SMGroup

Autism: Assessment of Behaviors

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OVERVIEW

The need for assessment of autism spectrum disorder stems from multiple components. It has been established that ASD behavioral signs can be detected in early infancy, with a large percentage of parents reporting concerns as early as the first year (Zwaigenbaum et al., 2013) [1]. In fact, noticed irregularities have been associated with ASD around 18 months of age: this is the age when parents most commonly begin to seek help (Landa, 2007) [2]. In this chapter, we discuss the assessment of young children with ASD, beginning with early infancy and going through early elementary school age. It is important to include this age-span in order to consider not only early diagnosis of ASDS but to assist in planning appropriate interventions and to understand the transitional behaviors that are commonly associated with their social-educational experiences.

Clearly, the earlier a child is diagnosed with autism, the sooner the child's family can begin to perceive the implications of the disorder and begin to seek intervention. (Layton & Hao, 2014) [3]. Prior to a diagnosis, parents and families are frequently worried and stressed about their

child's atypical development and behavior. A diagnosis allows families to refocus their worries into efforts to help their child, and it is frequently a source of relief (Johnson & Myers, 2007; Ozonoff et al., 2014) [4,5].

Compared to children who are typical developing or have other developmental disorders, children with ASD have unique learning patterns, and they have distinctive strengths and weaknesses. Therefore, these children often need modified teaching approaches that are designed to accommodate their unique learning patterns. In this chapter, we discuss the need for medical assessment and educational setting assessments for related behaviors in individuals with ASD.

Medical assessment and educational assessments are performed for different reasons: the essential difference between the two is the impact that the results have on the child (Burnette, 2012) [6]. Medical assessments are to determine medical conditions that may affect or even cause ASD, as well as to provide a valid diagnosis. The educational assessment is to determine the individual's strengths and weaknesses for intervention planning.

A medical assessment typically is completed based on the Diagnostic and Statistical Manual of the American Psychological Association (DSM-V) (APA, 2013) [7]. The DSM-V is a guide for diagnosing autism and many other mental disorders. It provides the symptoms that must be present, or cannot be present, in order for a diagnosis of ASD to be possible (Autism Society, 2014) [8]. An accurate medical setting diagnosis of ASD depends on observations concerning the individual's communication, social interaction abilities, and specific aspects about the individual's activities and interests (Bearden et al., 2014) [9].

A medical assessment for ASD is commonly made by a physician, psychologist, or other trained professionals (Autism Society, 2014) [8]. Many diagnostic centers have interdisciplinary teams that work together to make the medical diagnosis. For example, the interdisciplinary team may be led by a behavioral developmental pediatrician, and it may include a psychologist, physical therapist, occupational therapist, speech-language pathologist, social worker, nurse, nutritionist, and other related health care professionals (Ozonoff et al., 2014) [5].

A formal medical diagnosis aids in the individual's early identification, his/her ability to receive treatment, waivers for developmental disability, and insurance reimbursements (Autism Society, 2014) [8]. However, a medical diagnosis does not provide sufficient supporting information for individuals to receive specific services within the educational system. Educational assessment is critical in determining the support and services each individual need (Autism Society, 2014) [8].

An educational assessment is completed generally in an academic educational setting and is accomplished under the specific guidelines of the Individuals with Disabilities Education Act (IDEA) (Burnette, 2012) [6]. These evaluations are completed when a parent, guardian, teacher or other individual in the school system, believe the services may be essential (Autism Society, 2014) [8]. It is organized by a multidisciplinary team of staff members: a team that must include at

least one specialist, one teacher, who has precise knowledge about ASD, and a parent or guardian. The team frequently includes some of the same specialists that are included during a medical diagnosis, but in order for an educational assessment to be made, educators or administrators from the school system must be included (Ozonoff et al., 2014) [5].

The educational assessment team determines the impact the disability has on a student's learning and his/her abilities to function in the classroom, as well as the needs for special education services (Morris, 2012) [10]. The team concentrates on how the child functions in the classroom, in other learning environments, and determines the services that will be most helpful to the child's education (Burnette, 2012) [6]. An Individualized Education Program **(IEP)** is written for the child. The IEP specifies the specific services and intervention, as well as how often the child receives the services and interventions. It also details the child's disability and established goals for the child.

To understand the process for both the medical and educational assessments, it is important first to understand the screening and diagnostic instruments that are available for use with individuals with ASD. It is important to know their purposes, internal content, and their reliability in order to make good decisions for their use with the individual being assessed.

SCREENING FOR ASD

Screening is a process used to identify children who are at risk for ASD, or other developmental disorders. If the child fails the screen, she/he will need a more extensive diagnostic evaluation (Robins & Dumont-Mathieu, 2006) [11]. Screening procedures should not be confused with diagnostic testing since screeners only indicate whether ASD is a possibility for the individual. In general, therefore, screening tools are designed primarily to identify broad based developmental delays and to predict the possibility of ASD (Landa, 2008; Screening and Diagnosis, 2014) [12, 13].

Wide-based screening tools and assessments that are not necessarily used with the ASD population do share some basic features (Screening and Diagnostic Evaluation, 2014) [14]. For instance, these wide-based screening instruments typically involve a broad assessment of paramount behaviors that commonly indicate ASD as well as other clinical conditions. They characteristically evaluate how the child is developing socially and communicatively, and compare the child's results to the developmental abilities of typically developing peers. These tools can be used to evaluate a child's developmental situation and to conclude if there is adequate evidence for the need of a more thorough diagnostic assessment (Sigafoos et al., 2008) [15]. Many wide-based screening tools require a parent interview, professional interactions with the child, or both: they are quick to administer and take between five to 20 minutes to complete.

Screening--Level I and Level II

Screening assessments fall under two categories

level I broadband assessments and level II assessments (Robins & Dumont-Mathieu, 2006) [11]. Level I broadband assessments are also known as broadband screening tools, or population-level screening tools. They are used to identify children in the general population who could potentially be at-risk, regardless of if there is a concern about ASD, or other developmental delays (Dababnah et al., 2011) [16]. Broadband assessments are designed for children who have no previously identified risk and can identify children who face a risk of any type of atypical development (Pandey et al., 2008) [17].

Level II assessments, or narrow-band screening tools, are designed for a high-risk population, consisting of children who have previously been recognized as at-risk for developmental disorders, or specifically ASD (Pandey et al., 2008) [17]. These narrow-band assessments involve a more thorough investigation than Level I broadband assessments: Level II assessments are specific to ASD and can help to recognize children who are at risk specifically for ASD instead of children with other developmental delays or disabilities. Level II narrow-band assessments are used frequently with children who have a sibling with ASD, display distinguishable social or communicative delays, or exhibit stereotyped or repetitive behaviors (Dababnah et al., 2011) [16]. Compared to Level I broadband assessments, the narrow-band assessments typically are more complex and require more time for administration, require more training for the administration, scoring, and interpretation of the results (Screening and Diagnostic Evaluation, 2014) [14].

Examples of both Level I and Level II screeners are provided in Table 1. As can be seen in the table, one of the screeners i.e., M-CHAT (Robins, Fein, & Barton, 1999) [18] was designed as a Level I instrument for children ages 16-30 months and contains 20 questions. Three other screeners are both Level I and Level II instruments (i.e., M-CHAT-R/F: Robins & Dumont-Mathieu, 2006; PDD-ST: Siegel 2004; CAST: Layton & Hao, in progress) [11,19,20]. The M-CHAT-R/F is an updated version of the M-CHAT and is appropriate for 16-30 month old children. It contains 20 questions (i.e., Level I) with follow-up questions (i.e., Level II). The PDD-ST is for children ages 24-35 months and contains 22 items. The CAST is for Chinese children only, ages 18-84 months, and contains 20 items. The remaining two screeners (i.e., STAT: Stone Coonrod, & Ousley, 2000; and SCQ: Rutter, Bailey, & Lord, 2003) [21,22] are considered Level II instruments only. The STAT is appropriate for children 24-36 months and contains 12 items, while the SCQ is for children ages 4 years and older and is the most complex instrument including 40 items. All of the screeners are found to have moderate to high sensitivity and specificity, as well as good predictive value, except for the M-CHAT, which has low predictive value (see Table 1). Sensitivity is the ability of the instrument to determine accurately those children with ASD. Specificity is the ability of the instrument to determine those children who are not ASD. Positive predictive value is the probability that individuals with a positive screening test truly have ASD.

Table 1: Screening Instruments for children with ASD.

Screening Tests	Levels	Ages	Format	Description	Sensitivity Specificity +Predictive
M-CHAT[a]	Level I	16-30 months	2-Stage Questionnaire	20 Questions <5 minutes	Sen = .91(high) Spec = .96 (high) +Pred = .14 (low)
M-CHAT-R/F[b]	Level I Level II	16-30 months	2-Stage Questionnaire	20 Questions <5 minutes Follow-up questions 5-10 minutes	Sen = .67(moderate) Spec = .99 (high) +Pred = .51 (good)
STAT[c]	Level II	24-36 months	2-Stage Observation	12 items 20 minutes	Sen = .67(moderate) Spec = .99 (high) +Pred = .51 (good)
PDD-ST**2**	Level I Level II	24-35 months	2-Stage Observation	22 items 10-20 minutes	Sen = .92 (high) Spec = .91 (high) +Pred = (unknown)
CAST[e]	Level I Level II	12-84 months	2-Stage Observation and Questionnaire	20 items >10 minutes	Sen = .92 (high) Spec = .42 (moderate) +Pred = .75 (good)
SCQ[f]	Level II	4 years	2-Stage Questionnaire	40 items 10 minutes	Sen = .96 (high) Spec = .80 (high) +Pred = .93 (good)

[a]Modified Checklist for Autism in Toddlers-Revised

[b]Modified Checklist for Autism in Toddlers-Revised with Follow-up

[c]Screening Tool for Autism in Toddlers & Young Children.

[d]Pervasive Developmental Disorder Screening Test-II.

[e]Chinese Autism Screening Test

[f]Social Communication Questionnaire

Screening: Early Screening and assessment of infants and toddlers

It is currently considered best practice to screen children for developmental delays while they are infants. The American Academy of Pediatrics recommends that children receive developmental screenings when they are 9 months, 18 months, 24 months, and 30 months old, and these screenings should be completed with all children. Specific autism screenings should be completed with children when they are 18 months and 24 months old. However, screening should occur earlier if concerns have been noticed or if risk factors, such as a sibling with ASD, are pertinent (Dababnah et al., 2011) [16].

Three available level I screening tools for very young children include the First Year Inventory (FYI: Reznick, Baranek, Reavis, Watson, & Crais, 2007) [23], the Early Screening for Autistic Traits Questionnaire (ESAT: Swinkels, Dietz, van Daalen, Kerkhof, van Engeland,& Buitelaar, 2006) [24], and the Quantitative Checklist for Autism in Toddlers (Q-CHAT: Allison, Baron-Cohen, Wheelwright, Charman, Richler, Pasco, & Brayne, 2008) [25]. The FYI is a 63 item, level I, a parent report that is designed to be used specifically with 12-month-old babies. It assesses behaviors within two fundamental developmental domains including Social-Communication and Sensory-

Regulatory functions. Individuals receive a score for both domains and an average total FYI risk score. Higher scores are indicative of behaviors that are more atypical and are a higher risk for ASD. Currently the FYI is used only for research and not for general clinical function (Turner-Brown et al., 2013) [26].

The ESAT is a Level I screener designed for use with 14-month olds at well-baby doctor visits, and should be completed by the health care provider. It includes a 14-item checklist that takes about five to ten minutes to complete, and babies who fail three or more items typically are recommended to receive further evaluation. Subscales include the following: Social interaction, Emotional reaction, Reaction to sensory stimuli, preoccupations, Stereotypes, verbal and Nonverbal communication, Eye contact, Interest in others, Joint attentions, and Pretend play (Swinkels et al. 2006) [24].

The Q-CHAT is another level I screening instrument. A 24-item questionnaire is designed for use with 18-24 month old babies. It specifies the frequency a child performs certain skills and behaviors, and it is completed by a parent or caregiver. It takes roughly five to ten minutes to complete. The Q-CHAT-10 is a shorter, ten-item version that is frequently used as well (Allison et al., 2008) [25].

Screening Cautions and considerations

Because there is a variety of screening assessments and no one single screening instrument may be considered as definitive over the others, there are numerous considerations to keep in mind when selecting a screening instrument. For instance, the areas of reliability, validity, sensitivity, and specificity should be considered when selecting a screener. A screening assessment's reliability is important because it describes its consistency, or dependability, for acquiring the same results every time it is used by the same person and under the same conditions. Just as important is an instrument's validity, which indicates the accuracy of the conclusions that are obtained, or does the instrument purport to measure what it is designed to measure? A screening instrument's sensitivity indicates its ability to identify accurately individuals who may need further evaluation and/or should be considered at-risk for ASD. A screening instrument's specificity determines its ability to recognize correctly individuals who do not need a more thorough evaluation and are, therefore, not to be considered at risk for ASD (Ozonof et al., 2014) [5].

In general, the screening assessments reported in Table 1 are more accurate in sensitivity than in specificity because the purpose of screenings is to identify any child who could potentially be at-risk. As a result, false positives (i.e., negative findings) are quite common, so it is important to use caution when explaining results to parents or caregivers. Therefore, when explaining the screening test's results it is important to consider the parent's perceptions, especially if the parent does not have any prior concerns about their child's behavior (Ozonof et al., 2014) [5]. Parents may easily become upset when they are informed of the screening results. It is important to inform the parents of the specific implications of the results, with a reminder that a negative result does not necessarily indicate a diagnosis of ASD (Ozonof et al., 2014) [5].

MEDICAL ASSESSMENT

Assigning a Diagnosis

In order to accurately diagnose or identify autism from a medical assessment, the information needs to be assimilated from an assortment of sources and material. Then it should be interpreted by a team of professionals (Akshoomoff et al., 2006) [27]. A diagnosis should never be based on a single diagnostic or screening instrument since no single tool can possibly establish an adequate foundation for a valid diagnostic conclusion (Layton & Hao, 2014) [3]. There are a variety of tools that can aid in the identification and screening of autism (Autism Screenings and Assessments, 2013) [28]. Additionally, a collaborative team approach among professionals is much more reliable than a diagnosis made by one individual, and professional research generally concurs that a team approach is the most dependable (Ortiz, 2008) [29].

A formal diagnosis of ASD is based on the standards set by either the Diagnostic or Statistical Manual of Mental Disorders (DSM-V) (APA, (2013) [7] or the International Statistical Classification of Diseases and Related Health Problems (ICD-10) (WHO, 2016) [30]. The DSM-V is the most commonly used manual in the United States and it designates that specific symptom be visible in order for a diagnosis to be made (Ortiz, 2008) [29].

The DSM-V requires individuals to have broad symptoms present in social-communication (with three of the sub-domains present) and in restrictive and repetitive behavior (with two of the four sub-domains). Specifically, the three social-communication subdomains include "Deficits in social-emotional reciprocity," "Deficits in nonverbal communication behaviors used for social interaction," and "Deficits in developing, maintaining, and understanding relationships." The four restrictive and repetitive behavior sub-domains include, "Stereotyped or repetitive motor movements, use of objects, or speech," "Insistence on sameness, inflexible adherence to routines, or ritualized patterns of verbal or nonverbal behavior," "Highly restricted, fixated interests that are abnormal in intensity or focus", and "Hyper- or hypo-reactivity to sensory input or unusual interest in sensory aspects of the environment." The DSM-V also requires symptoms to be existent early in the individual's developmental period, symptoms to cause significant impairments regarding social or occupational abilities, or significant impairment regarding other aspects of the individual's functioning, and the problems cannot be more suitably explained because of an intellectually disability or a global developmental delay (Diagnostic Criteria, 2014) [31].

Based upon abilities in the previously described social communication and restricted, repetitive behaviors domains, the DSM-V (APA, 2013) [7] classifies individual as level 3: requiring very substantial support, level 2: requiring substantial support, or level 1: requiring support. Regarding the social communication domain, a level 3 diagnosis indicates the individual has severe communication deficits and minimal social exchanges. A level 2 diagnosis signifies the individual has noticeable communication deficits and limited social exchanges and a level 1 diagnosis indicates the individual has communication deficits when there are no available supports and he

or she has decreased social interaction. Regarding the restrictive, repetitive behavior domain, a level 3 diagnosis denotes the individual has immense difficulty adjusting focus, inflexible behavior, exceeding trouble handling change, or any other restricted or repetitive behavior that significantly inhibits the individual's ability to function. A level 2 diagnosis signifies difficulty adjusting focus, inflexible behavior, trouble handling change, and the behaviors interfere with functioning across a range of settings. A level 1 diagnosis indicates inflexible behavior that inhibits functioning in at least one context, trouble with transitions among activities, and organizational and planning difficulties that impede upon the individual's ability to be independent.

Herbert (2012) [32] noted that precise identification of autism relies strongly on having a complete understanding of the child's developmental history. Autism spectrum disorder is incredibly complex: there are varieties of genetic and environmental elements that can increase an individual's risk for having the disorder. Herbert (2012) [32] states that the amplified risk linked to any solitary factor is comparatively moderate, and an increased risk of ASD involves a combination of elements (Herbert, 2012) [32]. In general, most experts agree that autism results from an aggregate of environmental and genetic factors and, therefore, is probably the result of a combination of genetic susceptibility and environmental exposures. As of now, there is no consensus among research regarding the specific genes that lead to ASD, and current research concludes that autism is probably the result of a complex association of multiple genes (Chaste & Leboyer, 2012) [33]. In the following session, first, we will discuss the formal diagnostic assessment of ASD. Then, we will discuss the general list of components that typically are included during a medical assessment procedure.

DIAGNOSTIC ASSESSMENT OF ASD

Thorough diagnostic evaluations should be completed in the event that the results from a screening evaluation signify a possible problem or indicates the individual may have ASD (Layton & Hao, 2014) [3]. It is best practice for these evaluations to be completed by an interdisciplinary team of professionals, as indicated earlier.

The diagnostic evaluation, most likely, will require supplementary assessments and will normally include clinical observations along with the administration of one or more diagnostic protocols (Sigafoos et al., 2008) [15]. These evaluations are critical to making a formative diagnosis of ASD that is both valid and reliable. The information gathered during the diagnostic evaluation may also be helpful to both parents and professionals, because it helps to understand the child's specific behavioral and developmental complications and helps in the intervention planning and understanding of the child's specific needs (Sigafoos et al., 2008) [15].

There is a variety of assessment tools available to help with the diagnostic process. No single diagnostic instrument is intended to provide a full diagnosis: instead, they just assist with the process and provide further information. Four commonly used diagnostic instruments include The Autism Diagnostic Interview-Revised (ADI-R) (Lord, Rutter, & Le Couter, A., 1994) [34] the

Autism Diagnostic Observation Schedule – Second Edition (ADOS-2) (Lord, Rutter, DiLavore, et al., 2012) [35], The Childhood Autism Rating Scale – Second Edition (CARS-2) (Schopler, Van Bourgondien, Wellman, & Love, 2010) [36], and The Gilliam Autism Rating Scale – Third Edition (GARS-3) (Gilliam, 2013) [37].

ADI-R and ADOS-2 are both widely used diagnostic procedures that are considered the gold standard for assessment. The Autism Diagnostic Interview-Revised (ADI-R) can be used to assess both children and adults, as long as their mental age is above 2.0 years. It is a clinical interview which includes 93 questions and takes 1 ½ to 2 ½ hours to complete. The questions are divided into three separate domains, including language and communication, reciprocal social interaction, and restricted, repetitive, and stereotyped behaviors and interests. The ADI-R uses a template for scoring that converts the scores to match diagnostic criteria based on the International Classification of Diseases-10th Revision. The Autism Diagnostic Observation Schedule – Second Edition (ADOS-2) uses standardized, direct observations of individuals between 12 months to adulthood to assess for ASD, and administration can take between 40 to 60 minutes to complete. It assesses the individual base on four areas, including communication, social interaction, play, and restricted and repetitive behaviors (O'Brien, 2013).

The Childhood Autism Rating Scale – Second Edition (CARS-2) uses a rating scale to assist with diagnosing ASD. CARS-2 is designed to recognize the presence of ASD and to identify the severity of the child's condition. The Gilliam Autism Rating Scale – Third Edition (GARS-3) is another rating scale that assesses children on six sub categories, including maladaptive speech, social interaction, social communication, emotional responses, cognitive style, and restrictive/repetitive behaviors. CARS-2 and GARS-3 are both relatively quick and easy to administer and they both provide extensive information about communication and social development (Sigafoos et al., 2008) [15].

All above diagnostic tests were originally developed for English speaking individuals, and later translated to multiple languages. A diagnostic instrument designed exclusively for measuring Chinese children with ASD is the Chinese Autism Diagnostic Scale (CADS) (Hao, Zou & Layton, 2015) [38]. The CADS includes seven behavioral domains (i.e., motor-vocal imitation, stereotype behaviors, sensory behaviors, play behaviors, social interaction, receptive language, and expressive language) along with two supplemental domains (i.e., academic, and executive function). It is for use with children ages 24- to 84 months. It uses direct observations and parent information for scoring.

Related Medical Assessment

Developmental milestones

Evaluation of developmental milestones is an important component of a medical assessment because failure, or delay, to acquire age-appropriate developmental milestones is a critical rag flag for the potential of autism spectrum disorder (Layton & Hao, 2014) [3]. A thorough assessment of

motor, social, and language/communication abilities is important. Individuals with ASD present with a wide range of abilities and behaviors that deviate from the norm, and the developmental abilities of a single individual with ASD frequently fluctuate from day to day (Joseph, Tager-Flusberg, & Lord, 2002) [39]. This common fluctuation causes difficulty in the assessment of developmental milestones because it can result in vast variances concerning the results of different assessments administered to the same child. Ortiz (2008) [29] strongly advises that developmental abilities be assessed by multiple sources in order to assure accuracy.

Motor abilities

Abnormalities or disruptions in motor abilities are commonly present for children with ASD (Landa, 2008) [12]. Delays in acquisition of motor milestones, unstable posture, difficulties with motor coordination, passivity, low muscle tone, and abnormal motor behavior patterns all represent a risk for impairment of ASD (Landa, 2008) [12]. Excessive mouthing and repetitive motor behaviors are common among children with ASD, as well as low flexibility and variety of play. Although many of these impairments are not necessarily specific to the diagnoses of ASD, their manifestation still indicates a risk for a later diagnosis (Landa, 2008) [12].

Social skills

Continuing delay or absence of any developmental social milestones could potentially indicate a risk factor for ASD (Ortiz, 2008) [29]. Numerous social abnormalities may be early markers of ASD (Landa, 2008) [12]. For instance, debilitated social synchrony (i.e., not being able to coordinate social exchanges) resulting from discrepancies in joint attention, social orienting, affective engagement, and imitation are fundamental characteristics of ASD. More specifically, impairments regarding looking at others, pointing, showing objects, and orienting are considered critical risk factors. Additionally, affective expressions and socio-emotional reciprocity are commonly atypical among toddlers with ASD (Landa, 2008) [12].

Language and communication

Language deviances or communication delays are frequently the first symptoms noticed by parents (Tager-Flusberg, 2000) [40]. Communication impairments typically arise during infancy for children with ASD (Tager-Flushberg, 2000) [40]. Children with ASD present with disruptions in babbling, social communication development, and gesturing. At later ages, somewhere around age 24-36 months, communication impairments, such as the types of communication, initiation of social communication, gaze shifts, symbolic play, language comprehension, and repair strategies can be helpful for distinguishing children with ASD from children with developmental delays or language disorders (Landa, 2008) [12].

At two years of age, any child who has a vocabulary of less than 50 words, is unable to combine words into short phrases, should be considered to have a language delay and at risk for ASD. Furthermore, if a child repeats, echoes, or parrots more than 20% of utterances spoken, than

the child is considered to have a language deviance and a possible risk for ASD. Similarly, a child who is considered mute is at an extremely high risk for ASD because the absence of any spoken language is considered both a language delay and a language deviance. In addition, a child who has a vocabulary that noticeably regresses in language skills between the ages of 12 And 24 months is also considered to be at risk for ASD (Accardo, 2008) [41].

Family history

While genetics is clearly not the sole cause of autism, research has shown that it can play a role in identifying ASD (Nelson et al., 2013) [42]. Therefore, it is important for a diagnosis to include an extensive family history regarding clinical, medical, neurological and other pertinent information concerning the individual's immediate and extended family. Research suggests that the presence of autism among family members is considered a critical risk factor (Nelson et al., 2013) [42]. Specific red flags include siblings with autism, siblings with autism-like behavior, family members with autism, family members with autism-like behavior, and a family history of genetic disorders (Ortiz, 2008; Shapiro et al., 2008; Waterhouse, 2013) [29,43,44]. Furthermore, a child who has one sibling with ASD has roughly a 2- to 6% greater risk of also having ASD, and a child who has two siblings with ASD has roughly a 35% chance of having ASD (Nelson et al., 2013) [42]. In contrast, the presence of ASD among extended family member does not constitute a high risk factor for the presence of ASD among immediate family members, but it is still considered a risk factor (Waterhouse, 2013) [44].

Furthermore, the presence of social, emotional, and language disorders in other family members can be considered a risk factor too (Ortiz, 2008) [29]. Therefore, the diagnosis of the following conditions, among immediate family members or relatives, constitutes an increase in the prospect of ASD: depression, bipolar disorder, schizophrenia, psychosis, dyslexia, dysgraphia, dyspraxia, attention deficit disorder, attention deficit hyperactivity disorder, learning disabilities, obsessive compulsive disorder, Tourette's, anxiety, and semantic pragmatic disorder (Accardo, 2008; Ortiz, 2008; Shapiro et al., 2008) [41,29,43]. Other family related factors that increase the risk for autism spectrum disorder include low-income, lack of parental concerns, parents with limited education, parental unemployment, parents with mental health concerns, numerous siblings, and a single parent family (Ortiz, 2008) [29].

Hearing/Vision

Hearing and vision evaluations are important for a couple of critical reasons. Relative to vision, children with ASD frequently have trouble maintaining visual attention and difficulty coordinating their central and peripheral vision. Furthermore, eye movement disorders, such as crossed-eyes, are observed frequently among the ASD population (Vision and Autism, 2008) [45]. For hearing, individuals with ASD can be over-sensitive or under-sensitive to loud or unusual sounds. It is not uncommon for an individual with ASD to be hypersensitive to specific auditory stimuli and simultaneously hyposensitive to other auditory stimuli (Ortiz, 2008) [29].

Established severe visual or auditory problems can present with symptoms that mimic autism so they are easily misdiagnosed. It is an established fact that general problems with vision and hearing are areas that can cause a developmental delay or abnormal behaviors; these are areas of concerns that ASD are also frequently suspected of producing. In addition, children with ASD frequently experience abnormal speech patterns and language delays, which again are deficits that commonly occur from hearing loss (Prater & Zylstra, 2002) [46]. Therefore, it is important for the professional to be aware of any visual or auditory impairment before a confirming diagnosis of ASD (Prater & Zylstra, 2002) [46].

Previous evaluations/other diagnoses

There are particular comorbid disorders commonly linked to autism (Herbert, 2012) [32]. Risk for ASD is increased with other disorders such as Fragile X Syndrome, Tuberous Sclerosis, Down syndrome, and Angelman's Syndrome (Herbert, 2012) [32]. Additionally, children with ASD commonly have other comorbid conditions such as intellectual disability, epilepsy, attention deficit/hyperactivity disorder, and impaired language development (Waterhouse, 2013) [44]. Therefore, the presence of these comorbid disorders can be a risk factor for ASD.

Comorbidity occurs when an individual is diagnosed with a second order condition that includes different core symptoms than the primary diagnosis (Mannion & Leader, 2013; Mannion & Leader, 2014) [47,48]. ASD is commonly associated concurrently with other conditions that can be just as debilitating and persistent as the symptoms caused by ASD itself (Matson & Goldin, 2013) [49]. Comorbidity is actually extremely prevalent, and more than 70% of the individuals diagnosed with ASD are also diagnosed with a concurrent disorder (Lai et al., 2014) [50]. Therefore, when attempting to assess ASD, it is important to identify common co-occurring conditions along with the identification of core symptoms for ASD.

Distinguishing the core symptoms of ASD apart from the core symptoms of other conditions can be problematic and has led to widespread discrepancies among research regarding most concurrent conditions (Matson & Cervantes, 2012) [51]. With that stated, it is well to remember that there is still an immense need for additional research on this topic.

Intellectual disability/Intelligence quotient

A child's intelligence quotient (IQ) should always be a component of a medical evaluation for ASD. In fact, the most common dysfunction linked to ASD is Intellectual Disability **(ID),** with roughly 70% of children with ASD being considered intellectually disabled (ID) (Joseph, Tager-Flusberg, & Lord, 2002) [39]. It is strongly recommended (Layton et al., 2015) [52] that a child's IQ should always be obtained and considered before any interventions are considered or any therapeutic goals are developed because the IQ could adversely affect ability levels.

Children with ASD who score higher than 70 IQ points are typically considered to have mild ASD, whereas children who score between 55-70 IQ points are usually considered to have moderate

ASD, and children who score less than 50 IQ points are considered to have severe ASD (Layton & Hao, 2014) [3]. Yet, although a child's IQ normally correlates with severity of symptoms, it is not always an accurate predictor. For instance, it is common for children with higher functioning ASD to have IQ scores that are considered typical, but they are still unable to acquire skills at the same rate as typically developing children. This eventually can cause these children to decline in IQ scores and even to be considered intellectually disabled, as they grow older. Sometimes children will instead show intellectual improvement so a child's intelligence quotient may not be constant overtime (Shapiro et al., 2008) [43].

Some researchers (i.e., Matson & Shoemaker, 2009) [53] have found intellectual disability to increase the prevalence of many other conditions, and symptoms, that coincide with ASD. For instance, individuals with ASD, with concurrent intellectual disability, have higher rates of other comorbid disorders and symptoms compared with individuals with ASD without an intellectual disability (Tureck et al., 2014) [54]. However, a recent study by Golding et al. (2014) [55] found that the existence of intellectual disability did not positively correlate with increased comorbidity symptoms.

The specific relationship between intellectual disability and increased concurrent conditions is not entirely clear at this point in time (Golding et al., 2014) [55].

Anxiety and anxiety-related disorders

Anxiety and anxiety-related disorders make up some of the most frequent concurrent conditions that adolescents and school-age children with ASD face. These conditions include social phobia, generalized anxiety disorder, obsessive-compulsive disorder, and separation anxiety disorder. According de Bruin et al. (2007) [57], 55% of children with ASD qualify for a diagnosis of at least one of these disorders, and outpatient children who have been identified with similar disorders 11% to 84%. This wide range of data is possibly due to an inconsistency of research tools used along with a wide assortment of anxiety disorders being measured (Williams et al., 2015) [58].

Obsessive-compulsive disorder is one area that is considered to be highly associated with ASD, but specific prevalence rates are unclear. A study by Lainhart (1999) [59] suggested that 16% to 81% of people with ASD show symptoms of obsessive-compulsive disorder. In a related study, Simonoff et al. (2008) [60] found that only 8% of children with ASD had an OCD diagnosis, while Leyfer et al. (2006) [61] found 37% of their children with ASD also had OCD. These findings are somewhat inconsistent, but it is common for children with ASD to place their toys and possessions in a specific order and become extremely distraught if the order is not maintained. However, these behaviors may not be caused by OSD but merely by the stereotypical repetitive and restricted behaviors that are considered core features of ASD. There is some but no clear link between the two disorders or an association among the features (Nebel-Schwalm & Matson, 2008) [62].

Anxiety disorders are incredibly prevalent among individuals with ASD: it is common for individuals with ASD to be misdiagnosed because of difficulties differentiating between normal ASD characteristic and a concurrent anxiety disorder (MacNeil et al., 2009) [63]. It remains uncertain whether anxiety problems should be considered a distinct disorder, or if they are closely connected to the core symptoms of ASD (Williams et al., 2015) [58]. Recent investigations have identified a negative relationship between anxiety and intellectual disability, and individuals with ASD with an intellectual disability diagnosis are far less likely to have problems with anxiety (Williams et al., 2015) [58]. It has been hypothesized that the negative relationship is because of anxiety necessitates particular levels of cognition, social awareness, and self-awareness, and these abilities are not existent among lower functioning individuals with ASD (Mayes et al., 2006) [64].

Attention deficit/hyperactivity disorder

Attention Deficit/Hyperactivity Disorder (AD/HD) is a common concurrent condition that affects individuals with ASD (Mannion & Leader, 2013) [47]. Comparable to other concurrent conditions, there are again vast discrepancies among the findings in the research on this topic. For example, prevalence rates for AD/HD comorbidity have ranged between 14% and 78% and specific associations between the two disorders are still vague (Mannion & Leader, 2013) [47]. The formerly used, Diagnostic and Statistical Manual of Mental Disorders, Fourth Edition (DSM-IV), did not even allow for ASD and ADHD to be diagnosed concurrently. However, current impressions, regarding the association between the two disorders, have changed, and the currently used DSM-V (APA, 2013) [7] now allows for a comorbid diagnosis (Matson & Cervantes, 2012) [51]. However, the accuracy of this change is still being questioned by many researchers.

Most research suggests that ADHD and ASD are distinguishably separate conditions, but the primary ADHD symptoms are a fundamental aspect of autism (Mayes et al., 2012) [65]. The hyperactive, impulsive, and attention deficit behaviors that make up ADHD may be a portion of autism; however, while features of ADHD are typical in ASD, the core symptoms of ASD are not characteristically observed in ADHD, resulting in a clear distinction between the two disorders (Mannion &Leader, 2013) [47]. To support this, Mayes et al. (2012) [65] found a difference between children with ADHD and children with ASD's ADHD-like behaviors. The ability of the individuals with ASD was more hyper-focused than it was with the children with ADHD (Mayes et al., 2012) [65]. In essence, most children with ADHD struggle to maintain their focus on almost everything, but children with ASD typically are able to sustain their attention on activities in which they are interested in (Mayes et al., 2012) [65].

Gastrointestinal disorders

Gastrointestinal disorders also frequently concur with ASD (Mannion &Leader, 2013) [47]. These disorders include chronic diarrhea, abdominal pain, nausea, bloating, and constipation. Similar to anxiety comorbidity, there is inconsistency among research data regarding the

prevalence of gastrointestinal disorders coinciding with ASD (Williams et al., 2015) [58]. Specific prevalence rates range from 9% to 91% and increased ASD severity, and more severe intellectual disability, typically correlate with a higher probability for gastrointestinal disorders (Mannion & Leader, 2013) [47].

Epilepsy and seizures

Another common concurrent condition is epilepsy (Tuchman et al., 2010) [66]. Epilepsy only affects 2% to 3% of typically developing children but it affects approximately 30% of children with ASD (Tuchman & Rapin, 2002) [67]. In addition, research has reported a link between epilepsy and intellectual disability, whereas individuals with ASD with severe intellectual disability have more prevalent rates of epilepsy than those without intellectual disability or with milder intellectual disability (Berg & Plioplys, 2012) [68]. Therefore, there is evidence that high comorbidity rates between ASD and epilepsy are substantially due to the high prevalence of intellectual disabilities in individuals with ASD (Berg & Plioplys, 2012) [68]. A meta-analytical study conducted by Amiet et al. (2008) [69] also found that intellectual disability among individuals with ASD strongly indicated a risk factor for epilepsy with occurrence rates being roughly 8% for individuals with no intellectual disability but as high as 21.5% for individuals with an intellectual disability.

In summary, a medical assessment, provided by a skilled team of professionals, is an important part of the diagnostic process for ASD. This process should include measures of developmental milestones, family history, hearing/vision, previous evaluations, intellectual disability, anxiety-related disorders, attention deficit, gastrointestinal disorders, and epilepsy/seizures. Together this information along with screening or administration of diagnostic tests is important for assigning a diagnosis of ASD.

EDUCATIONAL ASSESSMENT

The primary purpose of an educational assessment is to determine special education support an individual child needs at school (Morris, 2012) [10]. There are several areas involved in the educational assessment, including assessment of social interaction skills, speech and language skills, sensory behaviors, challenging behaviors, and academics

Social Interaction Skills

Deficits in social interaction skills and communication abilities are considered to be the core symptoms of autism spectrum disorder (Gillis et al., 2011; Li et al., 2014) [70,71]. Difficulties in these areas may have devastating effects on a child because they have been linked with peer rejection, anxiety, poor academic achievement, and depression. In order to minimize these potential impairments, the accurate assessment of social abilities in young children is critical so that suitable goals and interventions can be developed to address the potential influences (Gillis et al., 2011) [70].

In the typically developing population, social and communication can be observed as early as 12 months of age. For instance, between 12 and 24 months of age, typically developing infants normally use preverbal communication strategies, such as pointing and gesturing, to respond and initiate communication with caregivers. This ability to respond to social interaction and initiate social interaction are considered predictors of the individual's later social abilities and social competence. It is not uncommon for infants with ASD to be significantly delayed in this area (Gillis et al., 2011) [70].

In addition, by two years of age, there are varieties of social-behaviors that can help predict future social skills and help to identify children with ASD. This includes lack of concern about other children, lack of initiation of social interactions, deficits in direction or showing attention, difficulties understanding the gestures of others, irregular use of pointing as a communication strategy, and deficits in joint attention (Gillis et al., 2011) [70]. Then, as these children become older, observable social impairments include difficulties maintaining social relationships, troubles with imaginative play and friends making, problems adjusting to social contexts, and pragmatic difficulties (Layton & Hao, 2014) [3].

A commonly used instrument for assessing social abilities in children with ASD is the Social Responsive Scale-Second Edition (SRS-2) (Constantino & Gruber, 2012) [72]. The SRS-2 is designed to detect the presence of social impairments in children with autism spectrum disorder, and classify the severity of the impairment. It assesses the child's abilities in regards to communication, interpersonal behavior, and repetitive/stereotypical behaviors. There are four different forms with the assessment that are appropriate for different age groups. There is a form for preschool children, school-age children, adults, and adult self-report. The SRS-2 takes roughly 15-20 minutes to administer and it generates a total social deficit score along with five subscale scores that are useful in designing treatment plans. The five subscales are social awareness, social communication, social cognition, restricted interests and repetitive behavior, social awareness, and social motivation. This instrument has been researched extensively and found to have high diagnostic validity (Constantino & Gruber, 2012) [72].

Speech and language assessments are critical to differentiating ASD from specific language impairments because both groups can share some overlapping signs and symptoms, and ASD is commonly confused with specific language impairments (Matson & Goldin, 2014) [73]. Additionally, numerous other speech and language disorders can co-occur with ASD such as dysarthria, apraxia, and aspects of specific language impairment. For this reason, a speech-language pathologist should assist with assessing and diagnosing ASD, in order to adequately distinguish and differentiate it from children with specific speech and language impairments (American Speech-Language-Hearing Association, 2006) [74].

Four broad categories should be measured when assessing speech and language behaviors. These categories are speech, receptive and expressive vocabulary, receptive and expressive

language, and pragmatics (Layton & Hao, 2014) [3]. Speech and language assessments in all of these categories typically involve informally observing how a child interacts with others among multiple environments, such as home and school, and formally assessing with a series of standardized diagnostic tests. Assessment tests should also be selected according to the individual child's age and speech and language abilities (Autism Screenings and Assessments, 2013) [28].

The following are a compilation of available tests for measuring speech and language skills in a child. For the preschool age child, there are two frequently used tests, the Goldman-Fristoe Test of Articulation-3 (Goldman & Fristoe, 2014) [74] and Preschool Language Scales, Fifth Edition (PLS-5), (Zimmerman, Steiner, & Pond, 2002) [76]. The PLSk-5 measures both expressive and receptive language abilities. The PLS-5 can be used for children from birth through 7-years of age and it uses pictures and objects for administration.

For school-aged children, there are several popular instruments. The Peabody Picture Vocabulary Test-4th (PPVT-4) (Dunn & Dunn, 2007) [77] is a commonly used, norm-referenced test that assesses receptive vocabulary abilities. The test requires the individual to look at four pictures and choose the one that best matches a word said by the examiner (Dunn & Dunn, 2007) [77]. The PPVT-4 is designed for children ages 2.6-years to 90-years. It takes approximately 15 minutes to administer. A popular language test is the Clinical Evaluation of Language Fundamentals-5 (CELF-5) (Wiig, Semel, & Secord, 2013) [78]. The CELF-5 is for ages 5-years to 22-years and contains 16 subtests. Ten to 16 of the subtests are to be administered to different age groups. The CELF-5 measures receptive language, expressive language, language structure and language content. It also includes a written language subtests. The CELF-5 takes between 30 to 45 minutes to administer. The Oral and Written Language Scales-II (OWLS-II) (Carrow-Woolfolk, 2011) [79] is an another frequently used language test for preschool and school age children. The OWLS-II measures Listening Comprehension, Oral Expression, Written Expression, and Reading Comprehension in children ages 3-years to 22-years. The Listening Comprehension and Oral expression take approximately 15 minutes to complete each, while the Written Expression and Reading Comprehension usually takes 30 minutes each to complete.

One school age test that measures pragmatic language is the Test of Pragmatic Language-Second Edition (TOPL-2) (Phelps-Terasaki & Phelps-Gunn, 1992) [80]. The TOPL-2 assesses pragmatic abilities in children from 6-years to 19-years of age. TOPL-2 utilizes stories and narratives about everyday social interactions in order to create an in-depth analysis of the child's social communication skills (Phelps-Terasaki & Phelps-Gunn, 2007) [80]. The TOPL-2evaluates social communication in context, telling you how well students listen, choose appropriate content, express feelings, make requests, and handle other aspects of pragmatic language . It takes approximately 45 minutes to complete. Originally, it was designed for use by speech-language pathologists; but because of the ever-increasing emphasis on social skills and conflict resolution in students, the TOPL-2 provides essential information for school psychologists, counselors, clinical psychologists, and special education specialists.

Sensory Behaviors

It is common for children with ASD to have a corresponding sensory processing impairment (Ortiz, 2008) [29], so sensory processing assessments are a useful component of a comprehensive evaluation. Sensory impairments cause irregularities concerning how the child's brain perceives information regarding the surrounding world (Burmaster, 2009) [81]. Sensory processing abnormalities can interfere with a child's capability to function normally within the environment (Ortiz, 2008) [29], and irregularities may be displayed through emotional outbursts or behavior challenges (Burmaster, 2009) [81]. Some research has suggested that people with ASD often experience altered sensory processing, and these sensory processing problems potentially can be linked to the difficulties people with ASD experience in handling daily life circumstances (Burmaster, 2009) [81].

A child with a sensory processing impairment may experience hypersensitivity, or hyposensitivity, and sensory seeking (Ortiz, 2008) [29]. Hypersensitivity causes the child to be over responsive sensitive to sensory stimuli in the environment, and causes the child to avoid/loath many common environmental stimuli. Hyposensitivity causes the child to be under sensitive under responsive to sensory stimuli, and the child often seems lethargic because he or she experiences low excitement to the environment's sensory stimuli (Burmaster, 2009) [81]. Sensory seeking results in individuals crave or display interest in sensory experiences. Some individuals may present both hyper-responsiveness and hypo-responsiveness, and shift frequently from one condition to another condition.

One frequently used series of instruments for assessing sensory processing among individuals with ASD is The Sensory Profile 2 (Dunn, 2014) [82]. The Sensory Profile 2 includes five separate versions distinguishable by the targeted age group. First, the Infant Sensory Profile 2 is for ages birth to six month while, second, the Toddler Sensory Profile2 is for ages 7-35 months. Third, the Child Sensory Profile 2 is for children 3- to 15-years old. Fourth, the Short Sensory Profile 2 is a shorter version that is also for the 3- to 15-years old age group. Finally, the additionally School Companion Sensory Profile 2 is used specifically designed for use in a school setting. Each of the five versions consist of a questionnaire that takes roughly 10-15 minutes to complete and provides information regarding the individual's ability to adapt to environmental sensory stimuli, interpret sensory stimuli, and specific sensory systems that are problematic (Autism Screenings and Assessments, 2013) [28].

In addition to the above, assessing sensory impairments can also be completed by using the original Sensory Profile The Sensory Profile provides an extensive representation of the individual's sensory processing situation. It consists of 125 questions that are answered by the child's caregiver. The questions pertain to the regularity of the child's responses to an assortment of sensory experiences (Kern et al, 2006) [83]. The profile contains three major sections, including modulation, sensory processing, and behavioral and emotional responses. It also comprises both

high and low threshold items in order to gain a complete understanding of the child's sensory processing circumstances. High threshold items can determine the child's lack of response to stimuli, which signals hyposensitivity, and low threshold items can determine a child's annoyance or awareness of sensory stimuli, which signals hypersensitivity (Kern et al, 2006) [83].

Challenging Behaviors

Challenging behaviors may be defined as any behavior that prevents or impedes upon daily functioning (Powers, 2010) [84]. Individuals with ASD frequently develop a range of challenging behaviors such as aggression, hyperactivity, self-injury, mood liability, sleep disturbance, property destruction, tantrums, inattention, impulsivity, repetitive behaviors, anxiety, and irritability (Myers, 2008) [85].

Prizant (2015) [86] has provided a list of ways for viewing the behaviors presented by individuals with ASD, including observing the dysregulation behaviors. Coping strategies and regulation behaviors and influences from other people.

Prizant notes the importance of understanding behaviors in addition to describing the acts. Understanding why the behavior is present is important for helping the individual to develop appropriate strategies for regulating behaviors.

Functional Behavior Assessment

Assessing challenging behaviors may be completed by using a functional behavior assessment (i.e., FBA). An FBA is used to discover the fundamental purpose, or function, for the behavior, to understand why the child is engaging in these problematic behaviors, and then design an intervention plan to help prevent these behaviors (Ozonof et al., 2014) [5]. The goal of an FBA is to discover environmental data about the behavior, such as precursors that regularly occurs before the behavior, adult reactions that could be maintaining the behavior, regular patterns of the behavior, common environments, and functionally equivalent behaviors (Powers, 2010) [84]. Assessment of challenging behaviors with an FBA can provide information about environmental motivations for the challenging behavior, such as desire for attention, aspiration to escape or avoid from situations, or the yearning to obtain tangible items.

It is also important to take into account the fundamental probability that the behavior could be a result of the underlying biological or internal factors of the ASD condition. Many professionals believe that specific core characteristics of ASD, and the frequently observed comorbid disorders, result in numerous challenging behaviors, and, therefore, challenging behavior assessments should take into account internal factors in order to truly determine the ultimate cause of the behavior (Myles et. al, 2004; Prizant,2015) [87,86].

The underlying ASD condition can create social, language, and communication deficits that make these individuals especially vulnerable to the evolvement of maladaptive behaviors.

Additionally, the frequent presence of comorbid disorders such as intellectual disabilities, psychopathologies, bi-polar disorder, depression, intestinal conditions, sleep deprivation, and anxiety also escalate the risk for the development of challenging behaviors (Vanderkerken et al., 2013) [88]. The present dilemma is whether these behaviors should be assessed and treated as the result of the aforementioned environmental factors, comorbid disorder influences, factors involving the underlying characteristics of ASD, or as a combination of the areas (Matson et. al, 2011) [89].

Although functional behavior assessments may not be able address internal causes of challenging behaviors, they are still important because research has found that management of these behaviors are most effective when they are tailored toward environmental causes. Thus, functional behavior assessments should be considered (Matson et. al, 2011) [89].

According to Powers (2010) [84], the first step to conducting a FBA is to form a team of individuals who have observed the challenging behavior. Team members often include teachers, speech-language pathologist, psychologist, behavioral therapist, occupational therapist, the child's parents or caregivers, and anyone else who has spent a substantial amount of time with the child. The second step is to pinpoint the specific problem behaviors that the team will target for assessment and intervention. It is common for there to be more than one challenging behavior, and when this circumstance arises, the team members should choose one behavior to target and address initially. This initial target behavior is often the behavior that is most problematic and has the most negative impact on the child's to learn. However, any behaviors that can lead to safety hazards should also be targeted immediately (Ozonof et al., 2014) [5].

Once the target behaviors are identified, the team should detail the specifics or already known factors about the behavior. They record the duration that the target behavior has been affecting the child's academic progress, whether or not the behavior encompasses any aggression, and whether it causes any property damage. Team members pinpoint the specific locations or circumstances where the behavior occurs, or does not occur, in order to determine any explicit environmental or situational causes. The team also discusses potential causes to the behavior and the current consequences the child has faced immediately after the target behavior has occurred (Ozonof et al., 2014) [5]. In addition, challenging behaviors are commonly are caused by a mismatch between the child's cognitive abilities and the behavioral or educational expectations the child is enduring, so it is critical to assess the environment and circumstance for potential causes of these challenging behaviors (Myers, 2008) [85].

If the educator or professional deems it necessary to chart the individual's behaviors, the team members should examine records concerning the child behavior, conduct both formal and informal interviews with the child's family, school staff members, and occasionally obtain information from the child, if it is deemed appropriate. Baseline data should be collected through direct observations of the child. This baseline data should describe the behavior, the antecedent

occurrences, any consequences that occur, the child's reactions to the situation, the time and place when the behavior occurs, and what environmental conditions appear to be triggering the behavior. This information is critical for the development of an intervention plan that can help alleviate the challenging behaviors (Ozonof et al., 2014) [5].

Once all of the information has been gathered and considered, a functional analysis is completed. A functional analysis involves manipulating circumstances such as the environment, antecedents, and consequences, in order to isolate particular variables that could be causing the behavior. A variety of conditions is tested with the child until behavior levels become stable (Mudford et al., 2008) [90].

Challenging behaviors in individuals with ASD may be assessed by, standardized assessment protocols. The Autism Spectrum Disorder – Problematic Behavior – child version (ASD-PBC) (Matson & González, 2007) [91]is a test designed for use with children ages 3-14 years old. The ASD-PBC requires a caregiver to rate the child's behaviors based upon severity levels. Severity levels range from 0-2, with 0 indicating that the behavior is not problematic, 1 indicating it is mildly problematic and 2 indicating a severe problem or impairment. There are 18 items in the questionnaire, and it assesses aggression towards others, aggression towards self, property destruction, odd behaviors, and inappropriate sexual behaviors.

Another commonly used assessment protocol is the Behavior Assessment System for children, Second Edition (Reynolds & Kamphaus, 2004) [92]. The BASC-2 is a parent rating scale and includes four forms that can be used with the corresponding age group: pre-school, school age, adolescent, and college. It is part of a sequence of assessments designed to measure internalizing behaviors, externalizing behaviors, withdrawal, atypical behaviors, adaptive skills, and attention problems. The internalizing behaviors subscale measures include anxiety, depression and somatization. Hyperactivity, aggression, and conduct problems are measured with the externalizing behaviors subscale, and the subscale for atypical measures hallucinations and lack of environmental awareness.

Assessment of Academic Skills

Reading/Literacy

Reading or literacy consists of two basic concepts, being able to read words (i.e., sight words and decoding or word attack skills) and being able to make meaning out of the words (i.e., reading comprehension) (Perfetti, Landi & Oakhill, 2005) [93]. Research among children with ASD suggests that phonological, orthographic, and sight word identification skills are either acquired at a slower rate than typically developing peers (TD) (Firth & Snowling, 1983) [94] or within average range (Cronin, 2014; Nation, Clarke, Wright & Williams, 2006) [95,96]. Frith and Snowling (1983) [94], for instance, reported on reading sight words in a group of nine children with ASD compared to a group of typical developing (TD) children. Their findings suggested a wide variability in performance but, in general, most of the children with ASD fell within average range for sight word reading.

In contrast to reading accuracy, reading comprehension or making meaning from words is an area of difficulty for most children with ASD (Cronin, 2014; Ricketts, Jones, Happé, & Charman, 2013) [95]. For instance, Ricketts et al. (2013), in a regression analyses, found that word recognition, oral language helped to explain variances in reading comprehension; however, measures of improved social behavior, and social cognition predicted better reading comprehension. Therefore, word recognition, oral language, and social skills appeared to affect reading comprehension in students with ASD.

Similarly, in a related study by Nation et al. (2006) [96] on reading comprehension measures, the researchers found 65% of their children with ASD demonstrated poor reading comprehension skills. Nation et al. were able to divide their children between those who were accurate in reading words but showed poor comprehension, while others were poor at reading words as well as non-words, and some who were unable to decode non-words but were accurate at reading whole words. In essence, there was no single pattern of reading ability among their children with ASD.

Reading skills among children with ASD, therefore, appears to vary by task as well as level of ability among individuals with ASD. In general, it can be stated that children with ASD tend to do better in sight word reading, less so in non-word reading, but typically fall behind in reading comprehension skills.

There are several assessments of reading and literacy used frequently with children with ASD. Unfortunately, none has been standardized for individuals with ASD. They, however, do provide a good measure of the student's academic, reading, and math skills.

One of the most widely used tests the Woodcock-Johnson Tests of Achievement-3rd (Woodcock, McGrew, & Mather, 2001) [100]. The Woodcock-Johnson is based on the theoretical model of intelligence, the Catell-Horn`-Carroll theory (Cattell, 1993) [101]. The individual achievement subtests are grouped under Reading-Writing skills as well as mathematical calculation and math fluency. Researchers have demonstrated that the Woodcock-Johnson is a good instrument for identifying disabilities among individuals with ASD.

The Test of Written Language-Fourth (Hammill & Larsen, 2009) [102], another frequently used test, is for students ages 9 years to 17 years. The stated purpose of the TOWL-4 is to identify students in need of support for intervention in written language. The TOWL-4 consists of seven subtests that are combined to form composites for Contrived Writing and Spontaneous Writing. There are no norms on the TOWL-4 for students with ASD, although individuals with ASD were included in the standardization population.

Test of Oral Reading and Comprehension Skills (Gardner, 2000) [103] is a norm–referenced test with 10 increasing difficult stories. The individual student reads out-loud the stories, and the performance is scored for correct pronunciation, additions, substitutions, omissions, and repetition of words-phrases-sentences. The individual is also required to answer questions about each story in order to measure reading comprehension. The TORCS is useful for individuals from grades K-8 years; however, there are no norms for individuals with ASD.

The Gray Oral Reading Test-Revised (Wiederhold & Bryant, 1986) [104] is for students from 7 to 17 years of age. It consists of a series of reading passages with multiple-choice questions for the individual to answer. The GORT-Ryields age scores but not grade equivalent scores. An Oral Reading Quotient is scored from the combination of the Passage and Comprehension Scores. There are no Oral Reading Quotient scores specifically for individuals with ASD. It does have usefulness for determining oral-reading comprehension skills.

In summary, a measure of educational assessment is important to help the individual with ASD receive the proper school placement and instructional goals. A team of professionals in a school setting completes the educational assessment and develops an IEP with specific individual goals to assist the individual with ASD to be a successful learner in the classroom.

ONGOING ASSESSMENT

Assessment of autism spectrum disorders does not end once a child is determined to have ASD. Assessment should be ongoing especially since ASD is a lifelong condition. Specific aspects about the individual may change throughout the life span due to maturation, intervention effects, and other influences. Therefore, the assessment process needs to be continuous, adaptable, and responsive to changes concerning the individual's specific needs and abilities. Additionally, assessment must be an ongoing process because it is associated with interventions and programs to help the individual.

Ongoing assessment is important because assessments help create learning profiles, and the child's unique learning profile must be kept up to date, with information regarding the child's current abilities and condition. After the initial assessments are completed, the learning profile will contain information about the individual's strengths and weaknesses in all of the previously mentioned assessment areas. As the child grows older and faces different environments, responsibilities and situations, many aspects of the original learning profile will change. Furthermore, due to the complex nature of autism spectrum disorder, and the subjectivity of ASD assessments, initial assessment results are not always entirely accurate. It is critical for the child's learning profile to be accurate because it helps to guide goals, interventions, and programs. As the child's needs and abilities change, his or her goals and interventions must change accordingly (Gavin-Evans et al., 2008) [105].

Continuing, ongoing assessment is also critical for determining intervention effectiveness. Ongoing assessments can help to determine if the child's goals are being met, and if the interventions are effective, or ineffective. Interventions need to be evaluated regularly, modified, and adapted to meet the individual's current needs and abilities. If assessment is considered to be a discrete process, with goals and interventions never being re-evaluated, it results in inadequate and ineffective interventions. Ongoing assessment helps in deciding if revisions to intervention plans are necessary or if additional interventions and goals need to be created. If additional assessment reveals that goals are not being met, then intervention materials, strategies, and contexts need be adapted (National Professional Development Center on Autism Spectrum Disorders, 2011) [106].

Ongoing assessment is also important because it provides a record of the individual's abilities and progress, over an extended period-of-time. This record creates accountability for the child's caregivers and professionals because it helps to document evidence of accomplishments and goals mastered. It can also provide documentation of a lack of accomplishments. It helps to determine if programs and interventions need to be re-considered and adjusted due to lack of progress (National Professional Development Center on Autism Spectrum Disorders, 2011) [106].

CONCLUSION

It has been stated that if you have met one person with autism, you have met one person with autism. This means that no single individual with ASD looks like or behaves like any other individual with ASD. Each person with ASD has his/her own strengths and weaknesses, his/her own behaviors, and his/her own way of regulating life's challenges. Each individual with ASD also has his/her unique learning style. It is, therefore, important for the professional to complete a thorough and valid assessment of the medical and educational behaviors of the individual seen with ASD: to understand the individual and not the broad characteristics of the disorder.

We have provided, in this chapter, several medical and educational assessment tasks for helping to understand the individual with ASD. We have also provided several common and frequent behaviors seen in different individuals with ASD. The chapter is not, by any means, complete or comprehensive. There are many other assessment tools available and many more strategies for describing individuals with ASD. We do hope, however, that the chapter is sufficient and adequate for the examiner to travel through the maze of assessment of individuals with ASD. It is important always to ask why the person behaves the way he/she does, instead of focusing on the behaviors: remember also to describe the strategies they use to help them live in this complicated and challenging world.

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