 through 16. This assessment is designed to examine symptoms that are characteristic of high functioning ASD, such as Asperger syndrome, in those children who have either normal intelligence or mild mental disability [151].

• Social Communication Questionnaire (SCQ):
This assessment is designed to assess children ages 4 and older and is a cost effective way to screen for ASD, so long as the individual's mental age exceeds 2 years of age. The SCQ assists in evaluating communication skills as well as social functioning in those children who may have ASD. A parent or caregiver completes the assessment. This assessment may be completed under ten minutes. The SCQ is available in two formats – Lifetime format and Current format. Each of these formats is composed of 40 yes or no questions.

The Lifetime format focuses on the child’s developmental history. The Current format moves from developmental history to the child’s present status and examines the child’s behavior over the most recent previous 3 months. The purpose of the Lifetime format is to aid in screening and referral. The purpose of the Current format is to aid in treatment planning, educational intervention, and to map and measure changes over time. The SCQ may also be utilized to compare symptoms across groups – for example, to compare symptoms across groups of children with a variety of language disorders [152].

ASD AND CO-MORBIDITIES

Epilepsy
ASD and epilepsy often co-occur. Approximately 30% of those children with autism have epilepsy, and approximately 30% of those children with epilepsy
have autism. When these two disorders co-occur they are often also associated with intellectual disability. While both ASD and epilepsy are considered heterogeneous disorders with multiple pathophysiologies and etiologies, there may still be some common underlying pathophysiological mechanisms that can help to explain why these two conditions frequently co-occur. For example, it has been proposed that both ASD and epilepsy are disorders of synaptic plasticity that result in excitation and inhibition imbalances in the developing brain. Synaptic plasticity refers to the process where synapses, which are the connections between two neurons, get strengthened through experience or practice. Synaptic plasticity relies on a variety of proteins whose genes are interrupted in certain genetic conditions that are associated with autism and epilepsy. Many of these conditions are also co-morbid with ASD and epilepsy and include such conditions as Rett Syndrome, Fragile X, and tuberous sclerosis.

The effect of seizures and epileptogenesis on the developing brain is important to understand. There are a number of possible effects of seizures and epileptogenesis on the developing brain on synaptic plasticity. Emerging evidence indicates that seizures that occur early on in life may alter the functioning of neurotransmitters and intrinsic neuronal properties of the brain, which may possibly contribute to cognitive impairments as well as learning impairments.

Gamma-Aminobutyric acid (GABA) is the primary inhibitory neurotransmitter in the brain, and the GABA-A receptors are those that mediate most fast synaptic inhibition. Changes in inhibitory neurotransmission have been known to affect learning, a common difficulty seen in those with ASD. Changes in excitatory neurotransmission can also lead to behavioral or learning differences after seizures early in life.
Glutamate is the main excitatory neurotransmitter in the brain, whose activity is mediated by a number of receptor subtypes, including N-Methyl-D-aspartate (NMDA) and non-NMDA, ionotropic receptors and metabotropic receptors. Excitatory signaling is critical for different types of long-term potentiation (LTP) and hippocampal learning. It has been found in some studies [157, 158] that mutant mice that lack subtypes of α-Amino-3-hydroxy-5-methyl-4-isoxazolepropionic acid (AMPA) or NMDA receptors have impaired learning. Further, changes in neuromodulatory pathways can also contribute to behavioral or learning differences following early-life seizures.

**Tuberous Sclerosis**

Tuberous sclerosis also frequently co-occurs with both ASD; a high co-occurrence is also seen with epilepsy. Tuberous sclerosis is a neurocutaneous disorder that is characterized by benign tumors and mental retardation, as well as epilepsy and autistic disorder. This syndrome results from mutations of tuberin or hamartin; together these inhibit the phosphatidylinositol 3-kinase (PI3) signaling pathway involving the mammalian target of rapamycin (mTOR) as well as a cascade of other downstream kinases that stimulate cell growth and proliferation, and protein translation [154].

Mutations of tuberin or hamartin in tuberous sclerosis lead to a hyperactivation of mTOR and downstream signaling pathways, and results in increased cell growth and proliferation and abnormal gene expression. The precise mechanisms of ASD in tuberous sclerosis are not known at this time. However, it is believed that ASD may stem from persistent seizures that occur early in the development of certain regions of the brain, such as those responsible for social perception and communication, located in the left temporal lobe [159]. Further, alterations in expression of certain glutamate and GABA-A receptor subunit as well as decreases in glutamate transporter GLT-1 may help bring about imbalances in excitation and inhibition [160, 161].

**Sensory Processing Disorder**
Unusual sensory processing has been reported in ASD [162]; however, most of the research has been focused on sensory processing disorders in children. Previous studies show that unusual sensory responses are present in most children who have ASD [163]; this has been identified since the earliest description of ASD [164]. These sensory abnormalities have primarily been described in relation to vision, taste, sound, touch, and smell [165], to include hyper and hypo sensitivity as well as general sensitivity overload. Additionally, responses have been reported as early as 6 – 12 months of age and are considered one of the earliest indicators of ASD in young childhood.

It is accurate that many individuals with ASD focus on details. One study indicates [166] that this particular trait may lie beneath stereotyped routines as well as repetitive interests and behaviors. The study examined 29 children who were diagnosed with either high functioning autistic disorder or Asperger syndrome who had completed the Embedded Figured Test (EFT). Parents or caregivers completed the Short Sensory Profile and Childhood Routines Inventory. The study found significant correlation between the degree of the amount of restricted and repetitive behaviour that was reported by parents or caregivers and the degree of sensory abnormalities.

Another study that examine sensory processing in adults utilizing the Adult/Adolescent Sensory Profile (AASP) indicated that 94.4% of the participants being studied reported extreme levels of sensory processing [162] in at least one sensory quadrant of the profile. Further, analysis of the patterns of sensory processing impairments suggests that individuals with ASD may experience extremely different, although severe sensory processing abnormalities. It is important to note that sensory processing abnormalities in ASD extend across the lifespan; they are not simply present only in childhood. Therefore, it is essential that the practitioner treat these issues with care in both children and adults.

**Fragile X Syndrome**
Fragile X syndrome is considered the most frequent form of inherited mental retardation [154]. Further, those with Fragile X and ASD may have a significantly lower IQ than do those with Fragile X who do not have ASD. Fragile X frequently presents with ASD as well as epilepsy. A hallmark of Fragile X pathology is a hyperabundance of dendritic spines with long, thin and immature morphology [167, 168], and Fragile X is a result of an expanded triplet repeat in the FMR1 gene.

Fragile X is a genetic, and therefore medical, diagnosis. This is an important distinction from ASD, which is a behavioral diagnosis. However, when it is associated with Fragile X, autism is caused by the genetic changes in the Fragile X gene [169]. This may be compared to other genetic conditions such as Down syndrome; individuals with Down syndrome may have related conditions such as autism or hearing loss. If a child is first diagnosed with ASD and then subsequently diagnosed with Fragile X syndrome, it is considered that the cause of the ASD is known, the cause being Fragile X.

It is estimated that between 15 – 33% of children who have Fragile X also have ASD [169]. Many of these children are considered high functioning, as while they do not meet the criteria for full autistic disorder, they do exhibit autistic like symptoms, such as social anxiety, poor eye contact, sensory issues, hand flapping, and shyness. ASD is more common in males with Fragile X than it is in girls with Fragile X. In comparison, it is estimated between 2 – 6% of children who have ASD also are diagnosed with Fragile X. This leads researchers to believe that all children with ASD, both male and female, should be genetically tested for Fragile X as well as other genetic causes of ASD.

**Anxiety Disorders**

The relationship between ASD and anxiety is not well understood at the moment. However, it is evident that anxiety is a big problem for a large number of those individuals who suffer from ASD. One review [170] estimates that comorbidity ranges from 11 – 84%. Certain variables have an influence on each individual's experience of anxiety; these include the type of ASD diagnosis, cognitive function, and level of social impairment.
There are a number of questions about the presentation and the course of anxiety in children with ASD, as the development and the course of specific types of anxiety as seen in ASD patients is not well understood. While the presentation of anxiety in children with ASD is in some ways similar to the presentation in children without ASD, some studies [171] have found marked differences. For instance, phobias may be more common among younger children who have ASD, whereas disorders such as social phobia or OCD may be more common in adolescents with ASD.

It is also thought that anxiety symptoms are often overlooked or mislabeled in children with ASD, primarily because children with ASD frequently lack the ability to express themselves in an emotionally accurate way. Additionally, it is thought that children with ASD face unique and considerable challenges as they transition from childhood into adolescence, as difficulties with social interactions and an awareness that they are different from others may lead to problems with anxiety, depression, or hostility [172]. Also, for teens with ASD, the new environments and quickly changing routines that come with high school as well as hormonal and physical changes may prove to be overwhelming and lead to anxiety [170]. Therefore, it is essential to understand that anxiety in children and teens with ASD is not only unique but a constantly shifting and changing dynamic. Understanding this concept will allow for informed development of adequate treatment options.

It is also essential to consider the degree to which anxiety in children who suffer from ASD affects relationships with parents and caregivers, as the quality of these relationships may in turn have an effect on the child’s mood. For example, if the parent or caregiver of an ASD child handles anxiety in a positive and calm manner, the relationship may remain positive, lessening the child’s overall anxiety as opposed to perpetuating it. In other words, there may be a bidirectional influence [172].
Treatment for children with both ASD and anxiety is woefully inadequate. Further research is needed in this area, in particular in such areas as adapting traditional approaches such as cognitive behavioral therapy (CBT) to ASD populations. Further, more thought should be put into the ways individuals with ASD think, behave, and feel in order to provide them with the very best and most effective treatment [173]. Of the treatments that are available, a multimodal approach is often considered the best approach, taking into consideration the child’s learning style, as well as strengths and limitations. The multimodal approach would include such approaches as individual therapy, occupational therapy (for children with sensory sensitivities or sensory-seeking behavior), and school consultations (to add structure), just to name a few approaches. Medications can sometimes help alleviate severe anxiety as well as complement therapy, although medications can affect the ASD brain differently than the normal brain. Parent education and parental support groups sometimes also help by providing a stable foundation for the anxious ASD child.

One review maintains that issues with anxiety “likely cause additional social and developmental impairment above and beyond the impairment caused by the core difficulties associated with ASD” [170]. The review further points out that ASD conditions are lifelong conditions and that a large number of individuals with ASD will need psychiatric care as they progress toward adulthood. Therefore, the need for accurate diagnosis and treatment of psychiatric conditions in those individuals with ASD is essential.

Parents and caregivers can assist in diagnosis by being observant of their child’s behavior at home and school. For instance, the child may start to act out more at home or school, or may display an increase in repetitive behavior or restrict more. The child may not be able to report symptoms accurately or could deny feeling anxious, despite showing symptoms that clearly display a problem, so it is essential that practitioners instruct parents to be observant to behaviors that are normal or abnormal for their child, as a child with ASD may not have insight into his or her inner feelings or anxious thoughts.
**Intellectual Disorders**

Intellectual disorders and ASD co-occur at very high rates. It should also be noted that the greater the severity of one of these disorders, the more the effect there appears to be on the other [38]. Intellectual disorders (ID) present cognitive, social, and adaptive skills deficits. Also, ID is frequently accompanied by stereotyped and challenging behaviors, such as repetitive behaviors [174]. Comorbid psychopathologies of a number of types – for example, depression, anxiety, or schizophrenia – may also present themselves [175]. All of these issues may be problematic for both the individual suffering from ASD and the practitioner, and these issues can prove to be debilitating [176].

One study [177] speculates that a great deal of the recent advances in ASD treatment has been with people who have ASD and are intellectually normal. Further, they posit that as a consequent, many of those individuals with ID may be overlooked. This is the case despite the fact that there is knowledge that ID co-occurs with ASD, and this knowledge has existed for several decades.

It should be noted that those with co-occurrent ID and ASD have different needs than those individuals who simply have ID or ASD alone. There are therefore 3 distinct groups present: those with ID, those with ASD, and those with co-occurrent ID and ASD [178]. Currently, it is difficult to make a clear distinction between symptoms in these groups. More scale development is required to make this distinction easier.

The combination of ASD and ID offers a number of challenges and deficits across a range of skills and behaviors that are not only seen in ASD or ID. For example, in individuals who had “severe and profound” ID with co-occurrent ASD, one study [179] found that these individuals had greater behaviorally based feeding issues, particularly where food refusal and selectivity were concerned, as compared to those individuals who had ID on its own.

Challenging behaviors have also recently seen a great amount of increased study. For example, researchers have discovered that as IQ decreases, the
severity of ASD and challenging behaviors increases, making ASD and ID major risk factors. Murphy et al [39] discovered that severe IQ and ASD were correlated with higher rates of challenging behaviors, but these correlations were not across the board. In particular, self-injury was correlated to severity of autism [180]. For those children with autism, functional assessment for challenging behaviors indicated that these behaviors were maintained through escape or retention of tangible items.

Those children who have co-occurrent ASD and ID do not tend to grow out of challenging behavior; rather, the challenging behaviors tend to persist of the life span with persons who have the highest rates of challenging behaviors early in life still having the highest rates of challenging behaviors later in life. Murphy et al [181] observed this to be the case in a study of 141 people who suffered severe ID and autistic disorder in a 12-year follow-up study. Practitioners should consider patterns of challenging behavior to be a high priority, as these problem behaviors occur at a very high rate. However, it is important to note that there is still much to be learned. The available research on this topic is small at the moment but is promising.

**Attention deficit hyperactivity disorder (ADHD)**

Children who have ASD and ADHD have some of the same features, which may complicate diagnosis [183]. For example, both experience attention deficit and over activity, behavior problems, and social difficulties. Often, the child is simply diagnosed with ADHD and a diagnosis of ASD is missed.

To further complicate matters, according to the DSM as well as the ICD-10, a diagnosis of either autism or Asperger syndrome automatically precludes a diagnosis of ADHD [184]. However, there is most certainly symptom overlap, as seen in population-based twin studies [185, 186] as well as a recent epidemiologically based study that reported a high rate of ADHD in autism and ASD [187]. In the DSM-V the diagnosis of ASD will no longer preclude a diagnosis of ADHD.
It is estimated that there is an approximate 30% prevalence of ADHD in individuals with ASD. This is about 6 times higher than the prevalence of ADHD in children and adolescents worldwide [188]. Further, autistic-like symptoms in those with ADHD are higher than in children who are healthy [189]. These findings preclude a co-occurrence of the disorders by chance.

There are risk factors for the development of the combination of ASD and ADHD. One risk factor is genetics. Both ASD and ADHD are highly heritable neurodevelopmental disorders. It is estimated that approximately 70 – 80% of the phenotypic variance of each of these disorders can be explained by genetic factors [190, 191]. Family studies indicated increased ASD-like symptoms in both affected and non-affected siblings of ADHD patients, which signifies a familiarity of the co-occurrence of ADHD and ASD symptoms [189]. Further, according to twin studies, which utilized questionnaire data on ASD and ADHD symptoms, approximately 50 – 70% of the co-variance of ASD and ADHD symptoms can be explained by shared genetic factors [185, 186].

Non-genetic biologic factors also pose a risk. Some studies have started to focus on the relevance of environmental risk factors for both ASD and ADHD [191]. Some environmental biologic risk factors increase the risk of both ASD as well as ADHD, and this supports the thought that both of these disorders may be alternate manifestations of the same risk factors. Recent studies reported increased rates of ASD-like symptoms in 11 year old, previously pre-term children below 26 weeks of pregnancy [182]. This study was replicated in adults with ADHD [192]. Additionally, several risk factors related to pregnancy seemed to simultaneously increase the risk of ASD with a combined diagnosis of ADHD or ADHD symptoms, such as the use of valproic acid [193], maternal diabetes [194], pre-eclampsia [195], and viral or bacterial infections [196, 197] during pregnancy. The majority of these risk factors has only been examined recently and is not yet well replicated.
Well-replicated factors that are specific to ADHD are pre-pregnancy obesity, which increases the risk of inattention symptoms [198], and smoking during pregnancy, which in particular is a risk factor for hyperactive and impulsive behavior. This risk factor also increases the risk of a comorbid conduct disorder with aggressive behavior in children who have ADHD [199-201]. Smoking during pregnancy has been excluded as a risk factor for ASD however. For ASD, increase in paternal age has been shown to be a particular risk factor [202]. On the other side, younger maternal age seems to be a risk factor specific to ADHD [200]. The exact mechanism of how these risk factors influence the developing brain is not yet determined.

Finally, non-genetic psychosocial factors pose a risk. For ASD, these factors have not yet been adequately defined, whereas for ADHD, several of these risk factors have been very strongly replicated in longitudinal studies. For example, an association exists between family conflicts and divorce, maternal depression, paternal antisocial personality disorder, and lowered familial socio-economic status with increased rates of ADHD as well as increased symptoms of inattentiveness and hyperactivity and impulsivity [200, 201]. Therefore, these risk factors appear to be specific to ADHD and may also increase ADHD symptomology in those children who suffer from ASD.

In regard to psychosocial risk, the relevance of psychosocial risk factors for comorbid ASD and ADHD has been indicated by population-based study, wherein a higher area of deprivation was a specific risk factor for co-occurring ADHD in children who have ASH [187]. In children with ADHD who also have increased ASD-like symptoms, family risk factors in one study were predictive of increased ASD-like symptoms [203], which indicates one of two things: either there is some relevance of psychosocial risk factors to ASD symptoms in general or there is the possibility that an increase in ASD symptoms in ADHD may represent a particular ADHD subtype but not the same disorder as ASD with no ADHD. Therefore, it may be concluded that there are overlapping factors at play that lead to the comorbid diagnosis of ASD and ADHD.
In examining the new DSM-V rules that allow for a joint diagnosis of ASD and ADHD [204] the following are highlighted:

- Previous versions of the DSM forced practitioners to choose between a diagnosis of ASD or ADHD, which may have prevented those with both disorders from receiving the course of treatment they really needed.
- The DSM-V is going to allow for a dual diagnosis of ASD and ADHD.
- Practitioners will no longer have to qualify symptoms of one disorder or the other; for example, diagnosing an individual with ASD and calling his or her ADHD symptoms “ADHD-like” in order to offer treatment for ADHD.
- Under the new guidelines, practitioners will be able to directly analyze whether or not those with a primary diagnosis of ADHD and some ASD symptoms may benefit from the strategies designed for treating ASD, for example, social, speech, or occupational therapy. Also, on the other side of things, those who are diagnosed with ASD but show symptoms such as hyperactivity, inattentiveness, or impulsivity could benefit from treatment protocols designed to treat ADHD [205].
- The new guidelines will allow practitioners to treat children with drugs such as Ritalin for conditions they can actually diagnose them with. Until now, practitioners could not dual diagnose and prescriptions for ADHD medications for those who have ASD were prescribed as off-label medications being given for “ADHD-like” symptoms.

In addition to the above a benefit may be seen in clinical studies. Studying those who have both ASD and ADHD may help researchers identify and design treatments specific to this group.

MANAGEMENT AND PROGNOSIS
Treatment Goals

Lessen deficits

Once the child has been diagnosed with ASD, the treatment program should begin at once. As indicated above, over the past 15 years there is evidence that has shown early intervention programs result in much improved outcomes, particularly when started in very young children. The reason for this is because a younger child’s brain is more able to change [206]. However, there is really no single best program for children with ASD to lessen deficits. The key is to combine interventions, with the goal being to engage the child’s unique combination of special interests in an effort to keep the child involved with tasks. Good behaviors should also be positively reinforced.

One key factor to lessening deficits is parental involvement, which is instrumental to the success of treatment. It’s important for parents to work side by side with practitioners in an effort to learn how therapeutic practices may be continued outside of a clinical setting. This is because parents are the child’s primary teachers. Therefore, impressing on the parents how important it is that they remain active and involved in their child’s care is crucial.

Some common interdisciplinary approaches that are utilized to lessen deficits for individuals with ASD are listed and explained below:

- Speech therapy:
  Speech therapy is conducted by a professionally trained speech therapist. This therapy involves a great deal more than just teaching a child how to speak. The therapist may work with the ASD individual on a number of skills, including skills such as:
    - Nonverbal language skills: Nonverbal language involves communication such as gestures, PECS (picture exchange
communication system), electronic talking devices, or utilizing other alternative devices such as iPads or iPhones.

- Speech pragmatics: Speech pragmatics involves training regarding the suitable speech context.

- Conversational skills: Speech therapists may instruct individuals with ASD on how to have a back and forth conversation. This is called joint attention.

- Concept skills: A speech therapist may help an individual with ASD understand abstract ideas, as they relate to communication.

- Occupational Therapy:
  Occupational therapy helps those with ASD work on the basic personal and social skills that are necessary to live independently, as many individuals who suffer from ASD lack these skills. Some of the things that an occupational therapist may work on are:

  - Provide interventional therapy to assist a child in responding appropriately to information and stimuli that enters through the senses. Interventions may include brushing, playing in a ball pit, or other activities that are aimed at assisting the child who suffers from ASD to better manage how their body operates in space.

  - Facilitates play activities that offer instruction as well as assist in teaching a child in interaction and communication with other people. For an occupational therapist who specializes in treating those with ASD, this may mean designing specific structured play therapies, for example, Floortime, that are developed to building emotional, intellectual, and physical skills.

  - Comes up with strategies to assist the child with transitioning from one type of setting to another and from one person to another, as
well as from one phase of life to another. For the child who has ASD, this may involve self-soothing strategies to manage transitions from home to school; for adults with the condition it could involve learning vocational skills.

- Develops adaptive strategies and techniques to maneuver around disabilities. One example of this would be teaching the individual typing should he or she find handwriting too difficult.

**Behavioral Therapy:**

Amongst those behavioral therapies that are most effective for working with children who suffer from ASD are the kinds that engage a child’s intrinsic motivation to learn. This type of motivation utilizes the child’s inner interest in a topic to encourage the individual to seek more and more knowledge in that particular area. Behavioral therapists who utilize intrinsic motivators may use a child’s interest in dinosaurs, for example, to create a story that includes dinosaurs as the main topic of the story, making learning a reward of the story.

Two of the most frequently used behavioral play therapy interventions utilized with children who have ASD are Floortime and Relationship Development Integration (RDI). These are therapies that assist the child in integrating emotional, intellectual, and social capabilities, as opposed to simply focusing on skills or isolated behaviors. Both of these types of therapies allow for the individual’s particular interests in order to encourage learning and to engage the child in their own physical environment as well as at their current level of cognitive and emotional development.

Another therapy that is frequently utilized, and is considered the gold standard of behavioral therapy, is Applied Behavioral Analysis (ABA). This behavioral therapy is a technique that is utilized to reduce inappropriate behavior while increasing communication and increasing appropriate
social behaviors. ABA frequently utilizes confrontational techniques as well as punishment (i.e. time outs from preferred objects or activities, or removal of a token) in attempts to decrease behaviors that are unwanted. Many psychologists and therapists who work with those who have ASD utilize ABA, making this the most likely therapy to be utilized in most schools and clinical settings.

- Social Skills Training:
  Social skills therapists are psychologists, social workers, occupational therapists, or speech and language therapists whose specialty is working with those who have ASD. Drama therapists may also teach social skills by working with those with ASD through scripted scenarios or through improving or critiquing practiced interactions.

  In school settings, social skills therapy can consist of group activities with those with ASD and those who are not affected. These activities are generally games and conversation. These activities are generally overseen by social workers or school psychologists, and can be held in the classroom, playground, or lunchroom. Social skills groups held at school generally focus on game playing, conversation, or sharing.

  Groups that are held outside of school may have a similar style, but are often paid for privately. Children may be grouped by similar age and ability, and they make use of a particular social skill curriculum that is developed by trained practitioners in social skills therapy. Social skills therapy that is effective provides those with ASD the opportunity to share, play, converse, and work with their non-affected peers.

Dietary Interventions:
ASD is sometimes caused by a genetic predisposition that is combined with an environmental trigger. It is thought that this trigger may be a
sensitivity to a particular food that the individual with ASD consumes on a regular basis, such as gluten, casein, corn, nightshade vegetables such as tomatoes or potatoes, soy, or food dyes or preservatives.

The individual must be given an IgG food sensitivity test to determine food sensitivities. This is a blood test that is given by a food allergist. The recommended treatment for food sensitivities is to cease consumption of the food that the individual is reacting to, commonly termed a food exclusion diet. Many parents indicate that their child with ASD became less moody and better behaved as well as less sensitive to light, sound and touch upon adoption of the food exclusion diet.

Lessen family stress

For many families, the stress of ASD – whether the diagnosis comes earlier or later – starts immediately. There is no aspect of family functioning that is not affected, from having to cope with the affected child’s temper tantrums to dealing with the financial burden ASD brings or the social isolation that frequently results. Research conducted by the Interactive Autism Network (IAN) examined the many aspects of stress that families experience as well as the responses to stress and the feelings that result.

Families answered questionnaires that gauged stress on several measures. Fathers reported slightly lower overall stress levels than did mothers. The first aspect assessed was child behaviors. Parents were asked in the Parental Depression History Questionnaire to determine to what extent their child’s challenging behaviors had a detrimental impact on their lives. Seventy-two percent of participants indicated that challenging behaviors had a moderate or great detrimental impact on their lives.

Two of the most frequently mentioned contributors of stress that were associated with challenging behaviors were meltdowns and aggression. Both of these behaviors required the parent to be hyper-vigilant and made interaction with the
world at large difficult. One of the greatest consequences of challenging behaviors was social isolation for the whole family. Additionally, parental self-esteem suffered as a result of the child’s challenging behaviors.

Another aspect assessed was sleep disruption. Parents of children with ASD indicate that they do not sleep as long and often have sleep that is poorer in quality when compared to parents of other children, including those who are parents of children with other types of disabilities [208, 209]. One study that was conducted in Philadelphia stated that the accumulated poor sleep quality and shorter sleep duration contributes to the stress of raising a child who suffers from ASD [210]. Children with ASD do themselves have unusual sleep patterns, including a refusal to sleep, awakening in the middle of the night, and prolonged rituals at bedtime. Forty-eight percent of parents indicated that they experienced exhaustion as a result of these sorts of issues, and that these issues had a moderate or great deal of impact on their stress level.

One other aspect that was assessed involved issues with treatment. A great number of children with ASD need therapy for issues that are associated not only with ASD but also with other co-occurring conditions, such as ADHD, depression, or anxiety. It may cause extreme stress on the parent or caregiver to have to obtain and manage multiple treatments, which may include physical, speech and language therapy, occupational therapy, social skills therapy, medication, and ABA, just to name a few. Additionally, all of these therapies can put a financial burden on the family in addition to placing a logistical burden on the person coordinating the therapy [211]. Further, many parents and caregivers feel that they are largely unsupported in seeking and obtaining adequate treatment for their child, and that quality treatment options are not always readily available. This adds to the stress of obtaining treatment.

In the aforementioned study, nearly 70% of participants indicated that managing multiple therapies, including attempting to obtain treatment – either on their own or through insurance – created a moderate or great negative impact. Treatments
may also prove to be disappointing, and it can prove stressful when the family has invested their time, energy, and money in a treatment option that has not been fruitful. Forty-six percent of participants indicated that disappointments in treatment outcomes have had a moderate to great negative impact on their lives. Another aspect that was assessed was child setbacks. Parents and caregivers can find child setbacks very disheartening, particularly because they help their children to work so hard to make progress.

The IAN research determined two categories into which setbacks fell: 1) classic regression, in which the child acquired a skill and then lost that skill, and; 2) more general setbacks wherein new negative behavior emerged. More than 70% of respondents indicated that there was a moderate or great deal of negative impact when the child experienced “a major problem or reversal in progress at school or in some other area of life” [207]. In other words, setbacks were highly stressful. Some parents even reported feeling “traumatized” by the setback experience.

One other aspect that was assessed was parental worry about the future. Parents worry about a number of different factors pertaining to their ASD child’s future. For example, when the child is young, the parent worries about whether or not the child will be bullied in the future. As the child grows up, the parent starts to worry about such things as independent living and employment prospects. Parents also worry about how other family members will fare. Eighty-nine percent of study respondents indicate that stress over worrying about the future has a moderate or great negative impact on their lives, with some respondents indicating that this is an issue they think about every single day. Despite this stress, many parents and caregivers indicate that they have feelings of hope for their children.

Another aspect that was assessed was the impact on career and continuing education. Participants were asked, “What impact, if any, has raising a child with an ASD had on your own career or continuing education?” [212] Mothers and fathers answered this question differently. Fathers felt more often than mothers
did that there had been no impact on their education or career, with 44% versus 28%. While many fathers reported that there was a negative impact (46%), more mothers reported that there was a negative impact (59%). Researchers believe that the reason for this may be because women are more likely to stay home with children than are men.

Studies show that gender roles are more likely to become more traditional after men and women make the transition to parenthood [213, 214]. Mothers take on the bulk share of the domestic duties, even if they work outside the home [215]. Additionally, there is still a disparity in pay between what men earn and what women earn [216, 217]. Therefore, women end up more often than men being titled the homemaker. Also, many women plan on returning to work after having the child, but may not be able to because the child has extensive needs. Those women who were planning to return to work may have discovered that having a child with ASD meant missing work or performing below the standards they had set for themselves, resulting in a negative impact on their careers.

Many parents reported that challenging child behaviors were one of the major problems standing in the way to fully achieving at work – these led to phone calls from schools or care centers that interrupted the work day and contributed to stress at the job. Additionally, childcare was often an issue. Many parents had issues finding or maintaining consistent childcare options for their child. These issues often interfered with work, leading to the parent having difficulty or inability in holding down a job. In one study that compared families of children with ASD to families of children who were not affected, parents of children with ASD were nearly 7 times more likely to leave a job as a result of issues with child care than were parents of children who were not affected [218].

In addition, in another study conducted by the University of Rochester, researchers indicated that 39% of parents of those with ASD stated that they had quit a job, changed a job, or not accepted a job as a result of childcare issues that were related to having a child who suffered from ASD – this is more than 4
times the 9% that is reported by families who are raising a child who is not affected [219]. However, not all parents indicate that raising a child with ASD has had a negative impact. Nine percent of fathers and 13% of mothers indicate that raising a child with ASD has had a positive impact on their education or career. This did vary somewhat dependent on the parent’s level of education. A number of these individuals had simply found new careers, many of them in areas such as autism advocacy, ABA, social work, special education, or a related field.

One other question asked parents in the IAN research related to the impact, if any, that raising a child with an ASD had on their financial situation; nearly 80% of participants indicated that the impact was a negative one. One reason for the negative impact was that many parents were required to cut back on or change employment. Additionally, the cost of evaluation, treatment, and therapies adds up quickly and can create financial hardship. Expenses can be of all kinds, and can include various types of therapies.

Many parents reported feeling desperate, with adequate treatment options always feeling just out of reach. A negative impact was reported by parents of children with every type of ASD, with 75% of those parents of children suffering from Asperger syndrome, 78% of those parents of children suffering from PDD-NOS, and 80% of those parents of children suffering from autistic disorder reporting negative impact. For many parents, immediate needs are pressing, and
adding to the stress and negative impact is the constant worry of how to pay for future needs.

Another area assessed was how friendships and social networks are impacted, with nearly 60% of participants indicating that having a child with ASD had a negative impact on friendships and social networks [221]. Many parents mentioned that getting out into the social world at large at all could be difficult, in particular if their child suffered from temper tantrums or from meltdowns, as these tended to draw negative reactions from other people, particularly strangers. This is particularly true because children with ASD often appear to be physically fine, unlike many other children with mental or physical disabilities, making it appear as though the child is simply acting out. This means that others may be less understanding about what the parent must deal with when the child acts out, and that the child’s challenges may be attributed to lax parenting as opposed to an actual disability.

Further to the above, parents indicated that it is not only strangers that make socializing difficult; parents conveyed that they have sometimes been asked to leave organizations such as playgroups or churches as a result of their child’s challenges. Therefore, it is no surprise that feelings such as loneliness or isolation are common amongst those parents who have children who suffer from ASD. These parents tend to begin to avoid social situations. In fact, a study indicated that families with children ages 3 – 5 who have ASD were 70% less likely to attend church services as compared with children who have ADHD or were not affected [222]. Another study that focused on quality of life with families who have children with disabilities indicated that those parents who have children with ASD had more difficulty with social relationships than did parents of children who had cerebral palsy or mental retardation or parents of children who were not affected [222]. Further, in a Canadian study where parents were interviewed regarding their experience raising a child with ASD, many described that they were made to “live in a world of their own”, or a world that was isolated [223].
Some of the parents interviewed for the IAN research indicated that they themselves exhibited ASD-like traits, for example, social anxiety [224-226]. This made the social situation even more difficult for these parents, as they started the situation feeling socially awkward and then found the situation compounded by their child's challenges. Parents also found that friendships, which they had enjoyed previous to having a child with ASD, were strained upon having to care for their child's challenges. Basically, the majority of participants in the IAN study indicated that having a child with ASD is a situation that reveals who one's true friends are, and while they often found new friendships, often with those experiencing the same hardships, they also lost friendships they had previously valued.

Relationships with extended family also suffered. Forty three percent of fathers and 50% of mothers responding to the IAN research indicated that raising a child with ASD had a negative impact on their relationships with their extended family. For many of the families, the impact was mixed, with many relatives in denial or dismissive of the ASD child's diagnosis. Other relatives were helpful or supportive. Still, an ASD diagnosis may bring barriers to the typical family interaction, as a child with ASD may have unusual needs that a non-affected child may not have, such as a particular need for quiet or routine. This can make events such as birthdays or weddings particularly trying or isolating for family members who must care for the child who has ASD, not to mention exhausting, as some participants indicated.

Some study participants indicated that they avoided family functions to avoid the accompanying stress. Others indicated that they avoided events to avoid the accompanying critical remarks made by other family members who did not believe the child had ASD. However, stress with extended family was not without its positive aspects. Participants indicated that stress helped them focus on who the real supporters in their journey were and avoid those who would be critical and negative to progress.
The relationship between the parents/caregivers was also researched. Parents who are raising a child with ASD face challenges that are in addition to balancing work and family demands, paying bills, and doing chores. These families must also cope with additional tasks to manage their child, for example, they must investigate treatments, find providers, wrangle with insurance providers, shuttle their child to appointments, and prepare for Individualized Education Plan (IEP) meetings. Additionally, there is also an emotional toll that is exacted on the couple once they learn that their child has ASD.

How the couple adapts and copes has implications for the ongoing health of their relationship. Participants in the IAN research indicated that 60% of mothers and 54% of fathers stated that raising a child with ASD had a somewhat or very negative impact on their relationship with each other. However, despite this research finding, couples raising a child who is suffering from ASD are not all that different from those couples who are raising an unaffected child when it comes to respect for partner, commitment, or support [227]. There also is no support for the previously reported 80% divorce rate of 80% for those families who have a child suffering from ASD [228, 229]. One study that examined the divorce rates for families with children who suffered from a number of disabilities indicated an average increased rate of 5.97% over the rate of couples for non-affected children [230].

Researchers have reported a number of different areas of marriage difficulty for parents with a child with ASD. One study of couples that were raising children with ASD indicated that these couples experienced lower relationship satisfaction and less social support than did parents of children who were not affected [231]. Another study that examined families of children with developmental disabilities, mental health problems, or no issues over a number of years to determine adaptation and coping mechanisms found that parents with developmental challenges themselves had lower instances of employment as well as social participation. However, these parents were the same as the parents without
developmental challenges when it came to such factors as physical health, psychological health, and marital status. Those parents who had a child with a mental health issue fared a bit worse. They were also the same as the normal parents when it came to marital status; however, they experienced a greater instance of depression and physical issues [232].

Such a research study is particularly important to pay note to, because many children with ASD also have mental health issues [233-235]. One issue that couples frequently mentioned was a lack of time together or being too exhausted to make time together. Additionally, marital conflicts often arose from such issues as division of labor, or if one of the two parents remained in denial of the child’s diagnosis of ASD. It should be noted though, that a conflict over division of labor in the household might occur even amongst those couples that have a non-affected child [236]; the issue only becomes more difficult to navigate when a child with a disability is involved. Gender differences may contribute in how division of labor occurs, as many men see care of the child as the mother’s purview. Some participants in the IAN research were deeply involved in meeting their child’s needs; however, many others were not, and the most common strategy employed by fathers in dealing with their child’s ASD needs – and a source of stress on the couple – was avoidance [237].

Conflict and stress need not result in tragedy, however; families, as it turns out, can be extremely resilient [238, 239]. Families may discover many positive aspects to having a child with ASD, such as finding pleasure in caring for the child, finding a sense of accomplishment in progress the child makes, coming to a sense that the marriage and family has been strengthened by what the family unit has gone through as a whole as a result of the diagnosis, and increased spirituality. Families may also gain a new perspective on what is truly important about life.

One last important grouping of note is siblings of those with ASD. Raising a child who suffers from ASD places a high demand on the time and resources of parents not only as individuals but also on the family as a whole. Oftentimes,
other members of the family do not get their needs attended to in the same way that the ASD individual gets his or her needs attended to. Many parents feel that even as they are giving their all in caring for the child who suffers from ASD, they struggle in caring for the rest of their family as well as caring for themselves – the feeling is compared to putting the rest of life on hold while they care for the autistic individual. What results is a constant tension between the needs of the child with ASD and the needs of the other family members. While research indicates that the majority of siblings of those who have ASD cope well with having an autistic brother or sister, these individuals still encounter specific challenges as they learn how they must deal with having a sibling with ASD.

Some of the top sources of stress for siblings are covered below, and these include [240]:

- Embarrassments around their peers as well as jealousy regarding the amount of time parents spend with the child with ASD.
- Feelings of frustration over not being able to get a response or engage with the child with ASD.
- Being the target of aggression.
- An attempt to make up for the deficits the child with ASD suffers.
- Feelings of concern regarding parental stress or grief.
- Feelings of concern regarding their own role for caregiving in the future.

There are things that parents – and practitioners as well – can do to help siblings understand ASD, as well as to help improve sibling interaction and to ensure that all children in the family feel loved and attended to. First, ASD must be explained to children early and often, and the information should be given to them in ways that is appropriate to their developmental age and level of understanding. For example, preschool age children may need an explanation that will help them comprehend how the behavior concerns them: saying that the child with ASD doesn’t talk is an appropriate way to explain this.
An older child may want an explanation that is more interpersonal in nature, for example, an explanation of how to explain autism to his or her friends. The role is to listen carefully and pay attention to the unique needs and concerns of the child at every age, adjusting explanations to fit those needs and concerns. Additionally, explanations need to be offered again and again. Offering constant opportunities for education allow the sibling repeated chances to have open conversations where questions and concerns may be raised. A parent, caregiver, or practitioner may conduct these conversations.

Secondly, parents and caregivers should work to help their children form a bond with each other. This is difficult because of the nature of ASD. Many siblings become discouraged at forming bonds with their ASD siblings; however, they can often be taught simple skills that will help them engage with their sibling who is suffering from ASD. Some of these skills include ensuring that the sibling has the ASD child’s attention, offering simple instructions, and praising good play.

Thirdly, to help alleviate sibling stress, it is important to teach parents that they must make family time special for all family members. Parents frequently work very hard to make certain that the individual with ASD is fully integrated into family life, but they work less hard to make certain that this is the case for the other children. One way families can make certain the non-affected children feel special is by setting aside time for non-affected children that is separate from time spent together as a family unit.

Fourth, it is important for parents to recognize that being the sibling of a child with ASD does not end when the sibling reaches adulthood. The sibling of a child with ASD is a lifelong commitment, just as being the parent of a child with ASD is. Therefore, practitioners should prepare parents for how to address sibling concerns as siblings enter early adulthood. For example, young adults may be concerned about the genetics of ASD and whether or not there is a chance that they themselves may have a child with ASD. They may also be concerned about
whether or not they will end up taking care of their ASD sibling as he or she ages, particularly when questions of parental aging are also involved.

All of these questions can create stress, but this stress can be adequately managed by having open – and consistent – conversations, as siblings grow older. While it is true that growing up the sibling of an individual with ASD can by challenging, most siblings handle the challenge very well.

**Applied Behavior Analysis**

Applied Behavior Analysis (ABA) is the design, implementation, and evaluation of modification of the individual’s environment in order to produce a socially significant improvement in the individual’s behavior [241]. ABA includes the usage of direct observation and measurements as well as the functional analysis of the relationship between environment and behavior. ABA utilizes changes in environmental events to produce both practical and significant changes in the individual’s behavior. These environmental events are generally identified through a number of specialized assessment methods.

ABA is based on the idea that the individual's behavior is determined by both the past and current environmental events that are in play with certain organic variables, such as genetics, as well as ongoing physiological changes. The focus of ABA is on treating behavioral difficulties by changing the environment as opposed to focusing on variables that are beyond the direct control of the practitioner. ABA is considered the standard of care for treatment of ASD [241].

Contributions made by ABA to people who have ASD have been studied; ASD has previously been considered to be a disorder that has been associated with a poor prognosis, with only 50% of those individuals affected expected to develop spoken language skills [242]. Behavioral intervention has been shown to be the most effective method at addressing the needs of those who have ASD [243]. One early behavioral intervention study that was conducted by Lovaas in 1987 discovered that 40 hours per week of early intensive behavioral intervention
(EIBI) that involved a curriculum that emphasized language skills as well as intensively applied behavioral procedures, resulted in nearly 50% of participants achieving IQs in excess of 100. Participants also greatly improved their social development and were able to successfully mainstream. This study is considered monumental in this area of research, as it was the first in history to produce such incredibly encouraging outcomes for those with autism. The gains produced in this study were replicated and maintained through several follow-up studies.

To determine if the gains that were shown in the Lovaas study could be maintained over an extended time period, McEachin, Smith, and Lovaas [244] conducted a longer-term study of the same children by studying intelligence and adaptive function 4.5 years later. Results indicated that the outcome of EIBI was better in relation to gains made by a control group that received minimal treatment. Sallows and Graupner [245] provided further validation of the results through a four-year long-term study that demonstrated a replication of the EIBI success when parent directed and intensive treatment was utilized. The Lovaas study [246] was met with methodological criticism, however, one criticism of which was that it lacked randomization. Others have made efforts to replicate the findings of this study while addressing the problems of randomization. Smith, Groen, and Wynn [247] published the first randomized study that evaluated less intensive treatment at 20 hours per week; results indicated that even when it was delivered with less intensity, EIBI showed improvement over parent training on its own.

Although a dose effect, indicated by Smith et al [248], had been raised there was a question that remained about a need for adherence to the ABA principles, as to whether intensity alone was a significant variable. Studies that followed worked to validate the necessity to adhere to ABA versus more eclectic approaches that may be more common in the early intervention programs. One study [249] validated Lovaas’ style of EIBI in those children of autism who received Lovaas style of treatment for a period of one year. The participants in the treatment
possessed superior skills as compared with a control group who had received more eclectic procedures that were considered generally well regarded. The group that received the Lovaas treatment showed gains that were evident in areas of language, intelligence, and adaptive behavior. These findings were later supported in a study by Howard et al [250], which indicated that classic eclectic approaches did not produce the same type of favorable results that the Lovaas method resulted in.

Even though the Lovaas method proved to be remarkably successful, there has always been a focus on improving the quality of treatment methods. Additionally, ABA practitioners criticized the Lovaas method of EIBI because it did not utilize B.F. Skinner's (a psychologist that studied human behavior and language) analysis of verbal behavior [251]. There are two examples of efforts that did utilize Skinner’s analysis, in Bondy and Frost’s [252] and Partington and Sundberg's [253] research. These efforts resulted in the development of technology as well as teaching procedures that include the Picture Exchange Communication System [254] and a treatment pack referred to as the Applied Verbal Behavior pack [255]. It does still remain unclear whether or not approaches that are based on Skinner’s analysis of verbal behavior are superior to the Lovaas method. However, regardless of whether this is the case or not, ABA treatments of all types assist individuals with ASD in living more fulfilling lives. ABA is a wonderful treatment for people with autism. It also is true that people with ASD have been good for ABA, as elaborated on below.

How have individuals with ASD contributed to ABA and to Society? Those who have received ABA as well as parents and caregivers who are advocates have made great strides in efforts to provide those who need this valuable therapy with behavioral intervention in both home and school environments. Efforts to bring ABA into these environments have had many favorable impacts on education of those with ASD as well as on the image of ABA.
Improving the image of behaviorism is important, as there have been common misconceptions and contentions that misrepresent the significance and achievements of behaviorism. B.F. Skinner himself identified 20 such contentions [251], which ranged from the idea that behaviorism ignores the idea of conscious and feelings or states of mind, the thought the behaviorism formulates behavior as a set of responses to stimuli that are limited to the prediction and control of behavior that basically present the person as a machine or robot, the idea that behaviorism works with animals but not people, the notion that behaviorism is dehumanizing and confined to a laboratory setting instead of being applicable to real life, and the thought that behaviorism is more concerned with general principles instead of being focused on the uniqueness of each individual. All of these ideas are damaging, but as more individuals have become consumers of ABA, ABA’s image as a discipline has been improved, and its practitioners have come to be seen as effective and humane teachers. This is one contribution that the ASD world has made to ABA.

Another way in which those with ASD have helped the world of ABA is by permitting practitioners to understand whether or not Skinner’s analysis of verbal behavior is valid and practical. Dixon et al [256] indicate that Skinner’s analysis offered the first overall accounting of language acquisition from “a naturalistic perspective” [242] and also made a conceptual and empirical contribution to ABA that is enduring.

Children with ASD have also shown the importance of early intervention methods such as the Lovaas method. Methods such as EIBI may accelerate the learning process in all children, including those without ASD. For example, if one considers the history of those children who have been labeled as geniuses, such as Mozart, one may be struck by the fact that these individuals are often the beneficiaries of large amounts of early training [242]. Since methods such as EIBI benefit those with ASD so greatly, they may also benefit those in other populations, such as those with Down syndrome, fetal alcohol syndrome, and even those who are not disabled.
ABA has a history of focusing on addressing serious problems that affect those who have severe disabilities [257] and have majorly benefited those who have ASD. While ABA has not been integrated into mainstream science and remains in a niche in the special education system, there is no denying the benefits it has produced for those who suffer from ASD.

**Structured Teaching**

Those who suffer from ASD thrive best in very well organized and highly structured environments. Structured environments are considered those that promote a clear understanding of schedules, activities, and expectations not just for the individual who suffers from ASD but also for their caregivers and teachers. Specifically, the structured environment allows the individual with ASD to [258]:

- Understand and predict what is going on in the environment around them
- Predict what is expected of them
- Acquire new skills
- Generalize the skills they acquire from one setting to another [259]

Structured teaching is generally a visually-based approach designed to create a structured environment that will in turn support individuals with ASD in a number of educational, community, and home or living environments [260]. The goal of structured teaching is to create this environment that promotes independence – and ultimately a decreased need for caregiver support – through incorporating an increased understanding of the characteristics of ASD and the strengths and interests of the individual [260]. External organization and visual support serves as the basis for intervention in the structured environment.

Structured teaching has certain specific components, and these are outlined below:

- Physical organization and visual boundaries:
This is the usage of visual supports such as furniture, labels, icons, and so on to make the learning environment more comprehensible and manageable to the individual. An environment that is physically organized clearly indicates the types of activities that occur in each area; this helps promote increased understanding and attention to each task. Visual boundaries help students understand the rules of the space, the specific types of activities they should complete in each space, as well as the behavioral expectations of each space.

- Schedules:
  Visual schedules offer a visual representation of planned activities in the order in which they will occur utilizing symbols, pictures, words, photos, icons, or even actual objects.

- Routines:
  Routines, when combined with visual schedules, help by assisting individuals with understanding their environment and becoming more flexible. Predictable routines serve as another form of structure, meaning that students with ASD experience decreased anxiety in routine situations. When their anxiety is lowered, students frequently demonstrate increased attention to tasks. In addition, once an individual with ASD learns the routine, he or she will increase in independence.

The primary goal of routines is to offer a framework for activities that will occur within the individual’s schedule. Once the framework is established, the specific context details may continually change [260]. For instance, once an individual understands the basic routine of their language arts lessons, the teacher may change the specific content. Since the individual with ASD may have difficulty paying attention, it is often helpful to provide each individual with his or her own set of directions. An individual schedule placed into the individual’s agenda will increase the individual’s chances of success in following a schedule or directions. When routine is consistent
and expectations are made clear, independence is increased and level of learning is often higher.

- **Work systems:**
  Work systems are sequences that are visually structured and provide opportunities to practice skills, activities, or concepts that have been previously taught. The key here is that these are visually structured to increase independence.

- **Task organization:**
  Visually structured tasks are highly incorporated and organized visual instructions. These structured activities clearly indicate what activity the individual should complete, the steps for completing the task, as well as the important and essential features of the task. Tasks are selected based on assessment information utilizing emerging skills. Tasks are developed so that the person utilizing the system knows what to do simply by looking at the materials and the design. There may be a picture or written instructions. Also, limiting the work area by utilizing a box tray or folder assists the individual with ASD in knowing what to focus on in a particular task. It is important to make certain that all materials are secure; this lessens frustration. To know what is important, the task may have highlighting in certain important parts, a limited number of items, be color coded, or labeled.

There are several ways to create highly organized learning environments; these should all be adapted to meet the needs of the individual suffering from ASD. These include:

- **Paying attention to individual consideration:**
  a. Consider the interests, strengths and needs of the individuals in the particular setting at hand
  b. Consider safety issues
- Designing the physical space and developing the visual boundaries:
  a. Link the physical set up to the needs of the individuals in that particular setting
- Developing the schedules
- Creating the work system
- Organizing the tasks
  a. Choose the tasks based on an assessment of the individual
  b. Design the tasks to indicate direction
- Implementing and monitoring progress
  a. Make sure to teach the particular steps of the system. Utilize strategies such as prompting, modeling, and reinforcement in the teaching process.
  b. Make sure to collect data on each individual’s ability to remain actively engaged in the environment.

Structured teaching may be used in any setting or may be utilized to support any individual with ASD. Further, any caregiver, educator, or practitioner, may use the principles of structured teaching to support an individual suffering from ASD. These strategies may be used at home, in educational environments, and in community living settings, as well as to promote success at work.

**Speech and Language Therapy**
Most ASD behavior intensive therapy programs include a speech-language component. This is because many individuals with ASD experience language difficulties. With a number of techniques, speech-language therapy addresses a number of challenges faced by those individuals who suffer ASD. For example, some individuals who suffer ASD do not speak, while others enjoy speaking but have problems utilizing conversational speech or even understanding language or nonverbal cues when others are speaking.
Speech-language therapy is made to coordinate with the mechanics of speech as well as with the meaning and social usage of language. Speech-language therapy programs start with an individual evaluation by a speech-language therapist to assess the individual’s verbal aptitude and to determine where the individual may be challenged. From this evaluation, the therapist then sets goals based on the individual’s challenge areas. In every case, the goal is to assist the person in communication in more effective ways.

Even if a person is nonverbal, they can benefit from the skills of a speech-language therapist. These individuals may benefit from augmentative and alternative communicative (AAC) devices or methods. The Picture Exchange and Communication System (PECS) is one of the most commonly utilized methods with children or adults who have little or no verbal language skills. This method allows children or adults with ASD to develop a vocabulary through which they may articulate desires, observations, or feelings. This system may be taught and utilized at home, in classrooms, or in a number of other settings.

**Augmentative and Alternative Communication**

At the beginning of the PECS program, the instructor teaches the individual to exchange a photo for the object – for example, the adult would exchange the picture of the apple for the apple itself. With further instruction, the individual then learns to distinguish pictures as well as symbols and utilizes them to form sentences. Even though PECS is a visually based system, the program reinforces and emphasizes verbal communications. Caregivers may purchase standard PECS systems as part of a manual or put together their own by
gathering photos from everyday sources, for example, magazines, newspapers, and books.

Other augmentative and alternative communicative devices include devices that may be specially programmed, such as iPads and iPhones. A speech-language therapist may provide therapy in a one-on-one setting, in small groups or in a classroom setting.

Social Skills Therapy
Social skills are considered “socially acceptable learned behaviors that enable a person to interact with others in ways that elicit positive responses that assist in avoiding negative responses” [262]. One of the biggest areas that those who suffer from ASD experience deficits is the area of social skills. There are five basic tenets of social skills programming in individuals with ASD:

- Individuals who suffer ASD have a desire to establish meaningful social relationships.
- If those with ASD are to be successful socially, then they must be given the skills to be successful.
- Successful social behaviors are not always “appropriate” social behaviors.
- Social success is dependent upon the individual’s ability to adapt to his or her environment.
- Social interaction skills are not the equivalent of academic skills.

There are 3 integrated components that form up the essence of social interaction. These are: thinking, feeling, and doing.

In order to approach social skills therapy in those with ASD, a five-stage approach must be taken. This approach includes:

- Identifying and assessing areas of need
- Discerning between skill acquisition deficits and performance deficits
• Selecting appropriate intervention strategies
• Implementing intervention strategies
• Evaluating the selected program and modifying the program as needed

The social skills assessment is by far the most essential piece of this approach. The purpose of the assessment is to discover: a child’s current level of performance; current strengths as well as limitations; identify skills to teach, and; answer the important question, “What is precluding the child from establishing and maintaining social relationships?” [262].

The most common social skills difficulties that social skills therapy addresses are difficulties in social initiation, difficulties with reciprocity and terminating interaction, difficulties with non-verbal communication, difficulties with social cognition, difficulties with perspective and self-awareness, and difficulties with social anxiety or social withdrawal.

**Occupational Therapy**

Occupational therapy addresses engagement in “activities…of everyday life, named, organized, and given value and meaning by individuals and a culture” [263]. Occupational therapy services focus primarily on enhancing participation in these activities, based on an individual’s own goals and priorities for participation in these activities.

Occupational therapy focuses on a number of skills, including cognitive, physical, and motor skills. The goal is to assist in helping the child or adult gain independence that is age-appropriate and allow the individual to participate more fully in life. For an individual with ASD, occupational therapy frequently focuses on skills for appropriate play or leisure, learning, or caring for oneself.

Therapy starts with a therapist certified in the area of occupational therapy evaluating the individual’s developmental level as well as their learning styles and social abilities. The individual’s environmental needs are also assessed.
Based on the evaluation, the therapist selects strategies and goals designed to enhance certain skills. For example, a goal may include dressing independently, feeding or grooming oneself, or using the toilet on one’s own. Occupational therapy typically involves half-hour or one-hour sessions, with the frequency of sessions determined by each individual’s needs. Additionally, the individual suffering ASD practices the skills with guidance at home or in other settings, such as school.

PHARMACOLOGY

Current Medications
Even though prescription medication is common for the treatment of ASD, there is not much evidence that medications do much good. Surveys indicate that as many as 50% of children with ASD take some psychiatric medications – most often these are antidepressants, antipsychotics, or stimulants [264].

In one recent survey of 2853 children in the Autism Treatment Network, 27% of respondents were using at least one psychotropic medication. Use of medication ranged from 11% in children ages 3 – 5 years to 66% in those 12 – 17 years of age. Most of the use was related to comorbid psychiatric diagnoses, which included diagnoses such as ADHD or ADHD-like symptoms, bipolar disorder, obsessive-compulsive disorder, anxiety, and depression. Despite the fact that there are a wide number of medications utilized to treat patients with ASD, there is little evidence that exists to show that medication is effective.

Educational interventions are still considered the cornerstones of treatment. These typically involve behavioural or rehabilitative components to address the deficits that exist with ASD. The components may involve occupational therapy,
behaviour modification, or speech and language therapy. However, medication may be considered in the treatment of ASD if non-pharmacologic interventions have failed or if maladaptive behaviours are severe. Medications are not intended to treat the core symptoms or ASD; they also cannot cure ASD. Medications are considered adjuncts, and they may be utilized to decrease the severity of symptoms as well as to help patients participate in more active ways in educational interventions or to assist patients in living outside of institutional settings.

Patients with ASD are more sensitive to the side effects of medications, so practitioners must take care to observe that the benefits of utilizing medications in ASD patients outweigh the risks of the development of adverse reactions to such drugs. Medication often utilized to treat symptoms related to ASD was frequently chosen based on their ability to treat the same symptoms in other psychiatric disorders. For instance, Selective Serotonin Reuptake Inhibitors (SSRIs) are utilized to treat stereotypical behaviour based on the use of these medications in obsessive-compulsive disorder. Many medications utilized in the treatment of ASD symptoms do not carry any sort of FDA indication for the usage of treatment in ASD.

Studies of medication usage in ASD populations are sparse and often have small sample sizes. Trials are often also complicated by the concomitant usage of other medications utilized to treat symptoms related to ASD. Frequently, researchers have difficulty recruiting enough study participants. The medications most commonly used to treat ASD are listed below [264]:

**Antipsychotics:**

These are the most studied type of medication when it comes to the use of medication in the treatment of ASD. The primary usage is for the aggression, irritability, and the self-injurious behaviours that are associated with ASD. However, antipsychotics may also be used to treat stereotypical behaviours and ADHD-like behaviours.
**Haloperidol** is one antipsychotic that has been utilized and studied for usage in treating ASD. An average dosage of 1.12 mg/d has been shown in 2 clinical trials to decrease maladaptive behaviours [265]. Doses exceeding this dosage show no additional effectiveness. Usage of this antipsychotic was associated with a high incidence of side effects. These side effects included sedation, increases in irritability, and dystonia. At doses of 1.75 mg/d, 1/3 of patients developed dyskinesia that primarily affected the face and mouth.

Over 90% of the antipsychotics prescribed to children are second-generation atypicals (SGAs). *Risperidone* is the most well studied SGA in ASD and is considered one of the most commonly prescribed of the antipsychotics in children. Risperidone and *aripiprazole* are the only two SGAs that carry an FDA indication for treating associated irritability in children with ASD. Risperidone has been shown to reduce maladaptive behaviour in ASD. The Research Units on Pediatric Psychopharmacology (RUPP) Autism Network studies convey strong evidence for the efficacy of risperidone in treatment of ASD [266]. In an 8-week double-blind, randomized, placebo-controlled study of 101 children who ranged in age from 5 – 17 years, a mean dosage of 1.8 mg/d of risperidone resulted in a 14.9 decrease in the ABC-irritability (ABC-I) subscale. This was versus -3.6 points for the placebo group.

Risperidone does come with some side effects. These include fatigue, drowsiness, and tremor. Aripiprazole was shown to reduce symptoms of irritability in those with ASD in some small studies. The strongest evidence for the efficacy of this treatment comes from two manufacturer-sponsored trials that led to the drug’s approval by the FDA for treatment of symptoms associated with ASD. Both trials were 8-week trials on children ages 6 – 17 years [267, 268]. Participants had to have both a diagnosis of ASD as well as irritability-type behaviours such as aggression, tantrums, or self-injurious behaviours.

The first trial consisted of a flexible dosage schedule that started at 2 mg/d that increased weekly to a maximum dosage of 15 mg/d by 6 weeks. In 98
participants with a mean age of 9.3 years, there was a between group change in
the ABC-I scale of -7.9 [267]. Side effects to the medication were seen in 91.5% of
participants. The most common side effects of this medication were fatigue,
sedation, somnolence, drooling, vomiting, diarrhea, and tremor. The second trial
consisted of fixed-dosage aripiprazole, with dosage being 5 mg, 10 mg, or 15 mg
daily, given to 218 patients with a mean age of 9.7 years [268]. Decreased in ABC-
I were statistically significant across all doses as compared to placebo. In the
group receiving the 5 mg dosage, the total change was -4.0; in the group
receiving the 10 mg dosage, the total change was -4.8, and; in the group
receiving the 15 mg dosage, the total change was -6.0. Side effects were
experienced by 85.2 – 89.8% of all of the participants on the medication and
resulted in 17 withdrawals from the study.

Evidence for the usage of other SGAs is fairly sparse. Olanzapine and
ziprasidone have each had 1 clinical trial that demonstrate that they may reduce
maladaptive behaviours in those who suffer from ASD; however, the sample
sizes in both trials were very small (<20). In other small trials, quetiapine showed
some mixed results. These medications remain unproven [265, 269].

Selective Serotonin Reuptake Inhibitors (SSRIs):

Treatment with SSRIs is common. This is because the maladaptive and repetitive
behaviors frequently exhibited by those with ASD resemble those with obsessive-
compulsive disorder. Research evidence has shown mixed results. One trial of
citalopram in 149 children did not find any benefit [269].

In early trials, fluvoxamine was shown to improve repetitive behaviours and
language use in 8 out of 15 adults, but a trial that followed did not find similar
responses in children [265]. Another trial of paroxetine in 15 patients was initially
shown to have positive benefits on aggressive and self-injurious behaviours, but
the effects waned after 4 weeks of treatment [270]. One small trial of escitalopram
in 28 participants indicated improvement in the ABC-I scale [265].
There are two medications that have shown promise. These medications are sertraline and fluoxetine. Setraline has been shown to improve aggression and self-injurious behaviour. In one study, sertraline improved both of these behaviours in 8 out of 9 patients [285]. In another trial, 57% of ASD patients displayed significant decreases in aggression and repetitive behaviours when given a mean dosage of 122 mg/d of sertraline [270]. However, those with Asperger syndrome did not show any response to the medication. In a study of fluoxetine in 34 children ranging in age from 5 – 17 years, fluoxetine given at mean dosages of 0.38 mg/kg/d decreased the compulsion subscale of the Yale-Brown Obsessive Compulsive Scale by 1.55 points. This was as compared to 0.25 points for placebo [271]. In another study of 37 adult patients with ASD, a mean dosage of 64.75 mg/d of fluoxetine led to a decrease in the Yale-Brown Obsessive Compulsive Scale of 3.7 points [272]. Side effects for fluoxetine were generally mild, and included vivid dreams, insomnia, dry mouth, and headache.

**Stimulants and Atomexetine:**

Individuals who suffer from ASD often also have ADHD-like symptoms. These symptoms may include symptoms such as hyperactivity, distractibility, excitability, and difficulty concentrating. Psychostimulants and often considered the first line to treat these types of symptoms. However, unlike children who have ADHD, children who have ASD are not as responsive to stimulants and may have an increased sensitivity to side effects such as emotionality or agitation.

**Methylphenidate** is the preferred medication, mostly because it has been used in most of the clinical research. Short acting formulas should be used first so as to gauge tolerance [273]. Although there are a number of trials that demonstrate the efficacy of methylphenidate in treating the ADHD-like symptoms in children who have ASD, the strongest evidence to this point comes from RUPP trials. In a 4-week trial of 72 children ranging in age from 5 – 14 years who were treated with low dosages (0.125/mg/kg/d), medium dosages (0.25/mg/kg/d) and high dosages (0.5/mg/kg/d) of methylphenidate in 3 divided dosages. During the first phase,
forty-nine percent were found to respond to the medication. However, 18% stopped the medication because they were unable to tolerate it.

During the crossover phase, the ABC-I decreased from 30.9 – 33.2 to 17.2 – 20.1 (dependent upon the evaluator) [274]. In the second phase, which was conducted as an open label, 8-week trial of 34 responders who were dosed on what was determined to be their best response dosage, response was maintained. Side effects were most commonly irritability, sadness, lethargy, dullness, and social withdrawal. In a follow-up analysis of 33 participants from this study, it was indicated that there was substantial improvement in self-regulation, joint attention, and the ability to regulate one’s emotions [275].

Two small studies indicate that there are potentially minor benefits of atomoxetine in those children with ASD and ADHD-like symptoms. The first study was a crossover study that consisted of 16 participants ranging in age from 5 – 15 years. Over 6 weeks the patients were given a mean atomoxetine dosage of 44.2 ± 21.9 mg/d; patients experienced a mean decrease of 5 points on the ABC-I hyperactivity scale as compared to 0.1 point for placebo [276]. In the second study, 97 participants ranging in age from 6 – 17 years were assigned randomly to either a fixed dose atomoxetine regimen (1.2 mg/kg/d) or a placebo regimen. After 8 weeks, participants on the atomoxetine experienced an 8.2-point decrease in the 5-point ADHD Rating Scale (ADHD-RS) score as compared with 1.2 for placebo [277].

In both trials, atomoxetine was well tolerated. The most common side effects were decreased appetite, nausea, fatigue, and early morning awakening. The drug’s manufacturer sponsored both of these trials. Although they do suggest that there is a possible benefit in this drug in the treatment of ADHD-like symptoms in those individuals who suffer from ASD, further research is needed before this medication may be considered a first line therapy.
Even though *clonidine* and *guanfacine* have been utilized to treat ADHD, there is sparse data on their usage in ASD. Both risperidone and aripiprazole have been shown to decrease ADHD-like symptoms in those children who also have ASD. However, there is a risk of weight gain and movement disorders with these medications. Therefore, these medications are not recommended unless there is a high degree of impulsivity that threatens the child’s life, for example, the child displays dangerous or impulsive running or jumping. Another example would be a child who displays excessive irritability or aggression [273].

*Cholinesterase Inhibitors and Glutamatergic Antagonist (Memantine):*

Medication typically utilized to treat Alzheimer’s Disease that may be added to their treatment plan. There has been increased interest in utilizing both *cholinesterase inhibitors* and the *glutamatergic antagonist memantine* to improve executive level functional deficits such as decision making, problem solving, and social deficits in those patients with ASD. The interest in this avenue of treatment stems from findings in autopsies that indicate a deficit of cholinergic receptors as well as abnormal functioning of those receptors in the prefrontal regions and cerebral cortex. There have only been small trials of these types of agents and these agents are not yet proven [278].

One 10-week trial conducted with 34 participants with *donepezil* at 10 mg/d indicated that participants did not show any difference on tests that were made to measure cognitive functions such as verbal ability or problem solving [279]. In another open label, 12 week study conducted with 32 participants ranging in age from 2 – 12 years, *rivastigmine* dosed at 0.8 mg twice a day was shown to improve expressive speech and autistic behaviour, as indicated by a 3 point drop in the Childhood Autism Rating Scale Score [278]. *Galantamine* has been shown to bring about mild improvement in such behaviour as hyperactivity, eye contact, and inappropriate speech, but these results are limited [280, 281].

Additional autopsy findings have shown a decreased neuronal size in the greatly interconnected structures in the limbic system. This indicates neuronal
immaturity, which impacts the ability to form memories. An “excitotoxicity” state may occur which might then lead to high levels of the neurotransmitter glutamate, which in turn may lead to neuronal death. Small studies of both amantadine, which is related structurally to memantine, and D-cycloserine, which behaves as a partial agonist at the NMDA receptor, indicated positive effects on those with ASD. These indications have in turn led to an interest in memantine as a treatment for ASD [282].

In one 8-week open label study of 14 participants ranging in age from 3 – 12 years, memantine dosed at 0.4 mg/kg (up to 20 mg/d) culminated in a small improvement on simple memory tests. Improvements were not seen on other cognitive measurements. However, participants did show improvements on all ABC subscales [282]. In a second trial of 18 participants ranging in age from 6 – 19 years, with a mean dosage of memantine of 10.1 mg/d and over a treatment period that averaged 19.3 weeks, participants were “much improved” or “very much improved” as indicated on the Clinical Global Impression [283].

The results of studies that use galantamine, rivastigmine, and memantine do show promise, but they must be confirmed before these medications may be utilized in routine treatment.

**Behavioural Interventions:**

Behavioural interventions are still considered the best option. Many early intervention therapies utilized in treating those with ASD are based on the principles of ABA, which utilized positive reinforcement as well as other techniques to encourage a behavioural change. Research suggests that high intensity intervention – considered to be at least 30 hours per week for one to three years – may help improve behaviour and thinking ability as well as broaden the individual’s language skills, as compared to other, more broad treatment options.
**Future Therapies**

Future therapies for treating ASD may take many paths. Researcher Jeffrey Bradstreet is examining how neuronal stem cells may help treat ASD \[284\]. His research is currently being tested on mice models of autism.

Additional therapies are also being explored. For example, trials on mice utilizing metabotropic glutamate receptor 5 (mGluR5) blockers have shown promise \[285\]. It has been commonly thought that a glutamate imbalance could lead to many of the core symptoms of ASD; therefore, balancing glutamate may lead to alleviating these symptoms.

Other therapies involve more individualized behavioral therapies and a more away from a one size fits all approach to therapy. Since ASDs sit on a wide spectrum, allowing for a wide spectrum of treatment options that may be tailored to each individual also allows for optimum treatment, ensuring that each individual may get his or her needs met fully.

---

**VACCINE CONTROVERSY**

Vaccines are considered one of the great advances in health care. However, many parents have questions about the possible link between vaccinations and ASD. These questions persist even after science has debunked connections between vaccinations and autistic disorder \[287\].

The concern over autism and vaccines first arose after Wakefield and colleagues published a small and controversial study in The Lancet in 1998 that suggested that autism is related to the MMR (measles, mumps and rubella) vaccine. This led to a media frenzy that in turn led to widespread public concern and a decrease in MMR vaccination rates as well as several measles outbreaks. The link between the MMR vaccine and ASD was never substantiated, and The Lancet has since issued a retraction \[288\]. Additionally, Wakefield was found guilty of professional misconduct and lost his license to practice medicine in the U.K.
Nevertheless, the idea that vaccines and ASD are linked continues to receive a fair amount of public and media attention. In addition, there has more recently been speculation that thimerosal and other preservatives are responsible for the rise in autism in spite of the removal of thimerosal from vaccinations.

Scientifically speaking, vaccinations are safe. The benefits of vaccines far outweigh the risks they bring. There is not evidence of a relationship between ASD and vaccinations. Vaccinations in fact save millions of lives as well as prevent long-term complications from life threatening diseases. Legally speaking, vaccinations have also been found safe. However, the decision to vaccinate continues to be a hotly debated and highly emotional issue.

The rise in the incidence of ASD is a public health concern; therefore, it is prudent to ask if there is any remaining scientific evidence for the concern associating vaccinations and ASD. Some parents believe that the rise in ASD is due to vaccinations; however, some researchers believe that the rise in ASD diagnoses is because diagnostic tools have become more finely honed and specified, allowing for more precise diagnosis than in previous years, where individuals may have been diagnosed incorrectly. Additionally, practitioners are receiving a greater level of education on ASD in recent years than they received previously, increasing awareness as well as allowing for more accurate diagnosis.

In 2009, Fombonne reviewed 43 studies on the epidemiology of ASD, and concluded that “there is evidence that the broadening of the concept [of autism], the expansion of the diagnostic criteria, the development of services, and the improved awareness of the condition have played a major role in explaining this increase, although it cannot be ruled out that other factors might have also contributed to that trend.”
There have been a number of studies that have examined beliefs about immunizations in families who have individuals who suffer from ASD, and these studies reflect that beliefs that vaccinations are related to ASD persist. For example, one study that examined 486 families registered on the Interactive Autism Network [292] found that 26.4% of the families who had at least one child with ASD delayed vaccinations for other children; 18.9% declined vaccinating their other children. When asked for their reasons for delaying or declining vaccinations, the degree of belief in the link between the vaccine and autism was the largest associated factor. In another study of 197 children with ASD in western Los Angeles County, researchers discovered half of caregivers stopped or altered vaccinations based on the belief that the vaccinations contributed to ASD [293]. This indicated to researchers that there is still a large gap between parental belief and practices as well as medical practice and recommendations for childhood immunizations.

It is important to note that parental beliefs have the power to adversely affect vaccination practices and rates. In particular, those who are parents of children with ASD may be more likely than others to change their vaccination practices. These parents may also serve as sources of trusted information for other families in their communities who fear ASD. Since there is a high prevalence of ASD, it is important to understand the concerns and vaccination practices of parents of children with ASD so that these concerns and practices may be adequately addressed. Researchers in the Los Angeles County study believe that the large proportion of parents who think that vaccines cause their child’s ASD is indicative of a communication barrier between practitioners and parents, in addition to the powerful effect the media has on vaccine practices. This communication barrier may exist for a couple reasons. For example, physicians may believe that parents of children with ASD might not be open to discussion about vaccination or that education will not cause a change in beliefs, and parents may be fearful to ask questions or think that practitioners do not value what they believe. One study [294] found that those parents who chose not to vaccinate felt estranged.
from and untrusting of their doctors, and another study [295] indicated that those caregivers who had refused the MMR vaccine felt that their good intentions were not recognized.

Those parents of children with ASD often feel very guilty over the idea that in vaccinating their child that they may have caused their child’s disorder. They then may be more likely to decline vaccines because they may be concerned that they could make their child’s ASD worse or cause ASD in their other children. Parents frequently perceive that practitioners underestimate safety concerns as well as the impact of ASD on their family. However, although parents frequently turn to outer sources such as media for information, it is likely that they will continue to ask their practitioners for information. Therefore, it is essential for practitioners to advance open discussion as well as make it clear that both parent and practitioner share the concern for the child’s welfare.

**SUMMARY**

Autism Spectrum Disorders (ASD) includes a group of developmental disorders whose symptoms range on a continuum that runs from mild to severe in expression. ASD is typically present early in life, anytime from infancy or early childhood. More than 500,000 people in the United States have some form of diagnosed autism. Autism may keep a child from forming effective relationships with other people, due in part to an inability to properly interpret facial expressions or emotions. Children with autism spectrum disorders may be resistant to cuddling or change, and they may play alone or have delays in speech development. People with ASD also frequently repeat body movements or have extreme attachments to certain objects.

It is not known what causes ASD. However, it is known that there are strong genetic factors that play a role in causing ASDs to develop. Additionally, non-genetic, environmental factors play a role in the development of ASD. Most researchers agree that ASD is a combination of genetic and non-genetic factors, with the individual who is genetically predisposed having been exposed to factors
that then make him or her more vulnerable to developing an ASD. ASD may develop gradually, or there may be a regression course, where the individual starts out developing normally and then loses the skills he or she acquires. There are a number of risk factors for the development of ASD, including gender, prenatal and perinatal factors, and neuroanatomical anomalies.

The diagnosis of ASD is of utmost important, and it is important that ASD be diagnosed early. There are many testing tools available for the diagnosis of ASD, and these tools allow parents and practitioners to assess children to allow for early intervention. While there is no cure for ASD, early intervention research indicates that early intervention allows for better outcomes than does standard treatment protocols. The main goals of treatment in ASD are to lessen individual deficits and to lessen stress on the family. There are several ways to do this, including structured teaching, behavioral therapy, speech and language therapy, occupational therapy, social skills therapy, and the use of medication. In addition, educating family members offers valuable ways to cope.

However, it is important to remember that there are positive aspects to autism, such as the fact that many people with ASD excel on certain mental levels, such as counting and measuring, or at art, music, or memory. Many family members also report feeling accomplished in caring for the individual in their family who has autism, and feeling a deep sense of fulfillment in being around their ASD sibling or child. Although there is no cure for ASD, ASD is not a hopeless diagnosis. There is hope for progress both in research and for those who have an ASD. ASD affects the entire family unit, but with the proper education and coping tools, the entire family unit can be well equipped to handle the ASD diagnosis.

References


240. Behavior Analyst Certification Board. Health plan coverage of applied behavior analysis treatment for autism spectrum disorder. 2012;1.1


256. Friman PC. The future of applied behavior analysis is under the dome. Association for Behavior Analysis International Newsletter 2006;29.


