Foundations of Autism Spectrum Disorders: An Online Course

Session 3
Assessment for ASD

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Session 3, Lesson A
Early Identification and Screening

Upon completion of Session 3, Lesson A, learners will:
1. Discuss two factors that have contributed to the recent emphasis on early identification of ASD.
2. Identify three benefits of early identification of ASD.
3. Distinguish between developmental surveillance and screening.
4. Describe at least four early "red flags" that indicate risk for ASD.
5. Identify the purpose of screening.
6. Compare the psychometric properties of sensitivity and specificity that are important for screening instruments.
7. Discuss two characteristics of screening instruments for Asperger's disorder that can differ from those used for autistic disorders.

Early Identification

Recently, there has been an emphasis on the early identification of ASD that may be attributed to at least three factors:

1. the increased prevalence of autism spectrum disorders (Rice, 2009),

2. the recognition of identifiable early characteristics associated with ASD (Landa & Garret-Mayer, 2006; Stone, McMahon, Yoder, & Walden, 2007; Wetherby, Watt, Morgan, & Shumway, 2007; Zwaigenbaum, Bryson, , Roberts, Brian, & Szatmari, 2005), and

3. evidence of the efficacy of early intervention for children with ASD (Bodfish, 2004; Koegel, 2000; Lord, 2000; National Research Council, 2001).

Currently, the average age of diagnosis of autistic disorder and PDD-NOS is between 3 and 6 years (Chakrabarti & Fombonne, 2005; Levy, Hyman, & Pinto-Martin, 2008; Shattuck, et al, 2009), although many parents have concerns much earlier. In a 2007 survey, 30-50% of parents of children later diagnosed with ASD reported initial concerns before the first birthday (Nadig, Ozonoff, Young, Rozga, Sigman, & Rogers, 2007).

Children with Asperger's disorder or high functioning autism may not be identified until late preschool or early school age, when school personnel or others notice difficulties with peer interactions, abstract language demands, and/or behavior (Johnson, Myers, & Council on Children with Disabilities, 2007; American Academy of Pediatrics, 2006; Mandell, Novak, & Zubritsky, 2005). These discrepancies highlight the need for more effective early identification of young children with ASD.

The early diagnosis and assessment of young children with ASD has many potential benefits. These include (a) access to early intervention services; (b) individual assessment of needs and recommendations for intervention (i.e. areas of strength and core deficits, potential approaches, desired outcomes, and the intensity of intervention); and (c) providing families with support and information about their child's disorder and possible causes, anticipated developmental changes, associated features, and the future(Lord & Richler, 2006).

Earlier and more effective identification has become a priority of early interventionists, educators, health care providers, parents, and advocates. Multiple federal agencies, including Health and Human Services, the Centers for Disease Control (CDC) and the U.S. Department of Education have made early identification of ASD a priority. Since 2007, The National Center on Birth Defects and Disabilities (NCBDD), the CDC, the Maternal and Child Health Bureau (MCHB), and the Health Resources and Services Administration (HRSA) in partnership with the Association of University Centers on Disabilities (AUCD) have sponsored regional Act Early Summits. These summits have brought together key stakeholders and state leaders in early intervention to enhance collaboration, promote and improve early identification, assessment, diagnosis and intervention of children with ASD including the development of state plans. For more information, see http://www.aucd.org/template/page.cfm?id=547

 Likewise, many professional organizations such as the American Academy of Pediatrics (AAP), the American Speech and Hearing Association (ASHA), and the Council on Exceptional Children (CEC) have emphasized the need for early detection, screening, and assessment. As public and professional communities have become increasingly aware of the need for early identification, informational materials have been developed and made more readily available to parents, physicians, and others from sources such as the CDC's Learn the Signs campaign, the Autism Society, Autism Speaks, and the Act Early Campaign, co-funded by the American Academy of Pediatrics (AAP), Cure Autism Now, First Signs, Inc., and the Organization for Autism Research. One of the newer resources previously mentioned in Session 2, the *Web-based ASD Video Glossary*, was launched in October 2007 by Autism Speaks, First Signs, and Florida State University's *FIRST WORDS Project.*

Specific child find activities, like those articulated in IDEA (2004) requirements, and developmental surveillance and screening, as recommended by the AAP, are designed

to identify children at risk for ASD as early as possible. Identified children should receive further screening, referral for intervention, and, as appropriate, a diagnostic evaluation.

Early Identification/Child Find Requirements Associated with IDEA 2004
The *Individuals with Disabilities Education Improvement Act of 2004 (*IDEA; *P.L. 108-446)* requires each state to provide a comprehensive child find and referral system to identify children with disabilities, including ASD, as early as possible. Identification leads to the development of an Individualized Family Service Plan (IFSP) and to the provision of services for the child and the family. Each state's child find and referral system may include procedures for screening and must include policies and procedures for referral for an evaluation and assessment to determine eligibility for early intervention services. The federal regulations describe the requirements of child find activities in the early intervention system (Part C), as discussed in the box below. Likewise, child find activities are required of public schools to identify and evaluate children ages 3-5 in need of special education and related services (see Part B regulations below). Coordination of Child Find activities across Part C and Part B is required and can be challenging when the two programs are in different agencies. Coordination is needed with other community services and programs, such as public health, primary health care practices, and Head Start, both to strengthen relationships and to create an informed referral network.

Part C Regulations

Infants and toddlers who are suspected of having or have been diagnosed with ASD should be referred to the state's program for infants and toddlers with disabilities, or Part C of the *Individuals with Disabilities Education Improvement Act of 2004 (IDEA).* To facilitate identification of infants and toddlers with disabilities, each state's Part C lead agency must provide a comprehensive child find and referral system that may include procedures for the screening of children who have been referred and must include evaluation and assessment of a potentially eligible infant and toddler. Under requirements for Part C, each state must have a rigorous definition of "developmental delay" and serve children with conditions that have a high probability of developmental delay. Most states define infants and toddlers with ASD as a condition with a high probability of developmental delay. If an infant or toddler is referred with a diagnosis of ASD, an evaluation would not be necessary to determine eligibility; additional assessment of the child would proceed along with the development of an individualized family service plan (IFSP) (34 CFR 303.635 a 5).

Part B Regulations

Part B of the *Individuals with Disabilities Education Improvement Act of 2004* (IDEA) requires each state to identify, locate, and evaluate all children with disabilities in the state. "All children with disabilities" has been traditionally interpreted to include child find for children birth to three; child find efforts for birth to three must be coordinated with the Part C lead agency. A "child with a disability" under Part B includes not only children with developmental delay (ages 3 through 9 or a subset of this age group at the state's discretion) but other categories of disability including autism. Children with a suspected or known diagnosis of ASD could receive an educational evaluation and assessment to determine eligibility for special education services and related services and to develop an individualized education program (IEP) to address needs (34 CFR 300.612 a 3).

Developmental Surveillance and Screening
The primary purpose for gathering Information obtained through screening and surveillance is to help practitioners determine whether or not a referral for diagnostic assessment for ASD is warranted. Surveillance begins with an understanding of child development and may be conducted by any professional who has contact with a child. However, surveillance is routinely conducted during well child visits by the primary care physician or other office professional. "*Surveillance* is the ongoing process of identifying children who may be at risk of developmental delays, and *screening* is the use of standardized tools at specific intervals to support and refine the risk" (Johnson et al., 2007, p. 1195).

There are two levels of screening to accomplish this goal—population-based/universal screening and targeted screening. Population-based or *universal* screening is designed to evaluate all children and to identify those at risk for developmental differences. *Targeted* screening focuses on a *specific* group such as high risk children (e.g., premature births) or perhaps those who may be showing differences in their language development or behavior (e.g., "red flags for autism"). Screening results indicate levels of risk for delay or disability and provide guidance as to whether further diagnostic evaluation is needed. It is important to note that screening tools do not provide adequate information for making a diagnosis of autism.

Recent studies have found that surveillance without the use of screening tools missed 30% of children who were identified when screening tools were used (Charman & Baron-Cohen, 2006). Further, surveillance procedures and general developmental

screening typically do not identify specific, subtle symptoms of an autism spectrum disorder. To address these issues, practice parameters for ASD screening and diagnosis were recommended by the Child Neurology Society and the American Academy of Neurology (Filipek et al.,1999; 2000) and were adopted by the American Academy of Pediatrics (AAP, 2001). The AAP's recent report, *Identification and Evaluation of Children with Autism Spectrum Disorders* (Johnson et al., 2007), updates these practice parameters for pediatricians (www.aap.org/healthtopics/Autism.cfm). In addition to systematic developmental surveillance and screening during regular preventive health care visits (i.e. universal screening at 9, 18, 24 or 30 months), the AAP recommends ASD-specific screening of **all** children at 18 and 24 months. The recommended developmental surveillance that should take place at each preventive health care visit includes gathering a family history, conducting specific interviews about the child's development, observing the child's behavior, and monitoring development. The following behaviors have been suggested by the American Academy of Pediatrics (2006) and others as red flags for ASD in the first two years of life:

- Lack of appropriate gaze
- Lack of warm, joyful expressions with gaze
- Lack of sharing enjoyment or interests
- Lack of alternating to-and-fro vocalizations with parents
- Lack of response to name
- Delayed onset of babbling past 9 months of age
- Decreased or absent use of pre-speech gestures (waving, pointing, showing)
- No single words by 16 months
- No two word utterances by 24 months
- Repetitive movements or posturing of body, arms, hands, or fingers
- Loss of language or social skills at any age

When behaviors associated with risk for ASD are identified, ASD-specific screening should take place immediately.

Screening for ASD

Many young children are selected for targeted ASD screening because someone – a parent, pediatrician, or educator – has specific concerns about their development and behaviors. As discussed earlier, the AAP (Johnson et al., 2007) now recommends universal screening for ASD for all children at 18 and 24 months. Screening that is targeted for ASD most often takes place in a medical setting or other health-care or professional setting, or through a child find agency associated with early intervention (Part C) or the public schools (Part B). The instruments used for this level of screening typically take time and training to administer. Some of the tools that can be used for targeted screening are listed below, in Table 1.

ASD Screening Tools
ASD screening tools are designed to examine specific symptoms believed to be associated with an autism spectrum disorder. For example, studies have demonstrated that young children with autism typically point less frequently, often have more limited eye contact, respond to their name less frequently, and engage less in imitation than typically developing children (Coonrod & Stone, 2005; Osterling, Dawson, & Munson, 2002; Volkmar, Chawarska, & Klin, 2005). Other behaviors examined in early childhood include deficits in giving, showing, pretend play, and the development and use of joint attention (MacDonald et al., 2006; Wetherby, Watt, Morgan, & Shumway, 2007). These, as well as other recognized characteristics of ASD, are the focus of screening tools. Through a combination of observation, parent report, and interaction, the information obtained through screening helps examiners determine whether or not a referral for additional evaluation or a referral for a diagnosis of ASD is warranted.

Selection of a screening tool must be made carefully and include the consideration of the tool's psychometric properties. Psychometric properties include the tool's reliability and validity, as well as its sensitivity and specificity. The *sensitivity* of a tool refers to its ability to correctly identify those children who need additional evaluation; *specificity* refers to its ability to accurately identify those who do not need further evaluation. Screening tools can vary across a number of dimensions (Coonrod & Stone, 2005), including administration format, target population (e.g., child's age), and level of expertise required for administration.

Administration of ASD Screening Tools
Screening for ASD should be conducted by professionals who are familiar with typical and atypical child development, including autism spectrum disorders, and who are qualified to use the selected tools. The necessary qualifications and training of the examiner can vary depending on the measure. As shown in Table 1, some autism screening instruments rely solely on parent responses to a questionnaire, while others rely on a combination of parent or teacher report, observation, and interaction. Typically, those instruments that involve observation and interaction with a child may require some level of training, whereas those that rely solely on questionnaires and checklists completed by parents or others familiar with the child may not require the same level of training. To maximize the accuracy of parent responses about their child's development, it can be helpful to suggest that parents review family videotapes, photos, and baby albums to assist with their recall of important milestones, particular behaviors, and age when concerns first arose.

Screening for Asperger's Disorder and High Functioning Autism
Although much attention has been given to the early identification and screening for ASD in early childhood, instruments have also been developed to screen for Asperger's disorder and high functioning autism. Many of these tools can be used to differentiate

Asperger's disorder and high functioning autism from other autism spectrum disorders and/or other developmental disorders, such as intellectual disabilities and language delays. Qualitatively, these tools are quite different from the early childhood screening tools, highlighting more social/conversational, relationship, and perseverative/behavioral concerns that are often characteristic of school-age and older individuals with higher functioning ASD (Strock, 2004).

A summary of recommended screening instruments for autism is provided in Table 1a. Table 1b summarizes commonly used screening measures for Asperger Syndrome.

Table 1a. Recommended Screening Instruments for Autism				
Instrument	Age Range	Format	Training Needs/ Time to Complete	Author(s)
Early Screening for Autism Traits (ESAT)	14-15 months	Parent Questionnaire	Minimal Training 5 minutes	Dietz et al., (2006)
Modified Checklist for Autism in Toddlers (M-CHAT)	18 – 30 months	Parent Questionnaire	Minimal Training 10 minutes	Robins et al., 2001
Pervasive Developmental Disorders Screening Test –II (PDDST-II)	12 – 48 months	Parent Questionnaire	Minimal Training 10 – 20 minutes	Siegel, 2004
Social Communication Questionnaire (SCQ)	4 years – adults	Parent Questionnaire	Minimal Training 10 minutes	Rutter et al. (2003b)
Social Responsiveness Scale (SRS)	4 – 18 years	Parent Questionnaire	Minimal Training 15 minutes	Constantino & Gruber, 2005
Screening Tool for Autism in Two-Year-Old (STAT)	24 – 35 months	Direct Testing	Intensive 20 minutes	Stone et al., 2000

Table 1b. Commonly Used Screening Measures for Asperger Syndrome				
Instrument	Age Range	Format	Most Appropriate Use	Author(s)
Asperger Syndrome Diagnostic Scale	5 – 18 years	Parent or professional Questionnaire	Targeted Screening	Myles, Bock & Simpson (2001)
Australian Scale for Asperger Syndrome (ASAS)	6-12 years	Questionnaire completed by parent, teacher, or professional	Targeted Screening	Garnett & Attwood (1998)
Childhood Asperger Syndrome Test (CAST)	4-11 years	Parent Questionnaire	Targeted Screening	Scott, Baron-Cohen, Bolton, Brayne (2002)
Gilliam Asperger's Disorder Scale	3-22 years	Questionnaire completed by parent, teacher or clinician	Targeted Screening	Gilliam (2001)
Krug Asperger's Disorder Index (KADI)	6–22 years	Parent or professional Questionnaire	Targeted Screening	Krug & Arick (2003)

Screening Versus Diagnosis
When screening results indicate that a child is at risk for ASD, a referral for a diagnostic evaluation should be made. While screening procedures help identify children who are at risk (or not) for having ASD, they do not confirm whether a child meets the full criteria for an autism diagnosis. Likewise, for children old enough to qualify for school-based programs, screening results are not adequate to determine whether the child is eligible for special education services. Similar to other disabilities under Part B of IDEA regulations, screening leads to a referral and follow up, not to a diagnosis or placement recommendations. Part B regulations of the *Individuals with Disabilities Education Improvement Act,* (2004) emphasize that ". . .the screening of a student by a teacher or specialist to determine appropriate instructional strategies for curriculum implementation shall not be considered to be an evaluation for eligibility for special education and related services" (34 CFR 300.302).

Communicating Screening Results to Parents
Communication of screening results to parents is an essential part of early identification of ASD. Parents are often the first to recognize that something is different in their child's development. By the time surveillance and screening is conducted, some parents may have already had concerns about their child's development. It is important to consider a parent's perceptions when discussing with them your developmental concerns and questions about red flags for ASD. The direction of a conversation might progress differently with a parent who has already been wondering if their child is

showing characteristics of ASD compared to a parent who has not considered the possibility. Please refer to the Early Identification Module for suggestions on ways to communicate results with parents.

In conclusion, the early identification of children who may be at risk for having an autism spectrum disorder has received considerable attention. Many children can be identified at an earlier age than in the past because of increased awareness of the early symptoms or "red flags" of ASD and the implementation of systematic developmental surveillance and screening activities. Early identification procedures that have been recommended by federal agencies, professional organizations, and advocates include the use of child find, surveillance, and psychometrically sound screening instruments to detect general developmental concerns, as well as targeted autism screening tools, and knowledge of the signs of autism at earlier ages. Effective early identification and screening procedures can provide access to comprehensive diagnostic and intervention services as soon as possible, thus leading to more optimal developmental outcomes.

Session 3, Lesson B
From Diagnosis to Intervention

Upon completion of Session 3, Lesson B, learners will:
1. Identify three important principles for assessing children with suspected ASD.
2. Discuss the purpose and components of a "core battery" of assessment instruments for ASD.
3. Identify two broad types of characteristics that are the focus of an ASD evaluation.
4. Identify three principles that should be a part of any assessment of a child with ASD.
5. Discuss desired outcomes of assessments designed for intervention planning.
6. Identify three outcomes that can be achieved through systematic data collection and monitoring of progress.

Diagnostic Assessment of Children with Autism Spectrum Disorders

When a child has been identified as being at risk for ASD—perhaps due to family or teacher concerns, developmental surveillance, and/or findings from a screening measure, the next step is to refer the child for a diagnostic evaluation. When this referral is made, it is important to help families understand the concerns that lead to the need for an evaluation but also to answer parents' concerns and provide support. A discussion with families might include describing how the findings from a diagnostic evaluation may confirm a family's observations, provide an explanation for the child's characteristics, behaviors, and difficulties, and provide access to additional services and supports. Being honest with parents about their child's development, showing empathy,

listening to their questions, concerns and comments, and providing resources are important ways to support parents in understanding the next steps in the process. Parents will have a range of emotional responses to new developmental or diagnostic information about their child. For more tips, see the Early Identification Module.

The results from a diagnostic evaluation, whether the findings confirm a diagnosis of ASD or identify other developmental issues, should guide referrals for further assessment, if needed, and for appropriate medical, behavioral, and educational interventions. Traditionally, diagnostic evaluations have been conducted by developmental pediatricians, psychologists, psychiatrists, or neuropsychologist with the support of other multidisciplinary team members at a specialized program or center. Unfortunately, there are often long waiting lists for comprehensive evaluations because of the overwhelming numbers of children being referred. For example, Zwaigenbaum and Stone (2006) reported that the demand for clinical services for children with ASD in some regions has increased by as much as 400-600% over the past 10 years. To meet the increased demands for evaluation, a variety of other professionals (e.g., early intervention and public school personnel) are often being asked to participate in the process of making this complex and sometimes challenging diagnosis. For example, school-based teams have multiple disciplines available (school psychologists, speech-language pathologists, special educators) and can perform many of the components of a comprehensive evaluation. Further, these teams are critical to determine educational eligibility.

Educational Eligibility Versus Clinical Diagnosis
Beginning at age three when a child is referred for special education, an educational classification of autism may be used to determine eligibility. The educational definition (see box below) is compatible with DSM-IV criteria for ASD and does not require a child have a clinical diagnosis of autism. Sometimes, having a clinical diagnosis of ASD from a medical professional is not enough to qualify children for special educational services. It is quite typical for a team of qualified school personnel to conduct educational evaluations to determine a child's educational disability in these developmental areas: cognition, speech-language, adaptive behavior, and social-emotional and behavior. In addition vision and hearing is screened and the child's developmental and health history is gathered. Observations are made in school, home and community settings. This process would provide the information needed for the IEP team to deem a child eligible for special education services.

> **Part B definition of autism**: *"Autism means a developmental disability significantly affecting verbal and nonverbal communication and social interaction, generally evident before age three that aversely affects a child's educational performance. Other characteristics often associated with autism are engagement in repetitive activities and stereotyped movements, resistance to environmental change or change in daily routines, and unusual responses to sensory experiences"* (Assistance to States for the Education of Children with Disabilities and Preschool Grants for Children with Disabilities; Final Rule, 2006, p. 46756).

There are times when non-school specialists may be needed for other aspects of care and intervention planning. For example, if a child has a co-existing medical condition such as seizures, input from a physician may be necessary. Furthermore, there may be times when a clinical diagnosis is deemed necessary; for instance, this may be a required component of an application for Supplemental Security Income (SSI) or necessary to access mental health or vocational rehabilitation services.

Diagnostic Procedures and Instruments
A diagnosis of ASD is based on the presence of the core symptoms, elucidated in the DSM-IV-TR (2000), as discussed earlier. In the assessment process, clinicians typically employ diagnostic procedures and instruments that include interviewing the family about the child's current behavior and developmental history and interacting with and observing the child in a series of planned activities. Although some professionals may be hesitant to make an early, life-long diagnosis such as autism, studies have shown that a reliable diagnosis can be made in children as young as 2 years of age by experienced examiners (Landa & Garrett-Mayer, 2006; Lord, Risi, DiLavore, Shulman, Thurm, & Pickles, 2006). More and more, children under age 2 are being referred for evaluations. Fortunately, current research is focusing on a better understanding of the very earliest symptoms of ASD and the development of valid diagnostic instruments that are applicable for children under 24 months of age (Lord & Richler, 2006, Ozonoff et al, 2010).

Diagnostic evaluation of a child suspected to have an ASD should include a multidisciplinary assessment by individuals with extensive experience in working with children with ASD and their families (Tidmarch & Volkmar, 2003). In addition, it is important to consider three principles (Filipek et al., 2000) when assessing children with suspected ASD. These include:
- autism should be viewed within a developmental framework,
- information from multiple sources and contexts should be utilized, and
- professionals from multiple disciplines should be involved.

It is recommended that examiners use a core battery that covers the foundational elements necessary for diagnosis and treatment planning in addition to autism-specific procedures and tools (Ozonoff, Goodlin-Jones, & Solomon, 2005) . In order to develop the most appropriate educational, developmental, and behavioral treatment program, the team should also address descriptions of current communication and language skills, cognitive development, social skills, and behavioral issues (National Research Council, 2001). See Table 2 for Autism Specific Assessment Measures

Table 2. Autism-specific Assessment Instruments		
Instrument	Age Range	Format
Autism Diagnostic Observation Schedule (ADOS)	12 months – adult	Direct Assessment
Autism Diagnostic Interview –Revised (ADI-R)	18 months – adult	Parent Interview
Autism Observation Scale for Infants (AOSI)	6 – 18 months	Direct Assessment
Childhood Autism Rating Scale 2nd edition (CARS2)	2 years to adult	Direct Assessment or Observation

- ADI-R = Autism Diagnostic Interview – Revised (Rutter et al., 2003a)
- ADOS = Autism Diagnostic Observation Schedule (Lord et al., 2002)
- AOSI = Autism Observation Scale for Infants (Bryson et al., 2008)
- CARS = Childhood Autism Rating Scale 2nd edition (Schopler et al., 2010)

Core battery. For most children suspected of having developmental differences, a core battery of assessment instruments will include measures examining strengths and weaknesses across numerous domains. For children suspected of having an autism spectrum disorder, there are additional autism-specific measures that can be used to supplement the more traditional core battery.

Ozonoff, Goodlin-Jones, and Solomon (2005) discuss the need for a *core battery* for ASD evaluations that includes taking a careful developmental history, learning about current functioning in all contexts, diagnostic testing of the child to assess the

characteristics of autism, screening for potential medical and psychiatric issues, and assessment of (a) cognition, (b) communication/language, and (c) adaptive behavior.

Assessment of cognition, communication/language, and adaptive behavior. An important step in planning the assessment of a child with suspected autism is selecting measures with solid psychometric properties (reliability, validity). The same measure(s) may not be appropriate to use with all individuals with ASD. The choice of measures may depend on the child's individual profile: level of verbal abilities, ability to respond to complex instructions and social expectations, ability to work rapidly, and ability to cope with transitions in test activities (NRC, 2001). A summary of potential measures of cognition/intelligence, language, and adaptive behavior is provided in Table 3.

Table 3 Instruments by Assessment Domain

Instrument	Age Range	Format
Cognition/Intelligence		
Mullen Scales of Early Learning	Birth-68 months	Direct Assessment
Bayley Scales of Infant and Toddler Development-Third Ed.(Bayley-III)	1-42 months	Direct Assessment
Differential Abilities Scales, Second Ed. (DAS-II)	2.6 –17 yrs.11mos.	Direct Assessment
Wechsler Intelligence Scale for Children-Fourth Ed. (WISC-IV)	6-16 yrs.11 mos.	Direct Assessment
Stanford-Binet Intelligence Scales, Fifth Ed. (SB5)	2-85 years	Direct Assessment
Leiter International Performance Scale-Revised (Leiter-R)	2- 20 yrs. 11mos.	Direct Assessment
Kaufman Assessment Battery for Children, Second Ed. (KABC-II)	3-18 years	Direct Assessment
Language		
Preschool Language Scale, Fourth Ed. (PLS4)	Birth-6 yrs 11mos.	Direct Assessment
Clinical Evaluation of Language Fundamentals, Fourth Ed. (CELF-IV)	5-21 years	Direct Assessment
Peabody Picture Vocabulary Test, Fourth Ed. (PPVT-4)	2.5-90+ years	Direct Assessment
Expressive One-Word Picture Vocabulary Test, 2000 (EOWPVT)	2-18 years	Direct Assessment
Test of Language Competence, Expanded (TLC-Expanded)	5-9 years-level 1 10-18 years-level 2	Direct Assessment
Children's Communication Checklist (CCC-2)	4-16 years	Questionnaire
Comprehensive Assessment of Spoken Language (CASL)	7-21 years	Direct Assessment
Adaptive Behavior		
Vineland Adaptive Behavior Scales, Ed. II	Birth–18 yrs 11mo	Interview
Scales of Independent Behavior-Revised (SIB-R)	Infancy-80 years	Interview
Adaptive Behavior Assessment System, Second Ed. (ABAS-II)	5-89 years	Interview
Pediatric Evaluation of Disability Inventory (PEDI)	8 months-7 yrs.	Interview

In summary, when assessing children for ASD, the selection and combination of specific tests may vary. However, the National Research Council (2001) recommends that the following principles should be incorporated into *any* assessment of children with suspected autism.

- Multiple areas of functioning must be assessed including current intellectual and communicative skills, behavioral presentation, and functional adjustment.
- Given the association of intellectual disabilities* with autism, results must be viewed within the context of children's overall developmental level.
- A profile of strengths and weaknesses should be identified, rather than only presenting a global score.
- Observation in both facilitating and challenging environments is helpful because behavior may vary among settings.
- Adaptive behavior should be examined within the broader context of daily living and real-life demands.
- Effects of social disability must be considered.
- Behavioral difficulties should be considered.

*Note: The Center for Disease Control (Rice, 2009) estimated that 41% of children with ASD had cognitive impairment defined as IQ ≤ 70.

Following this session is an **optional Additional Reading** for this session on ASD specific measures and other assessment instruments by domain.

Linking Assessment to Intervention

Not only is assessment an ongoing, goal-oriented process for screening and diagnosis, but it is also important for (a) identifying children's individual learning profiles, (b) providing information for intervention planning, and (c) monitoring the effectiveness of an intervention or program.

Identifying Children's Individual Learning Profiles
When compared to typical peers, individuals with autism spectrum disorders often display uneven or scattered learning profiles. Moreover, there can be great variation in skills within and across individuals with ASD. Clearly, deficits in communication, social interaction and/or behavior can affect access to and participation in the curriculum. To address this concern, effective assessment is essential to document unique learning profiles and to provide assessment and individualized intervention planning.

While diagnostic assessments are usually standardized and may include a predictable battery of tests and procedures (e.g., cognitive testing, ADOS, developmental history), assessment methods used for intervention planning may be formal, informal, or rely on a combination of strategies. Selection of assessment procedures should depend on the questions being asked, individual skills and abilities, and the decisions to be made.

Formal assessment methods. Formal or standardized assessment tools are frequently used as part of a core battery, particularly to examine domains such as cognition, language, academic achievement, and adaptive behavior. Information collected through these core battery assessments can be helpful in understanding learning profiles. Children and youth are often compared to peers of the same chronological age and a discrete number of skills are assessed with each measure. Selecting measures to use with individuals who have autism depends on several factors including age, developmental level, verbal abilities, work skills, and social and behavioral functioning (NRC, 2001). Most standardized tools require some level of interaction with the examiner, attention and responsiveness to instructions, and numerous task transitions. All of these are known to present challenges for many children with ASD.

Informal assessment methods. Despite the availability of a variety of standardized instruments, reliance on these measures may not provide adequate or comprehensive assessment of all of the skills that need to be assessed in individuals with ASD. Furthermore, formal assessment results may not be easily translated into functional goals, nor do standardized tools allow for easy, frequent tracking of progress. Alternative, informal procedures such as behavioral observations, interviews, checklists or rating scales, work samples, and curriculum-based measures are often used to examine and better understand the array of behaviors and skills of children with disabilities (Nagle, 2007). Areas that can be assessed with informal strategies include learning style (e.g., organization, attention, motivation), behavioral functioning (e.g.,

restricted interests, perseverative behaviors), play, social competence, and social communication skills (e.g., conversation, initiations, peer relationships). Informal strategies may allow for more ecologically valid assessments; that is, viewing a child in the context of his or her natural settings and routines with family, peers, and other adults (Bagnato, Neisworth & Munson, 1997).

Some of the benefits of an ecological approach for children with autism spectrum disorders or other disabilities include: (a) more behaviors are examined than are typically sampled in a norm-based assessment; (b) skills examined are often those of most importance to parents, teachers, and individuals; and (c) multiple opportunities across settings allow children to demonstrate specific strengths and needs (McCormick & Nellis, 2004).

Convergent assessment methods. When information from formal and informal methods are combined, the resultant convergent model (Bagnato, Neisworth & Munson, 1997) allows professionals from multiple disciplines and families plan and implement an individualized assessment battery. This process would examine skills and needs across multiple settings, occasions, and domains by gathering information from multiple sources using a variety of measures.

Providing Information Relevant for Intervention Planning
One of the most critical stages of assessment is linking assessment results to practical intervention plans, potentially a complex and challenging process for children and adolescents with ASD. Success will depend on the clear identification of the purpose of the assessment and the strategies that were chosen. Of particular importance is including both formal and informal measures that provide a more comprehensive view of children. Critical decisions that will be made as a result of these assessment efforts include:
- identification of individualized and personalized goals and outcomes;
- identification of appropriate locations/settings for learning opportunities;
- selection of intervention approaches; and
- development of a plan for integrating those interventions into children's current environments.

Intervention-planning assessments should not be considered complete until enough information has been gathered about the child's developmental and functional skills and needs for these decisions to be made (Wolery, 2004a).

Intervention planning should include the interdisciplinary team, family members, and the student, if deemed appropriate. Wolery (2004a) suggested that the team identify goals and outcomes, conduct task analyses, write instructional objectives, and devise plans for implementing the interventions, with opportunities for practice across settings that are embedded in naturally occurring activities when possible.

Similarly, planning efforts should focus on information for individualized learning goals that:

- target emerging skills;
- use strengths to support weaker areas;
- integrate specific interests;
- incorporate parental priorities;
- use developmentally appropriate activities and materials;
- feature functional, meaningful activities; and
- aim for independent functioning (TEACCH, 2007).

Monitoring the Effectiveness of Interventions
Assessment plays a central role not only in the initial diagnostic and intervention-planning stages, but also in the monitoring of children's progress and the effectiveness of the interventions. The Committee on Educational Interventions for Children with Autism recommends that ongoing measurement of treatment objectives and progress be documented frequently across a range of skill areas to determine whether children are benefiting from a particular intervention and whether the intervention should be adjusted (NRC, 2001).

By systematically collecting data and monitoring children's progress, three outcomes may be achieved (Wolery, 2004b). First, conclusions from the initial assessments may be validated. Despite best efforts, autism is a complex disorder, and initial impressions from assessment results can be faulty or incomplete. Thus, early recommendations for intervention may be inaccurate, imprecise, or right on target. Second, assessment can provide a record of progress over time. This level of accountability is important for children, families and programs. This record of progress can provide evidence of achievement, initial goals, and need for new ones, or indicate that gains are not being made. Plans for assessing progress toward the attainment of IFSP or IEP goals should be developed while developing the intervention/education goals and objectives for the IEP or IFSP. Strategies for monitoring progress may include work samples, narrative descriptions, behavior observations, or systematic data collection systems such as time or event sampling. Third, ongoing assessment and monitoring can help the team determine if adjustments or revisions of intervention plans should occur. For example, by using an assessment strategy such as a *test-teach-retest* model (Sattler 2006), areas of weakness can be identified, interventions can be implemented, and behaviors or skills can be reassessed to determine if progress has been made. Follow-up assessment may reveal other areas of development that require monitoring and/or provide information regarding how an intervention can be modified to better meet individual needs. If necessary, adaptations can be made in intervention or teaching strategies, materials, or contexts.

Recently, there has been a focus on identifying the causal links between specific intervention and/or educational goals, program components, and child outcomes so that there may be a better understanding of the processes by which programs affect change (Nagle, 2007). Not only does ongoing assessment allow monitoring of outcomes and adjustment of goals for an individual child, it can also provide documentation of overall program effectiveness. From an accountability standpoint, documentation can assist schools, agencies, and professionals to ensure that specified learning standards are met. Assessing the quality of a program can help to justify why a program should exist and assist in securing available sources of funding. Ultimately, interventionists and teachers, along with other professionals and caregivers working with children with ASD, need to know whether specific interventions are truly evidenced-based; that is, do they actually result in increased learning and developmental gains as documented by research in peer-reviewed journals.

In summary, when developing programs for children with ASD, it is important to recognize the autism spectrum as a whole, with associated implications for social, communicative, and behavioral development and learning, and with understanding of the strengths and weaknesses of individual children across areas of development (NRC, 2001). Assessment plays a critical role at different stages throughout this process -- in the development, implementation, and evaluation of intervention and educational programs.

Session 3
Assessment for ASD

References

American Academy of Pediatrics, Committee on Children with Disabilities (2001). The pediatrician's role in the diagnosis and management of autistic spectrum disorder in children. *Pediatrics, 107,* 1221-1226.

American Academy of Pediatrics (2006). *Understanding autism spectrum disorders.* Elk Grove, IL: Author.

American Academy of Pediatrics (2007, October 29). New AAP reports help pediatricians identify and manage autism earlier. Retrieved October 30, 2007 from http://www.aap.org.

American Psychiatric Association. (2000). *Diagnostic and statistical manual of mental disorders (4th ed.- text revision).* Washington, DC: American Psychiatric Association.

Assistance to States for the Education of Children With Disabilities and Preschool Grants for Children With Disabilities; Final Rule, 34 C.F.R. § 300-301 (2006). Retrieved from http://www2.ed.gov/legislation/FedRegister/finrule/2 006-3/081406a.html

Bailey, A., Berument, S.K., Lord, C., Pickles A., Rutter, M. (2003). *Social Communication Questionnaire.* Los Angeles, California: Western Psychological Services.

Bagnato, S.J., Neisworth, J.T., & Munson, S.M. (1997). *LINKing Assessment and Early Intervention.* Baltimore: Paul H. Brookes Publishing Co.

Bayley, N. (2005). *Bayley Scales of Infant and Toddler Development (3rd ed.).* San Antonio: Harcourt Assessment, Inc.

Bishop, D. (2003). *Children's Communication Checklist (2nd ed.).* San Antonio: Harcourt Assessment, Inc.

Bodfish, J.W. (2004). Treating the core features of autism: Are we there yet? *Mental Retardation and Developmental Disabilities Research Reviews, 10,* 318-326.

Brasnell, R. (Ed.) (2000). *Expressive One-Word Picture Vocabulary Test (3rd ed.).* Novato, CA: Academic Therapy Publications.

Bruininks, R.H., Woodcock, R.W., Weatherman, R.F., & Hill, B.K. (1996). *Scales of Independent Behavior (Rev. ed.).* Rolling Meadows, IL: Riverside Publishing.

Bryson, S.E., Zwaigenbaum, L., McDermott, C., Rombough, V., & Brian, J. (2008). The Autism Observation Scale for Infants: Scale development and reliability data. *Journal of Autism and Developmental Disorders, 38,* 731-738.

Carrow-Woolfolk, E. (1999). *Comprehensive Assessment of Spoken Language.* Circle Pines, MN: American Guidance Service, Inc.

Chakrabarti, W., & Fombonne, E. (2005). Pervasive developmental disorders in preschool children: Confirmation of high prevalence. *American Journal of Psychiatry, 162,* 1133-1141.

Charman, T., & Baron-Cohen, S. (2006). Screening for autism spectrum disorders: The first 10 years. In T. Charman & W. Stone (Eds.). *Social and communication development in autism spectrum disorders (pp. 63-87).* New York: Guilford Press.

Coonrod, E.E. & Stone, W.L. (2005). Screening for autism in young children. In F.R. Volkmar, R. Paul, A. Klin, & D. Cohen (Eds.), *Handbook of autism and pervasive developmental disorders: Vol. 2. Assessment, interventions, and policy (3rd ed.), (pp. 707-729).* Hoboken, NJ: John Wiley & Sons, Inc.

Dunn, L.M., & Dunn, D.M. (2007). *Peabody Picture Vocabulary Test (4th ed.).* Minneapolis: NCS Pearson, Inc.

Ehlers, F., Gillberg, C., & Wing, L . (1999). A Screening Questionnaire for Asperger Syndrome and Other High Functioning Autism Spectrum Disorders in School Age Children, *Journal of Autism and Developmental Disorders, 29*, 129–142.

Elliot, C.D. (2007). *Differential Ability Scales-II.* San Antonio: Harcourt Assessment, Inc.

Filipek, P.A., Accardo, P., Ashwal, S., Baranek, G., Cooke, E. J., Dawson, G., et al. (2000). Practice parameter: Screening and diagnosis of autism. Report of the Quality Standards Subcommittee of the American Academy of Neurology and the Child Neurology Society, *Neurology, 55*(2), 468-479.

Filipek, P.A., Accardo, P., Ashwal, S., Baranek, G., Cook, E., Dawson, G. et al. (1999). The screening and diagnosis of autistic spectrum disorders. *Journal of Autism and Developmental Disorder, 29, 439-484.*

Garnett, M.S., & Attwood, A.J. (1998). The Australian Scale for Asperger Syndrome. In T. Attwood (Ed.), *Asperger syndrome: A guide for parents and professionals* (pp.17-19). London: Jessica Kingsley.

Gilliam, J.E. (2006). *Gilliam Autism Rating Scale (2nd ed.).* Austin, TX: PRO-ED, Inc..

Gilliam, J.E. (2001). *Gilliam Asperger's Disorder Scale.* Austin, TX: PRO-ED, Inc.

Haley, S.M., Coster, W.K., Ludlow, L.H., Haltiwanger, J.T., & Andrellos, P.J. (1992). *Pediatric Evaluation of Disability Inventory: Development, standardization, and administration manual (Version 1).* Boston, MA: Trustees of Boston University, Health and Disability Research Institute.

Harrison, P., & Oakland, T. (2003). *Adaptive Behavior Assessment System (2nd ed.).* San Antonio: Harcourt Assessment, Inc.

Individuals with Disabilities Education Improvement Act of 2004, PL 108-446, 20 U. S. C. §§ 1400 *et seq.* Retrieved from http://www.copyright.gov/legislation/pl108-446.pdf

Johnson, C.P., Myers, S.M., & the Council on Children with Disabilities (2007). Identification and evaluation of children with autism spectrum disorders. *Pediatrics, 120*(5), 1183-1215.

Kaufman, A.S., & Kaufman, N.L. (2004). *Kaufman Assessment Battery for Children (2nd ed.).* Bloomington, MN: Pearson Education, Inc.

Koegel, L.K. (2000). Interventions to facilitate communication in autism. *Journal of Autism and Developmental Disorders, 30,* 383-391.

Krug, D.A. & Arick, J.R. (2003). *Krug Asperger's Disorder Index.* Austin, TX: PRO-ED, Inc.

Landa, R., & Garrett-Mayer E. (2006). Development in infants with autism spectrum disorders: A prospective study. *Journal of Child Psychology and Psychiatry, 47*(6), 629-638.

Le Couteur, A., Lord, C., & Rutter, M. (2003). *Autism Diagnostic Interview (Rev. ed.).* Los Angeles, CA: Western Psychological Services.

Levy, S.E., Hyman, S.L., & Pinto-Martin, J.A. (2008). Autism spectrum disorders: Overview and diagnosis. In Accardo, P. J. (Ed.). *Capute & Accardo's neurodevelopmental disabilities in infancy and childhood, Vol 2, The spectrum of neurodevelopmental disabilities (3rd. ed.)*, (pp. 495-511). Baltimore: Paul H. Brookes Publishing Co.

Lord, C. (2000). Commentary: Achievements and future directions for intervention in communication and autism spectrum disorders. *Journal of Autism and Developmental Disorders, 30,* 393-398.

Lord, C., & Richler, J. (2006). Early diagnosis of children with autism spectrum disorders. In T. Charman & W. Stone (Eds.), *Social and communication development in autism spectrum disorders* (pp. 35-59). New York: Guilford.

Lord, C., Risi, S., DiLavore, P. S., Shulman, C., Thurm, A., & Pickles, A. (2006). Autism from 2 to 9 years of age. *Archives of General Psychiatry, 63*, 694-701

Lord, C., Rutter, M., DiLavore, P.C., & Risi, S. (2002) *Autism Diagnostic Observation Schedule.* Los Angeles, CA: Western Psychological Services..

MacDonald, R., Anderson, J., & Dube, W. V. (2006). Behavioral assessment of joint attention: A methodological report. *Research in Developmental Disabilities, 27,* 138-150.

Mandell, D.S., Novak, M.M.., & Zubritsky, D.D. (2005). Factors associated with age of diagnosis among children with autism spectrum disorders. *Pediatrics, 116,* 1480-1486.

McCormick, K. & Nellis, L. (2004). Assessing cognitive development. In M. McLean, M. Wolery & D.B. Bailey, Jr. (Eds.) *Assessing Infants and Preschoolers with Special Needs (3rd ed.).* Upper Saddle River, NJ: Pearson Education Inc.

Mullen, E.M. (1995). *Mullen Scales of Early Learning.* Circle Pines, MN: AGS.

Myles, B., Bock, S. & Simpson, R. (2001). *Asperger Syndrome Diagnostic Scale.* Austin, TX: PRO-ED, Inc.

Nadig, A.S., Ozonoff, S., Young, G.S., Rozga, A., Sigman, M., & Rogers, S.J. (2007). A prospective study of response to name in infants at risk for autism. *Archives of Pediatric and Adolescent Medicine, 161*, 278-383.

Nagle, R.J. (2007). Issues in preschool assessment. In B.A. Bracken & R.J. Nagle (Eds.), *Psychoeducational assessment of preschool children (4th ed.)*, (pp. 29-48). Mahwah, NJ: Lawrence Earlbaum Associates, Inc.

National Research Council (2001). *Educating children with autism*. Committee on Educational Interventions for Children with Autism. Division of Behavioral and Social Sciences and Education. Washington, DC: National Academy Press.

Osterling, J., Dawson, G., & Munson, J. (2002). Early recognition of one year old infants with autism spectrum disorder versus mental retardation: A study of first birthday party home videotapes. *Development and Psychopathology, 14, 239-252.*

Ozonoff, S., Goodlin-Jones, B.L., & Solomon, M. (2005). Evidence-based assessment of autism spectrum disorders in children and adolescents. *Journal of Clinical Child and Adolescent Psychology, 34*(3), 523-540.

Ozonoff, S., Iosif, A., Baguio, F., Cook, I.C., Hill, M.M., Hutman, T., Rogers, S.J., Rozga, A., Sangha, S., Sigman, M., Steinfeld, M.B., Young, G. S. (2010). A prospective study of the emergence of early behavioral signs of autism. Journal of the American Academy of Child and Adolescent Psychiatry. 49(3), 256-266.

Perry, A., Condillac, R. A., Freeman, N. L., Dunn-Geier, J., & Belair, J. (2005). Multi-site study of the Childhood Autism Rating Scale (CARS) in five clinical groups of young children. *Journal of Autism and Developmental Disorders, 35*, 625-634.

Rice, C. Prevalence of Autism Spectrum Disorders: Autism and Developmental Disabilities Monitoring Network, United States, 2006. *Morbidity and Mortality Weekly Report. Surveillance Summaries*. Volume 58, Number SS-10

Robins, D., Fein, F., & Barton, M. (2001). The Modified Checklist for Autism in Toddlers: An initial study investigating the early detection of autism and pervasive developmental disorders. *Journal of Autism and Developmental Disorders, 31(2)*, 131-144

Roid, G.H. (2003). *Stanford-Binet Intelligence Scales (5th ed.).* Rolling Meadows, IL: Riverside Publishing.

Roid, G. H., & Miller, L.J. (1997). *Leiter International Performance Scale (Rev. ed.).* Lutz, FL: PAR, Inc.

Rutter, M., Le Couteur, A., & Lord, C. (2003a) *Autism Diagnostic Interview-Revised (ADI-R).* Los Angeles , CA : Western Psychological Services.

Sattler, J.M. (2006). *Assessment of children: Behavioral, social, and clinical foundations (5th revised and updated ed.).* San Diego: Author.

Schopler, E.C., Reichler, R.J., & Renner, B. (1988). *The Childhood Autism Rating Scale (CARS).* Circle Pines, MN: AGS Publishing.

Schopler, E.C.,Van Bourgondien, M.B., Wellman, G.J., & Love, S.R. (2010). *The Childhood Autism Rating Scale, Second Edition (CARS2).* Los Angeles, CA: Western Psychological Services.

Scott, F.J., Baron-Cohen S., Bolton, P., & Brayne, C. (2002). The CAST [Childhood Asperger Syndrome Test]: Preliminary development of a UK screen for mainstream primary-school age children. *Autism, 6*, 9-31.

Semel, E., Wiig, E.J., & Secord, W.A. (2003). *Clinical Evaluation of Language Fundamentals (4th ed.).* San Antonio: Harcourt, Assessment, Inc.

Shattuck, P., Durkin, M., Maenner, M., Newschaffer, C., Mandell, D., Wiggins, L., Lee, L.C. Rice, C., Giarelli, E., Kirby, R., Biao, J., Pinto-Martin, J., & Cuniff, C.,

(2009). Timing of identification among children with an Autism Spectrum Disorder: Findings from a population-based surveillance study. *Journal of the American Academy of Child & Adolescent Psychiatry*, 48(5), 474-483.

Siegel, B. (2004). *The Pervasive Developmental Disorders Screening Test II (PDDST-II)*. San Antonio, TX: Harcourt Assessment.

Sparrow, S.S., Cicchetti, D. V., & Balla, D.A. (2005). *Vineland Adaptive Behavior Scales (2nd ed.).* Circle Pines, MN: AGS Publishing.

Stone, W. L., McMahon, C. R., Yoder, P. J., Waldent, T. A. (2007). Early social-communicative and cognitive development in younger siblings of children with autism spectrum disorders. *Archives of Pediatric and Adolescent Medicine, 161(4),* 384-390.

Stone, W. L., & Ousley, O. Y. (1997). *STAT Manual: Screening Tool for Autism in Two-Year-Olds.* Unpublished manuscript, Vanderbilt University.

Strock, Margaret. (2004). Autism Spectrum Disorders (Pervasive Developmental Disorders). National Institute of Mental Health, National Institutes of Health, U.S.Department of Health and Human Services, Bethesda, MD. (http://www.nimh.nih.gov/publicat/autism.cfm).

Tidmarch, L., & Volkmar, F.R. (2003). Diagnosis and epidemiology of autism spectrum disorders. *Canadian Journal of Psychiatry, 48,* 517-525.

Volkmar, F., Chawarska, K., & Klin, A. (2005). Autism in infancy and early childhood. *Annual Review of Psychology, 56*(1), 315-336.

Wechsler, D. (2003). *Wechsler Intelligence Scale for Children (4th ed.).* San Antonio: Psychological Corporation.

Wetherby, A.M. & Prizant, B.M. (2002). *Communication and Symbolic Behavior Scales Developmental Profile.* Baltimore, MD: Paul H. Brookes Publishing Co.

Wetherby,, A., Watt, N., Morgan, L., & Shumway, S. (2007). Social communication profiles of children with autism spectrum disorders in the second year of life. *Journal of Autism and Developmental Disorders, 37,* 960-975.

Wig, E.J., & Secord, W. (1989). *Test of Language Competence (Exp. ed.).* San Antonio: Harcourt Assessment, Inc.

Wolery, M. (2004). Using assessment information to plan intervention programs. In M. McLean, M. Wolery & D.B. Bailey, Jr. (Eds.) *Assessing infants and preschoolers with special needs (3rd ed.), (pp. 517-542).* Upper Saddle River, NJ: Pearson Education Inc.

Wolery, M. (2004). Monitoring children's progress and intervention implementation. In M. McLean, M. Wolery & D.B. Bailey, Jr. (Eds.) *assessing infants and preschoolers with special needs (3rd ed.), (pp. 545-581).* Upper Saddle River, NJ: Pearson Education Inc.

Zimmerman, I.L., Steiner, V. G., & Pond, R.E. (2002). *Preschool Language Scale (4th ed.).* San Antonio: Harcourt Assessment, Inc.

Zwaigenbaum, L. & Stone, W. (2006). Early screening for autism in clinical practice settings. In T. Charman & W. Stone (Eds.). *Social and communication*

development in autism spectrum disorders. (pp. 88-113). New York: Guilford Press.

Zwaigenbaum, L., Bryson, S., Rogers, R., Roberts, W., Brian, J., & Szatmari, P. (2005). Behavioral manifestations of autism in the first year of life. *International Journal of Development and Neuroscience, 23*, 143-152.

ASD-specific measures. As mentioned in previous sections, the presentation of characteristics associated with ASD varies across children and age ranges. There is no single behavior that is always indicative of autism, nor is there any one specific behavior that would exclude children from an ASD diagnosis. Broadly-speaking, an ASD evaluation will focus on children's developmental history and two broad categories of characteristics:

- typical behaviors that have not developed (e.g., pointing, close social relationships, eye contact), and

- atypical behaviors that are not usually present in other children (e.g., echolalia, stereotypical behaviors, preoccupations).

Thus, to supplement the basic or core assessment battery, measures that directly assess characteristics of autism, such as those listed in Table 2 (below), should be included.

Table 2. Autism-specific Assessment Instruments		
Instrument	Age Range	Format
Autism Diagnostic Observation Schedule (ADOS)	12 months – adult	Direct Assessment
Autism Diagnostic Interview –Revised (ADI-R)	18 months – adult	Parent Interview
Autism Observation Scale for Infants (AOSI)	6 – 18 months	Direct Assessment
Childhood Autism Rating Scale (CARS)	2 years to adult	Direct Assessment or Observation

- ADI-R = Autism Diagnostic Interview – Revised (Rutter et al., 2003a)
- ADOS = Autism Diagnostic Observation Schedule (Lord et al., 2002)
- AOSI = Autism Observation Scale for Infants (Bryson et al., 2008)
- CARS = Childhood Autism Rating Scale (Schopler et al., 2010)

The current "gold standard" appears to be the joint use of the *Autism Diagnostic Observation Schedule* (ADOS) (Lord, Rutter, DiLavore, & Risi, 2002) and the *Autism Diagnostic Interview – Revised* (ADI-R; Le Couteur, Lord, & Rutter, 2003). The ADOS is a semi-structured, standardized assessment of communication, social interaction, and play. Activities allow examiners to observe behaviors that have been identified as important to the diagnosis of ASD at different developmental levels and ages. The ADOS consists of four modules spanning the range from young, nonverbal children to verbal adults. The examiner chooses the module most appropriate for use with an individual child. The ADOS diagnostic algorithm allows classifications of autism and autism spectrum disorder; the algorithm does not differentiate pervasive developmental disorders, such as Asperger's disorder or PDD-NOS (Lord et al., 2002).

Video Activity:

Log in to **the Autism Speaks Video Glossary at:**
http://www.autismspeaks.org/video/glossary.php

From the Overview category, select the tab **Screening and Diagnosis**.

These video clips discuss the importance of a complete developmental history and the use of an appropriate ASD-specific diagnostic measure such as the ADOS.

The ADOS should be paired with a developmental history and with reports of the child's current functioning in various contexts (such as home and school). To gain such information, diagnostic evaluation often includes the *Autism Diagnostic Interview-Revised (ADI-R)*, which is a standardized, semi-structured interview that is administered to parents of persons suspected of having an ASD, or others who are very familiar with the person and have knowledge of their developmental history. The interview has questions specifically related to the child's early development, language and communication, social development and play, and interests and behaviors. Both current and past behaviors are discussed, with emphasis on the developmental period from four to five years. This measure is considered appropriate for children with a mental age of 24 months and older. The interview takes approximately 1 ½ hours for preschoolers and

slightly longer for school-age children. Due to the length of administration, this measure may not be well-suited for school-based teams. The ADI-R has a diagnostic algorithm that produces an estimation of whether or not the person appears to meet the formal criteria for a diagnosis of autism and provides an overall estimation of how severely the person may be affected. Given the focus on the individual's developmental history and current behaviors, this measure can assist with differential diagnoses of Asperger's disorder and other pervasive developmental disorders (LeCouteur, Lord, & Rutter, 2003).

The *Childhood Autism Rating Scale (CARS;* Schopler, Reichler, & Renner, 1988) is one of the original diagnostic tools developed to examine characteristics of autism. Specifically, the CARS is an observation scale for which a trained observer rates childhood behaviors that are related to autism. The CARS consists of fifteen dimensions or domains related to autism, including Relationships with People, Imitation, Emotional Response, Body Use, Object Use, Adaptation to Change, Visual Response, Auditory Response, Near-receptor Response, Anxiety, Verbal Communication, Nonverbal Communication, Activity Level, Intellectual Inconsistency, and General Impression. Ratings on each of these domains yield a total score, which provides information regarding the presence and/or severity of autism. Currently in revision, the CARS has been shown to have good psychometric qualities, including good sensitivity and specificity, and has high concordance with other clinical diagnoses using DSM-IV criteria, (Perry, Condillac, Freeman, Dunn-Geier, & Belair, 2005). The CARS2 (Schopler et al., 2010) was published in 2010 along with the CARS2-HF (high functioning) and a parent interview version (CARS2-QPC).

Assessment of cognition, communication/language, and adaptive behavior. An important step in planning the assessment of a child with suspected autism is selecting measures with solid psychometric properties (reliability, validity). The same measure(s) may not be appropriate to use with all individuals with ASD. The choice of measures may depend on the child's individual profile: level of verbal abilities, ability to respond to complex instructions and social expectations, ability to work rapidly, and ability to cope with transitions in test activities (NRC, 2001). A summary of potential measures of cognition/intelligence, language, and adaptive behavior is provided in Table 3 (below).

Table 3. Instruments by Assessment Domain		
Instrument	Age Range	Format
Cognition/Intelligence	Birth-68 months	Direct Assessment
Mullen Scales of Early Learning	1-42 months	Direct Assessment
Bayley Scales of Infant and Toddler Development-Third Ed.(Bayley-III)		
Differential Abilities Scales, Second Ed. (DAS-II)	2.6 –17 yrs.11mos.	Direct Assessment
Wechsler Intelligence Scale for Children- Fourth Ed. (WISC-IV)	6-16 yrs.11 mos.	Direct Assessment
Stanford-Binet Intelligence Scales, Fifth Ed. (SB5)	2-85 years	Direct Assessment
Leiter International Performance Scale-Revised (Leiter-R)	2- 20 yrs. 11mos.	Direct Assessment
Kaufman Assessment Battery for Children, Second Ed. (KABC-II)	3-18 years	Direct Assessment

Language		Direct Assessment
Preschool Language Scale, Fourth Ed. (PLS4)	Birth-6 yrs 11mos.	Direct Assessment
Clinical Evaluation of Language Fundamentals, Fourth Ed. (CELF-IV)	5-21 years	Direct Assessment
Peabody Picture Vocabulary Test, Fourth Ed. (PPVT-4)	2.5-90+ years	Direct Assessment
Expressive One-Word Picture Vocabulary Test, 2000 (EOWPVT)	2-18 years	Direct Assessment
Test of Language Competence, Expanded (TLC-Expanded)	5-9 years-level 1	Direct Assessment
Children's Communication Checklist (CCC-2)	10-18 years-level 2	Questionnaire
Comprehensive Assessment of Spoken Language (CASL)	4-16 years	Direct Assessment
	7-21 years	
Adaptive Behavior		Interview
Vineland Adaptive Behavior Scales, Ed. II	Birth–18 yrs 11mo	Interview
Scales of Independent Behavior-Revised (SIB-R)	Infancy-80 years	
Adaptive Behavior Assessment System, Second Ed. (ABAS-II)	5-89 years	Interview

Pediatric Evaluation of Disability Inventory (PEDI)	8 months-7 yrs.	Interview

Cognitive measures that help identify a child's level of intellectual functioning (IQ) are important considering that approximately forty-one percent of children with ASD have intellectual disabilities (Rice, C. 2009). Understanding children's intellectual functioning helps frame the interpretation of observations that are relevant for diagnosis (Ozonoff et al., 2005), determine eligibility for services, and facilitate program planning. Cognitive level predicts long-term outcome, however, the results of cognitive assessment are more stable for older children (Lord & Schopler, 1989). Scores can change due to maturation and intervention (Ozonoff et al., 2005). Cognitive assessment generates a profile of intellectual strengths and weaknesses, highlights differences in verbal versus nonverbal skills, and provides information about memory, processing, and visual-motor and spatial abilities. Often, but not always, children with ASD may demonstrate a stronger performance IQ than verbal IQ; however, this may not be as true of children with Asperger's disorder or high functioning autism (Ozonoff et al., 2005). Information about intellectual strengths and needs can certainly guide practitioners in selecting strategies that may be the most effective and enjoyable for a particular student.

Communication difficulties are one of the core features of autism. Deficits in this area can affect the teaching of even basic information (NRC, 2001). Assessment should consider children's expressive and receptive communication, as well as their social or pragmatic communication/language, and include examination of articulation/oral-motor skills, use of correct syntax, and semantic abilities. Additionally, examiners should understand and watch for common communication characteristics often seen in children with autism (e.g., echolalia; differences in rhythm, rate, intonation; stereotyped speech; limited joint attention). For older or higher functioning children, aspects such as higher order language, topic management and conversational ability, and language flexibility are critical components of the communication evaluation (NRC, 2001). Many formal communication measures do not identify the more subtle nonverbal, reciprocal communication skills that are characteristic of ASD, nor do they assess these skills within natural social contexts.

Standardized measures are available to assess the *adaptive behavior or self-help* skills of children of all ages. These tools can provide basic information about children's independence within specific domains such as motor, communication, social, and personal/self-help. Behaviors are usually listed in terms of discrete skills that are present, absent, or emerging; however, they may not provide much information about children's ability to adapt to or generalize these skills to new situations or with unfamiliar adults or peers. Assessment of adaptive abilities (e.g., toilet training, dressing, fine motor skills) can assist in targeting areas for intervention and in determining appropriate placements and teaching strategies. A key finding from the use of adaptive measures is the amount of support and supervision children will need during activities of daily living. Children with autism frequently have adaptive functioning below what might be expected for their cognitive skills; therefore, assessment of this domain will add important individualized information necessary for treatment planning (Ozonoff et al., 2005).

Additional evaluation components. Depending on the nature of the referral, the referral questions, and individual children's needs, a comprehensive evaluation may require additional components. These can include, but are not limited to, neuropsychological constructs (e.g., attention, executive functioning), academic performance, psychiatric or other co-occurring conditions, and specific school and family factors (Ozonoff et al., 2005).

Session 3

Optional Additional Reading

References

American Psychiatric Association. (2000). *Diagnostic and statistical manual of mental disorders (4th ed.- text revision).* Washington, DC: American Psychiatric Association.

Bailey, A., Berument, S.K., Lord, C., Pickles A., Rutter, M. (2003). *Social Communication Questionnaire.* Los Angeles, California: Western Psychological Services.

Bayley, N. (2005). *Bayley Scales of Infant and Toddler Development (3rd ed.).* San Antonio: Harcourt Assessment, Inc.

Bishop, D. (2003). *Children's Communication Checklist (2nd ed.).* San Antonio: Harcourt Assessment, Inc.

Brasnell, R. (Ed.) (2000). *Expressive One-Word Picture Vocabulary Test (3rd ed.).* Novato, CA: Academic Therapy Publications.

Bruininks, R.H., Woodcock, R.W., Weatherman, R.F., & Hill, B.K. (1996). *Scales of Independent Behavior (Rev. ed.).* Rolling Meadows, IL: Riverside Publishing.

Bryson, S.E., Zwaigenbaum, L., McDermott, C., Rombough, V., & Brian, J. (2008). The Autism Observation Scale for Infants: Scale development and reliability data. *Journal of Autism and Developmental Disorders, 38,* 731-738.

Carrow-Woolfolk, E. (1999). *Comprehensive Assessment of Spoken Language.* Circle Pines, MN: American Guidance Service, Inc.

Dunn, L.M., & Dunn, D.M. (2007). *Peabody Picture Vocabulary Test (4th ed.).* Minneapolis: NCS Pearson, Inc

Elliot, C.D. (2007). *Differential Ability Scales-II.* San Antonio: Harcourt Assessment, Inc.

Haley, S.M., Coster, W.K., Ludlow, L.H., Haltiwanger, J.T., & Andrellos, P.J. (1992). *Pediatric Evaluation of Disability Inventory: Development, standardization, and administration manual (Version 1).* Boston, MA: Trustees of Boston University, Health and Disability Research Institute.

Harrison, P., & Oakland, T. (2003). *Adaptive Behavior Assessment System (2nd ed.).* San Antonio: Harcourt Assessment, Inc.

Kaufman, A.S., & Kaufman, N.L. (2004). *Kaufman Assessment Battery for Children (2nd ed.).* Bloomington, MN: Pearson Education, Inc.

Le Couteur, A., Lord, C., & Rutter, M. (2003). *Autism Diagnostic Interview (Rev. ed.).* Los Angeles, CA: Western Psychological Services.

Lord, C., Rutter, M., DiLavore, P.C., & Risi, S. (2002) *Autism Diagnostic Observation Schedule.* Los Angeles, CA: Western Psychological Services.

Lord, C. & Schopler, E. (1989). The role of age at assessment, developmental level, and test in the stability of intelligence scores in young autistic children. *Journal of Autism and Developmental Disorders,* 19, 483-489.

Mullen, E.M. (1995). *Mullen Scales of Early Learning.* Circle Pines, MN: AGS.

National Research Council (2001). *Educating children with autism.* Committee on Educational Interventions for Children with Autism. Division of Behavioral and Social Sciences and Education. Washington, DC: National Academy Press.

Ozonoff, S., Goodlin-Jones, B.L., & Solomon, M. (2005). Evidence-based assessment of autism spectrum disorders in children and adolescents. *Journal of Clinical Child and Adolescent Psychology*, *34*(3), 523-540.

Rice, C. Prevalence of Autism Spectrum Disorders: Autism and Developmental Disabilities Monitoring Network, United States, 2006. *Morbidity and Mortality Weekly Report. Surveillance Summaries.* Volume 58, Number SS-10.

Roid, G.H. (2003). *Stanford-Binet Intelligence Scales (5th ed.).* Rolling Meadows, IL: Riverside Publishing.

Roid, G. H., & Miller, L.J. (1997). *Leiter International Performance Scale (Rev. ed.).* Lutz, FL: PAR, Inc.

Rutter, M., Le Couteur, A., & Lord, C. (2003a) *Autism Diagnostic Interview-Revised (ADI-R).* Los Angeles , CA : Western Psychological Services.

Schopler, E.C., Reichler, R.J., & Renner, B. (1988). *The Childhood Autism Rating Scale (CARS).* Circle Pines, MN: AGS Publishing.

Schopler, E.C.,Van Bourgondien, M.B., Wellman, G.J., & Love, S.R. (2010). *The Childhood Autism Rating Scale, Second Edition (CARS2).* Los Angeles, CA: Western Psychological Services.

Semel, E., Wiig, E.J., & Secord, W.A. (2003). *Clinical Evaluation of Language Fundamentals (4th ed.).* San Antonio: Harcourt, Assessment, Inc.

Sparrow, S.S., Cicchetti, D. V., & Balla, D.A. (2005). *Vineland Adaptive Behavior Scales (2nd ed.).* Circle Pines, MN: AGS Publishing.

Wechsler, D. (2003). *Wechsler Intelligence Scale for Children (4th ed.).* San Antonio: Psychological Corporation.

Wig, E.J., & Secord, W. (1989). *Test of Language Competence (Exp. ed.).* San Antonio: Harcourt Assessment, Inc.

Zimmerman, I.L., Steiner, V. G., & Pond, R.E. (2002). *Preschool Language Scale (4th ed.).* San Antonio: Harcourt Assessment, Inc.