Chapter 5
Standardized Assessment of Prelinguistic Communication

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Abstract The assessment of individuals with autism spectrum disorder (ASD) at the prelinguistic stage of communication development requires a comprehensive approach. Standardized assessments can contribute valuable information to the evaluation of each individual's strengths and needs, from screening through to diagnosis, treatment planning, and treatment evaluation. However, using standardized assessments with this population can be challenging, given that many assessments require the individual to have symbolic communication skills. In this chapter, we outline the components of a comprehensive assessment, discuss the ways in which standardized assessments can inform clinical decision making, and provide recommendations to address the common challenges associated with using standardized assessments with prelinguistic individuals with ASD.

5.1 Current Research on the Topic

5.1.1 Standardized Assessment

Standardized assessments have been designed to elicit the same targeted information across a range of individuals in a consistent manner: that is, the procedures have been manualized for administration in a *standardized* way (Kaplan & Saccuzzo, 1997). This approach, which is commonly referred to as *formal assessment*, helps to reduce bias that may otherwise cloud the assessment process (Neisworth & Bagnato, 2004) by ensuring validity and reliability (American Speech Language and Hearing Association, 2006). Many standardized assessments are norm referenced, providing population norms against which to compare the performance on the test by an individual; others may allow for comparison against developmental norms. Such norm-referenced assessments are used largely as

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(a) screening tools to enable problem identification, providing acceptable levels of sensitivity (detecting individuals who will go on to receive a diagnosis) and specificity (excluding individuals who would not receive a diagnosis if they were further tested); and (b) diagnostic tools to identify or confirm a problem and differentiate its nature (e.g., autism spectrum disorder [ASD] from other forms of developmental delay), a process that determines eligibility for services (American Speech Language and Hearing Association, 2006).

Although the concept of *standardization* implies that these assessments should all be administered in a similar way, there is in fact a great deal of between-test variation. Neisworth and Bagnato (2004) described a continuum of assessment contexts reflecting the differences in administration procedures across standardized assessment tools. They suggested that, on a continuum from highly contrived to naturalistic, the *clinical context* is characterized by test administration involving highly scripted examiner and examinee behavior (Roid, 2003) in clinical or laboratory settings, which provide the most decontextualized assessment settings. Moving along the continuum, in the *simulated* context, the clinic room is furnished in an attempt to make it more homely, clinicians are instructed to build rapport, and there is some provision for modifying administration procedures (e.g., using the individual's name in questioning, substituting a child's toy instead of a similar item in the test kit). Child assessments (e.g., Bayley Scales of Infant and Toddler Development – 3rd Edition – Bayley, 2006) need not be conducted at a table, and target behaviors are observed during play-based interactions. Further along the continuum, the *analog* context involves arranging the individual's natural environment to create opportunities for target behaviors to occur. Communicative temptations and/or scripted routines are used to help ensure consistent administration and equal opportunities to produce the target behaviors (e.g., Communication and Symbolic Behavior Scales – Wetherby & Prizant, 2001). Finally, the *natural* context involves the use of consistent processes for observing and recording behaviors (e.g., Pediatric Evaluation of Disability Inventory [PEDI] – Haley, Coster, Ludlow, Haltwanger, & Andrellos, 1992). The examiner does not engineer the environment and only natural behaviors in the individual's everyday environment are recorded.

Traditionally, standardized assessments have been criticized for failing to provide information essential for goal setting and intervention planning, especially for individuals who have not demonstrated linguistic behaviors[1] (Crais, 1995). Olswang, Bain, and Johnson (1992), for example, argued that, in assessing static knowledge, standardized assessments provide little information about learning potential and scaffolding needs. These criticisms have been countered by arguments about the role of standardized assessments within more varied assessment protocols that provide comprehensive profiles of skills, learning preferences, and

[1] Throughout this chapter, we refer to children as *prelinguistic*, with the assumption that linguistic skills are still to emerge, and adults as lacking linguistic communication, thereby avoiding a developmental assumption.

communication contexts for both children and adults, including those with ASD who are pre- or nonlinguistic (Iacono & Caithness, 2009). To properly consider the strengths and limitations of standardized assessments, it is necessary to reflect on the purposes and recommended elements of comprehensive assessments for individuals with ASD.

5.1.2 Standardized Assessment Within a Comprehensive Framework

There has been consensus demonstrated within the scientific and clinical literature about what makes a good assessment for individuals with ASD, irrespective of their age and level of communication skills. According to the National Autism Plan for Children (NIASA, 2003), individuals who demonstrate signs of ASD should receive assessments that (a) identify their individual health and educational needs, including consideration of differential diagnosis; (b) consider the potential implications of the condition so that appropriate intervention and support strategies can be put in place; and (c) address their needs in the family context, in a way that promotes the capacity of family members to support one another. Given the multifaceted nature of ASD, input, to varying degrees, from speech-language pathologists, psychologists, occupational therapists, educators, and medical professionals has been recommended (AMAZE, 2009; Ozonoff, Goodlin-Jones, & Solomon, 2005). These professionals should have expertise in ASD but also expert knowledge of human development and related conditions, to ensure accurate differential diagnosis and appropriate treatment planning (Filipek et al., 1999; Kasari, Brady, Lord, & Tager-Flusberg, 2013; NIASA, 2003). Further, the central role of communication partners, especially family members, within the assessment team in providing comprehensive information of relevance to the person's social contexts has been highlighted (Crais, 1995; Iacono & Caithness, 2009).

The tools chosen for assessments will vary according to their purpose. Given the importance of early identification to early access of appropriate services, screening and diagnostic tools require strong psychometric properties, as demonstrated through measures of validity and reliability (American Speech Language and Hearing Association, 2006). For the purpose of identifying intervention targets and developing strategies that will maximize a person's functioning across contexts and potential for learning across developmental domains, assessment tools that examine and profile an individual's unique strengths and needs as demonstrated across his or her full range of life activities at home and in the community are required (Iacono & Caithness, 2009; Roberts & Prior, 2012). Iacono and Caithness recommended that assessment provides information on the preferences and priorities of an individual and his/her key communication partners to ensure that assessment findings and recommendations are arrived at, understood, and acted upon in a collaborative and respectful manner. Such an approach requires good

communication between all parties, the selection of appropriate assessment tools, and sufficient time to complete the process

Given the complex nature of ASD and the need to account for functioning in everyday environments, rarely can communication development in prelinguistic/nonlinguistic communicators be considered in isolation of all other areas of development and functioning. In fact, in most cases the information required for effective goal setting and intervention will be garnered from the assessment of the individual's broader adaptive living skills, interactions with others, and current levels of participation in daily activities. Comprehensive assessment for individuals with ASD requires (a) collecting all relevant existing information, such as previous assessment reports; (b) obtaining a thorough developmental and medical history with emphasis on characteristics relevant to the differential diagnosis of ASD; (c) ascertaining the needs, preferences, and priorities of those seeking the assessment; (d) direct assessment of the individual's social, communication, and cognitive skills; (e) assessment of mental health and adaptive behavior; (f) medical assessment to rule out underlying problems that may impede learning or development; (g) structured observation of behavior across multiple settings; (h) liaison with other professionals to elicit information for diagnosis, goal setting, and/or evaluation; and (i) accurate, tailored, sensitive, and timely sharing and reporting of the outcomes to individuals, families, and other key stakeholders (Filipek et al., 1999; NIASA, 2003; Ozonoff et al., 2005). Within this framework, the conscientious and judicious use of standardized assessments has the potential to contribute to an accurate diagnosis, and comprehensive understanding of the learning profile and needs of individuals with ASD.

We note that there are existing excellent reviews of assessment tools available for administration to individuals with ASD (e.g., Filipek et al., 1999; Kasari et al., 2013; Ozonoff et al., 2005). Rather than provide another review, the focus here is to discuss the role of standardized assessments in screening, diagnosis, goal setting, and intervention planning, with reference to examples of assessments that are commonly used in practice and research. Our approach is not to focus solely on assessments commonly used by speech-language pathologists to examine communication skills, but rather to consider what can be learned from the use of standardized assessments across all domains of development and at each stage of the process, commencing with screening.

5.1.3 What Can We Learn from Standardized Screeners?

With increasing recognition of the importance of early identification and intervention for children with ASD has come increasing use of standardized screening assessments. To illustrate, Soleimani, Khakshour, Khayat, Ghaemi, and Golchin (2014) completed a narrative review, documenting the use of 28 screening assessments in ASD research published from 1992 to 2014. These assessments include

routine development surveillance as well as ASD-specific screeners for young children showing signs of ASD (Filipek et al., 2000).

Both developmental surveillance and ASD-specific screeners can contribute useful preliminary information to the process of assessment and diagnosis, as well as to goal selection and treatment planning for prelinguistic communicators. Most screeners involve parents, health professionals, or educators reporting on the behaviors they see in the child's everyday natural environments; hence, they have strong ecological validity. The BRIGANCE Early Childhood Screen III (Curriculum Associates, 2015), for example, is a norm-referenced standardized development surveillance screener that is commonly used by health and education professionals to assess fine motor, gross motor, expressive language, receptive language, social-emotional, and self-help skills. Receptive and expressive communication skills include the prelinguistic behaviors of responding to sounds, babbling, imitating sounds, giving objects on command, pointing, and using gestures (e.g., waving goodbye), all of which are relevant to profiling a child's prelinguistic communication development. The availability of normative data enables the clinician to consider not just the presence, absence, frequency, and quality of behaviors of interest (e.g., use of gestures), but also how the child's skills compare to those of other children his or her age.

Screeners designed specifically to identify young children requiring further assessment for ASD, such as the Modified Checklist for Autism in Toddlers, Revised, with Follow-Up (M-CHAT-R/F) (Robins, Fein, & Barton, 2009), focus on behaviors that most reliably distinguish children with ASD from children with other developmental concerns, such as language delay. For instance, caregivers are asked to reflect on whether their children point to ask for things or to get help, in order to gather preliminary evidence regarding their children's use of intentional communication and gestures. Furthermore, a question regarding whether children give and show objects to others to share interest, not just to request, provides information about the functions (e.g., to request, share, comment, negate) served by the children's communication. Accordingly, the information gained from the M-CHAT can contribute to building a social-communication profile of the child that could lead to further assessment and also inform intervention planning.

The Childhood Autism Rating Scale – Second Edition (CARS-2) (Schopler, Van Bourgondien, Wellman, & Love, 2010) is another frequently used screener that comprises two 15-item questionnaires, one of which is completed by clinicians following observation of a child and the taking of a thorough developmental history. The Standard Version rating scale (CARS2-ST) is for use with children under 6 years of age who present with communication and learning difficulties. The High-Functioning Version rating scale (CARS2-HF) is for use with children over 6 years of age and with estimated average or above average intellectual ability. A parent-caregiver questionnaire (CARS2-QPC) is also included to assist in gaining a broader understanding of each child's skills and needs. For prelinguistic communicators, the Standard Version rating scale can provide a useful summary of the child's verbal and non-verbal communication, as well as social and behavioral skills relevant to a diagnosis of ASD. The CARS-2 has been normed on a

population of children with ASD, and provides cutoff scores, standard scores, and percentiles for comparing the profile of the child being assessed with those of other children with ASD.

In contrast to the availability of tools appropriate for children, there are relatively few screening assessments for adolescents and adults with ASD, and they have limited applicability to pre- and nonlinguistic communicators. For instance, the Social Communication Questionnaire *lifetime form* (Rutter, Bailey, Lord, & Berument, 2003) is used for screening individuals over 4 years of age and comprises 40 yes/no questions relating to social-communication skills and behavior. A few questions have limited utility in profiling the skills and needs of pre- and nonlinguistic communicators, such as those referring to whether a child ever used a person's hand as a tool, or used gestures other than pointing and pulling a person's hand to express wants and needs. However, most adolescent and adult pre- and nonlinguistic communicators will have received comprehensive assessments as children, negating the need for screening tools.

Developmental surveillance and ASD-specific screeners provide an important source of preliminary information about a child's development (in some cases with respect to normative data), which can then be corroborated with more comprehensive assessment across cognitive and communication domains. These screeners can provide insights into the child's social and cognitive skills that are foundational to the development of symbolic communication and evidence for the impact of any developmental delays or atypical behaviors on everyday activities that may ultimately become the focus of intervention. Given that screeners are used prior to a formal diagnostic assessment, they enable caregivers and professionals to contribute information at an early stage of the child's assessment, thereby affording them the opportunity to inform the selection of the tools for use in subsequent stages of assessment. In this way, caregivers can become integral members of the assessment team early in the assessment and intervention planning process.

5.1.4 What Can We Learn from Standardized Diagnostic Tools?

Prior to the introduction of standardized assessments, the diagnostic process for individuals with ASD was based predominantly on subjective observations and clinical impressions (Filipek et al., 1999; Klinger & Renner, 2000). The introduction of standardized diagnostic tools including the Autism Diagnostic Observation Schedule (ADOS) (Lord et al., 1989), the Autism Diagnostic Interview (ADI) (Le Couteur et al., 1989), and the Gilliam Autism Rating Scale (GARS) (Gilliam, 1995) heralded the beginning of a new era in which structured observation and interviewing, combined with scoring algorithms capturing core ASD symptoms, could be used in combination with non-standardized information gathering to

inform differential diagnosis. These assessments, which have since been revised (GARS-3 – Gilliam, 2013; ADI-R – Le Couteur, Lord, & Rutter, 2003; ADOS-2 – Lord et al., 2012), have the potential to contribute valuable information to the assessment of prelinguistic communication skills in children with ASD.

The ADOS-2 (Lord et al., 2012) is a clinician-administered standardized assessment of an individual's social-communication skills and behavior. The clinician selects from five available modules, designed to cater for children as young as 12 months who are not yet talking, to adolescents and adults using fluent phrase level speech (and hence, excludes adults who are nonlinguistic). The assessment is administered in a semi-structured manner according to standardized procedures with age-appropriate materials and involves the examiner engineering the materials and environment to administer *presses* for behaviors that are characteristic of ASD. The ADOS-2 takes approximately 30–60 min to administer, at which point the clinician scores the behaviors of interest using an algorithm. Cut-off scores for *Autistic Disorder* and *Autism Spectrum Disorder* are provided. These scores are used, in conjunction with other sources of information and with reference to the diagnostic criteria (e.g., American Psychiatric Association, 2013; World Health Organisation, 1992), to assist in differential diagnosis.

Given that the ADOS-2 is essentially a direct observation of behavior, it offers an excellent context in which to examine the learning skills, needs, and profile of prelinguistic communicators (i.e., children, rather than adults). To illustrate, the Toddler Module provides an opportunity to observe (a) the communication modalities the child is using, including vocalizations, gestures, physical actions, and words; (b) the functions his or her communicative behaviors serve, including requesting, negating, and sharing information; (c) the child's frequency and social quality of initiations of interactions, including joint attention; (d) his or her response to the initiations of others; and (e) his or her functional and symbolic play skills, imitation skills, and sense of shared enjoyment. Accordingly, the social-communication and behavior sample elicited during the ADOS-2 should provide the clinician with a clear indication of the child's current forms and functions of communication – regardless of whether or not the child is intentional and/or symbolic – as well as insight into the foundations of linguistic communication, including joint attention, imitation, and the emergence of symbolic play. Unlike an unstructured or informal play-based communication sample, the semi-structured standardized nature of the ADOS-2 increases the likelihood that the child's repertoire of behaviors relevant to a diagnosis of ASD will be observed during the relatively brief assessment.

The Autism Diagnostic Interview – Revised (ADI-R) (Le Couteur et al., 2003) is administered through a structured interview with parents or significant others and focuses on aspects of development and current functioning that are critical to differential diagnosis of ASD. The ADI-R scoring algorithms have been shown to be valid for use when assessing children and adults with a mental age above 2 years. Therefore, the algorithms will not be sensitive for many pre- or nonlinguistic communicators from a diagnostic point of view, thus leading to recommendation against its use for these populations (Ozonoff et al., 2005). However, the questions

asked in the interview mirror those contained in a standard comprehensive developmental interview, and the qualitative information gained through this type of interview is likely to be relevant to assessment and treatment planning for prelinguistic communicators, irrespective of age and intellectual functioning. Of particular relevance to the assessment of pre- or nonlinguistic communicators are questions on the ADI-R relating to communicative intent, use of other's body to communicate, use of gestures, spontaneous imitation of actions, imaginative play, social initiations and responses, and functions of communication. The systematic approach to questioning was designed to help interviewees reflect on the individual's early development and current functioning, thus establishing a comprehensive picture of skills, needs, and developmental trajectory. Furthermore, items inviting interviewees to "describe the person" and to share their "current concerns" provide a useful means to gather qualitative data about the individual and his or her family that are likely to be crucial to goal selection and intervention planning.

The Gilliam Autism Rating Scale – 3rd Edition (Gilliam, 2013) is a 56-item assessment completed by parents, professionals, or educators (for those at school). Designed for use with individuals aged 3–22 years, the GARS-3 includes questions relating to use of gestures, imitation, initiation of interactions, reciprocal social interaction, and the functional use of objects. Unlike the ADI-R, which takes approximately 2–3 h to complete, the GARS is designed to be completed in 5–10 min and so may be considered to be both a screener and diagnostic tool. Irrespective of its use as a screener or for diagnosis, the GARS is intended to contribute to a comprehensive assessment process including a detailed interview and observations. The use of the ADI-R or a similar structured interview (e.g., Diagnostic Interview for Social Communication Disorders – Leekam, Libby, Wing, Gould, & Taylor, 2002) can be supplemented with additional questions designed to further examine factors relevant to the emergence of linguistic communication. Such an approach improves both the efficiency and accuracy of the assessment process by ensuring a comprehensive profile of the individual's skills and needs across domains is developed, without the need for a separate interview focused solely on communication.

5.1.5 What Can We Learn from Standardized Assessments of Developmental Domains?

In order to complete the diagnostic assessment and plan intervention, diagnostic tests require supplementation with those designed to examine the individual's skills across a range of areas of development and functioning. For pre- and nonlinguistic communicators, relevant domains are cognitive development and behaviors, adaptive behavior, and social-communication skills with a focus on pre- or nonlinguistic communication. Norm-referenced standardized assessments are particularly

relevant to the evaluation of cognition and adaptive behavior, and can also be valuable in assessing pre- and nonlinguistic communication skills, including joint attention, imitation, and, for children, play skills (Kasari et al., 2013). Other areas for investigation as part of a comprehensive assessment may include repetitive and ritualistic behavior, mental health and physical health, vision and hearing, and genetic testing (see Filipek et al., 1999), all of which may influence the assessment team's understanding and interpretation of communication development in children who are prelinguistic communicators and skills in adults who are nonlinguistic. Here, we focus on the three areas (i.e., cognition, adaptive behavior, and communication) that are directly relevant to the assessment of all pre- and nonlinguistic communicators.

Cognition Standardized cognitive assessments can provide insight into an individual's attention, concentration, memory, visual processing, and problem solving, each of which is central to learning, thus impacting communication development (Organization for Autism Research, 2003). Cognitive assessments also assist in the process of differential diagnosis, whereby differences in an individual's social-communication skills, play skills (in the case of children), and behavior may be attributed to ASD, intellectual disability, both ASD and intellectual disability, or one or more other disorders (Filipek et al., 1999). Furthermore, cognitive development has been found to be a strong and consistent predictor of communication, and other developmental and educational outcomes, thus making information about an individual's cognitive skills essential to intervention planning and counseling caregivers of young children regarding prognosis (Kasari et al., 2013).

The Mullen Scales of Early Learning (MSEL) (Mullen, 1995) and the Bayley Scales of Infant and Toddler Development (current edition, Bayley-III– Bayley, 2006) are two cognitive assessments commonly used with children with ASD. Both tests evaluate cognitive skills (e.g., pattern matching, visual understanding, puzzle completion), expressive and receptive communication, and motor skills. The Bayley-III also includes a parent-completed questionnaire examining social-emotional development and adaptive behavior. Ozonoff et al. (2005) suggested that the MSEL has two key advantages over the Bayley-III: (a) a wider age range (0–68 months versus 1–42 months), and (b) the inclusion of five scales allowing for separate assessment of non-verbal and verbal abilities. Further, they noted that both assessments include standard and age-equivalent scores, thus allowing testing of older children with significant learning needs for whom administration of tests designed for their age range may be inappropriate.

Focusing on the MSEL, a review of individual scale items reveals the inclusion of a range of items relevant to the assessment of prelinguistic communicators. These include items assessing object permanence, cause-effect, and object associations in the visual reception scale, each of which is fundamental to language development. The communication scales include items examining response to sounds and words, social response to others, vocalizations, babbling, and use of gestures. Therefore, the individual items and raw scores associated with these may

be useful in determining skills and needs, as well as in monitoring progress in young prelinguistic communicators (Kasari et al., 2013). For older nonlinguistic communicators, these items arguably hold less meaning, given that the administration procedures and target behaviors are based on typical child development (e.g., baby sitting in mother's lap as clinician attempts to make the baby smile). Furthermore, the fact that some behaviors (e.g., babbling) appear at around 6 months in typically developing children but then reduce in frequency with the emergence of words from 12 to 18 months can make it difficult to assess and award credit for items appropriately to a 4-year old child who is no longer babbling, but not yet using words. Given the complexity of administering items and interpreting responses, it is imperative that clinicians have appropriate qualifications and training in the administration of these tests.

For older children and adults with ASD who are nonlinguistic, the Differential Abilities Scales (DAS-II) (Elliot, 2006) and The Leiter International Performance Scales – Revised (Roid, Miller, Pomplum, & Koch, 2013) have both been recommended (Filipek et al., 1999). Kasari et al. (2013) noted that the DAS has the advantage of assessing both intellectual and academic skills, as well as the option of "out of range" testing for older students with ASD who have significant learning needs. A key advantage of the Leiter scales is that it does not directly assess receptive or expressive language skills and is appropriate for individuals with a mental age of 2 years or higher, thus making it a good assessment of non-verbal cognition (Kasari et al., 2013). Assessing pre- and nonlinguistic communicators with ASD using non-verbal intelligence tests, where the intention is to reduce the potential impact of social and communication difficulties on an individual's ability to follow test instructions, may provide a more accurate reflection of his or her cognitive abilities (Organization for Autism Research, 2003). Furthermore, the use of non-verbal intelligence tests can help reduce, although not alleviate entirely, the linguistic challenges associated with administering and interpreting language-based assessments for individuals who are culturally and linguistically diverse (Rhodes, Ochoa, & Ortiz, 2005), including those with ASD.

Adaptive Behavior The results of cognitive assessments must be considered with reference to the individual's adaptive behavior: that is, his or her social, communication, motor, academic, and daily living skills in everyday environments of home, school, work, and/or the community. Adaptive behavior assessments document an individual's level of functioning and help to establish the impact of his or her learning difficulties. When combined with information about the social and environmental factors (e.g., family support, funding for services) pertinent to the individual's circumstances, an overall understanding of his or her level of disability (World Health Organisation, 2001) can be gained. Accordingly, the information gained from the adaptive behavior assessment is crucial to identifying goals for intervention planning (Ozonoff et al., 2005).

A frequently used adaptive behavior assessment for individuals with ASD is the Vineland Adaptive Behavior Scales, which is currently in its second edition (VABS-II) (Sparrow, Cichetti, & Balla, 2005). The VABS-II is administered via

an interview with parents, teachers, or significant others, or via a parent-completed or teacher-completed survey form. The VABS-II is appropriate from birth to 90 years and assesses adaptive skills across five domains: communication, socialization, daily living skills, motor skills, and maladaptive behavior. The domain scores (except maladaptive behavior) are combined to generate an Adaptive Behavior Composite, a broad measure of adaptive functioning in everyday environments. The VABS-II yields raw score, standard scores, percentiles, descriptive severity levels, and age-equivalent scores.

For pre- and nonlinguistic communicators, aside from documenting the presence and magnitude of developmental delay in adaptive behavior, the VABS-II is likely to yield information that is more relevant to goal setting, intervention planning, and outcome evaluation than to ascertaining the social-communication skills and needs of the individual. The reason is that while few items on the socialization and communication scales address development in the prelinguistic period, the daily living skills domain provides a useful insight into the individual's participation, independence, and support needs in daily activities. To illustrate, the expressive communication domain includes nine items relating to behaviors seen in the prelinguistic period, including production of vocalizations and gestures, while the receptive communication domain includes only three items. However, from a descriptive perspective, the information garnered from these is likely to add little to what can be collected in a brief communication screener (e.g., the M-CHAT-R/F– Robins et al., 2009). The daily living skills domain, however, provides information about the individual's personal skills (e.g., eating, drinking, dressing, personal care), domestic skills (e.g., looking after personal possessions, participating in household chores), and community skills (e.g., following household rules, road safety). The development of these skills is likely to become a key focus, and ultimately the most socially valid outcome measure, of intervention success.

Communication Communication development is routinely examined as part of diagnostic, cognitive, and adaptive behavior assessments, but warrants additional detailed examination in the case of pre- and nonlinguistic communicators. These assessments are within the purview of qualified speech-language pathologists with expertise in working with individuals with developmental disability, and include examination of (a) each person's functions of communication (e.g., to comment, request, negate); (b) the communication modes he or she uses (including vocalizations, gestures, eye gaze, physical actions, and idiosyncratic strategies); (c) the frequency, social quality, and effectiveness of verbal and non-verbal communication modes used; (d) his or her coordination of communication modes (e.g., coordinated use of eye gaze and gesture to make a request); and (e) atypical communication patterns, such as echolalia and use of words without apparent communicative intent (Filipek et al., 1999; New York State Department of Health, 1999; NIASA, 2003). An audiological examination is also required to rule out the possibility of hearing impairment (New York State Department of Health, 1999). Such a comprehensive assessment necessarily involves collecting information from multiple stakeholders and across multiple settings, with the use of a range of

assessment tools. Here we focus on the contributions of standardized assessments to this process.

Given that all typically developing children go through a prelinguistic phase of communication development, a common approach to the assessment of prelinguistic children with ASD is to administer a standardized speech and language assessment that caters for children under 12 months of age. The Preschool Language Scales – 5th Edition (PLS-5) (Zimmerman, Steiner, & Pond, 2011), for example, is a norm-referenced assessment of auditory comprehension and expressive communication in children from birth to 7 years 11 months of age. It was not designed for, nor is it suitable for, older children or adults who are nonlinguistic communicators (Zimmerman et al., 2011). The assessment takes approximately 25–35 min for children up to 11 months of age and up to 60 min for children aged 3–4 years; it yields standard scores, percentile ranks, age equivalents, and growth scale scores designed to assist in tracking changes in children's communication development over time (Zimmerman et al., 2011).

With its focus on typical development, the PLS-5 can provide insights into a child's prelinguistic skills, such as his or her response to sounds and instructions, functional and symbolic play, use of vocalizations and gestures, and communication for behavioural regulation and social purposes. However, comprehensive speech and language assessments, such as the PLS-5, cover a broad developmental period and arguably fail to provide fine-grained measurement and analysis of behaviors that occur during the prelinguistic period. In addition, the items relevant to the prelinguistic period of communication development become less appropriate as the child grows older, where assessable behaviors such as babbling and mouthing objects are less relevant. Instead, assessments that focus on the prelinguistic period of development may be more suitable in assessing the communication strengths and difficulties of these children.

The Communication and Symbolic Behavior Scales (CSBS) (Wetherby & Prizant, 2001) was designed to assess communication skills, social-affect, and symbolic abilities in children with a functional communication age of 8–24 months (Wetherby & Prizant, 2003). It assesses non-verbal social-communicative behaviors that correlate with language development through a standardized, semi-structured approach to sampling the child's behavior through activities including (a) creating communicative temptations to entice communication, (b) shared book reading, (c) symbolic and constructive play tasks, and (d) language comprehension probes. These activities take approximately 1 h to complete and the session is video recorded for coding and analysis. A parent questionnaire is used to gain additional information about the child's social-communication skills in everyday situations at home and in the community. Wetherby, Allen, Cleary, Kublin, and Goldstein (2002) noted the importance of supplementing direct testing in the CSBS with parent report, given that a child's performance on the day of testing may be influenced by a range of factors, including attention, interest, fatigue, familiarity with the setting, and general comfort.

A distinct advantage of the CSBS over other norm-referenced standardized assessments that include communication domains (e.g., Mullen Scales of Early Learning) is the information it can provide regarding the social-cognitive underpinnings of linguistic communication development. To illustrate, within the *communication scales*, not only is the presence of verbal and non-verbal communicative behaviors examined; the rate, coordination, and functions of these behaviors (behavior regulation, joint attention, social interaction) are also examined. The frequency and quality (e.g., positive, negative) of social affect is examined, as is social reciprocity and the child's use of repair strategies. Within the *symbolic scales*, the child's progress towards development of symbol use (i.e., words) is considered with reference to his or her language, functional and symbolic play skills, communicative intent, imitation, and tool use. This approach to examining the building blocks of linguistic communication means that intervention planning can proceed in a tailored fashion by targeting the constituent skills of linguistic development. To illustrate, a child with good social reciprocity but a limited range of communicative functions can be supported to expand his or her use of communication for behavior regulation, social interaction, and joint attention. In contrast, a child who demonstrates a range of communicative functions but poor social reciprocity may be supported by engineering the environment to increase the number of communicative opportunities with communication partners ready to wait and look expectantly at the child. Examples of strategies such as these were outlined in the test manual to facilitate goal setting and intervention planning (Wetherby & Prizant, 2003).

At present, there are no standardized assessments designed specifically for nonlinguistic adults with ASD. Clearly, the materials used in the assessments described are inappropriate for adolescents and adults with ASD, nor were these assessments designed for or normed with this older population in mind. Aside from gathering information about communication from standardized diagnostic, cognitive, and adaptive behavior assessment as part of the broader evaluation process, non-standardized assessment is currently the only option available (see Chap. 6). Furthermore, irrespective of whether the assessment is for a child or adult, standardized assessments alone do not provide the information necessary to form a comprehensive profile of individuals skills, needs, and functioning, either in terms of setting goals or intervention planning; instead they should be used in conjunction with other assessment tools (NIASA, 2003).

5.1.6 Standardized Assessment of Outcomes

At present, there is no single best intervention for all individuals with ASD, and parents, clinicians, and educators are unable to predict the outcomes of interventions selected (Trembath & Vivanti, 2014). Accordingly, it is imperative that the response of each child and adult to the interventions provided be carefully assessed and monitored. This information is relevant not only to individual clinicians,

clients, and families, but also to researchers and service providers in the field of ASD tasked with improving the efficiency and effectiveness of interventions provided.

There is very limited information available about the use of standardized assessments to monitor intervention progress for individuals with ASD as part of everyday service provision. However, the picture regarding the use of these assessments in research examining intervention outcomes is both clear and consistent over time. Matson and Rieske (2014) reviewed measures of treatment outcome used in early intensive behavioral intervention (EIBI) research published from 1987 to 2013. They found that of the 25 studies that included measurement of treatment outcomes, 22 employed standardized assessments of cognition and adaptive behavior, including assessments mentioned above (e.g., VABS-II, Bayley Scales of Infant Development, Leiter International Performance Scale). Five studies included a direct standardized assessment of speech and language development (i.e., MacArthur-Bates Communicative Development Inventories – Fenson et al., 2007; Reynell Developmental Language Scales – Reynell & Gruber, 1990; Preschool Language Scales – Zimmerman et al., 2011). Matson and Riske expressed support for the trend towards inclusion of standardized measures in research, which provide a consistent method for evaluating outcomes within and across studies. Given the goal of developmentally-focused EIBI programs is to return children with ASD to a typical developmental trajectory with respect to adaptive behavior, the ability to measure changes in cognitive and adaptive behavior, including communication, is an important attribute of norm-referenced standardized assessments.

However, in considering the merits of standardized assessments for evaluating treatment outcomes, it is noteworthy that of the standardized speech and language measures used in studies reported by Matson and Rieske (2014), the Reynell Developmental Language Scales is not suitable for children under 2 years of age, the McArthur Bates Communicative Development Inventories assesses the use of words and gestures only (and not other relevant prelinguistic communicative behaviors described above), and the Preschool Language Scales provides limited coverage of the prelinguistic period. The key risks in relying on standardized assessments to measure treatment outcomes for prelinguistic communicators are that they may not be sensitive to change, and cannot be re-administered within a short time frame without violating the standardized administration requirements. Accordingly, Matson and Rieske noted the importance of supplementing standardized assessments with direct non-standardized measurement of operationally defined target behaviors. For pre- and nonlinguistic communicators with ASD, these could include the number, form, and function of nonlinguistic intentional communicative acts.

5.2 Challenges

Despite the benefits of standardized assessments outlined above, there are a number of issues that impact their use and appropriateness for individuals with ASD, particularly those who are pre- and nonlinguistic communicators. To this end, Kasari et al. (2013, p. 12), following their review of assessment tools for minimally verbal children with ASD (i.e., children with fewer than 20 functional words), noted that ". . .most of the measures have serious limitations for use with minimally verbal children, which have severely impeded progress in both research and clinical practice." These issues must be understood and accounted for when selecting, scoring, administering, and interpreting the results of standardized assessments.

5.2.1 Selecting Standardized Assessments

As discussed previously, a serious shortcoming in the use of standardized assessments for prelinguistic individuals with ASD is the lack of appropriate tools. In terms of communication-specific tools, few exist for children and there are currently no dedicated standardized communication assessments for nonlinguistic adolescents and adults with ASD. There are standardized measures of cognition and adaptive behavior that include communication skills, which we have argued can inform the process of supporting the communication skills of children and adults with ASD, including assessment, treatment planning, and evaluation. However, there is a lack of research comparing assessments (Ozonoff et al., 2005) and no evidence base from which to determine the most valid assessments for individuals with ASD, irrespective of whether they are linguistic or pre- or nonlinguistic communicators (NIASA, 2003). Compounding the problem, Matson and Smith (2008) noted that measures of the same construct may vary considerably within and across studies, meaning that two or more assessments of purportedly the same construct (e.g., IQ, adaptive behavior) may yield different results. When considered together, these findings indicate that clinicians are currently forced to work with a limited selection of assessments that are likely to yield different results even when measuring the same construct, and at the same time have a lack of evidence on which to select from those available.

5.2.2 Administration

Concerns regarding the challenges of administering standardized assessments to individuals with ASD have been well documented in the literature. Neisworth and Bagnato (2004), for example, argued that standardized testing procedures conducted in clinical settings according to strict administration procedures are

decontextualized from the child's everyday routines and unlikely to capture an accurate representation of his or her functional abilities. Instead, they argued that only authentic or alternative forms of assessment are needed that are (a) useful for intervention; (b) acceptable to clients, carers, and clinicians; (c) conducted in natural contexts; (d) adaptable; (e) sensitive to change; (f) useable and interpretable by multiple professionals; (g) designed to foster parent-professional collaboration; and (h) relevant to the individual being assessed. Concerns have also been raised that standardized assessments may not yield accurate results or information that is relevant if administration is heavily reliant on the individual's verbal ability, auditory processing, and ability to follow commands (Indiana Resource Centre for Autism, 2015). As noted above, some assessments, such as non-verbal intelligence tests, go some way towards addressing this issue through the inclusion of tasks that are not reliant on language. However, even tasks that do not require language to complete (e.g., matching objects) invariably rely on the individual following some form of instruction, and hence, receptive language ability, in order to complete the task (Paynter, 2015).

The testing environment and standardized procedures may also be problematic for individuals with ASD, thus limiting the accuracy and relevance of the results. Standardized testing generally requires the individual to interact with an unfamiliar examiner in an unfamiliar environment, in an activity outside his or her normal routine (Indiana Resource Centre for Autism, 2015). These aspects of assessment are likely to result in mild anxiety for typically developing children and adults without disability, with the potential to be amplified for individuals with ASD for whom social interactions and changes in routine are particularly anxiety provoking (Matson & Smith, 2008). For pre- and nonlinguistic communicators, who are likely to have significant auditory comprehension difficulties, the challenges associated with standardized assessments are likely to be compounded. Ozonoff et al. (2005) noted that atypical use of language, frequent off-task behaviors, high levels of distractibility, and variable motivation to complete tasks may all present challenges to the use of standardized assessments. Bagnato and Neisworth (1995) surveyed 250 psychologists servicing over 7000 children in the United States regarding their use of standardized assessments with children with ASD. They reported that approximately 60 % of children would have been deemed untestable by the psychologists if not for their modifications of the administration procedures.

Koegel, Koegel, and Smith (1997) conducted an experiment in which they examined the impact of motivation and attention on standardized test performance amongst six children with ASD. In total, the six children completed 44 standardized assessment testing sessions under two conditions. In the first condition, the assessments were delivered as per the instructions provided in the manual. It the second condition, child behaviors that were likely to impact on test performance were identified through parent interview and child observation, and then accommodated by using tailored strategies for each child. To illustrate, one child reportedly screamed when asked to sit at the test table. Consequently, in the second condition, the test was administered on the floor. The results indicated that children consistently scored higher when motivation/attention issues were addressed across

receptive vocabulary, receptive language, verbal intelligence, and non-verbal intelligence tests. Koegel et al. (p. 241) suggested that "...standardized testing may be measuring the child's test-taking disability rather than intellectual or verbal ability." This concern is consistent with that of Matson and Smith (2008, p. 69) who noted that marked changes in IQ scores following 12 months or less of intervention, as reported in some studies, "...are likely due to compliance to test taking itself versus real changes in IQ."

5.2.3 Scoring and Interpretation

The challenges associated with using standardized assessments extend beyond administration to scoring and interpretation when working with individuals with ASD. In particular, there has been strong debate regarding the relevance and validity of normative data. Neisworth and Bagnato (2004) suggested that comparing the results of children with ASD against normative data is generally flawed for tests that have been neither designed nor field validated for this population. In contrast, Perry, Condillac, and Freeman (2002, p. 65) argued that commonly cited concerns regarding the relevance of standardized assessments to individuals with ASD, including the impact of motivation and verbal instructions, are "...little more than myths, unsubstantiated by or frankly inconsistent with the data and with best practices." They suggest that an individual's lack of verbal communication should not preclude use and scoring of items requiring receptive and expressive language, because these items form part of the construct of intelligence being measured (Perry et al., 2002).

In response to concerns regarding comparing individuals with ASD to general population norms, ASD-specific norms have been developed for the Vineland Adaptive Behavior Scales (Carter et al., 1998). Perry et al. (2002) questioned the clinical relevance of these norms, suggesting that little can be learned from knowing where along a spectrum of need a person lies within a population of people with the same need. However, Carter et al. argued that the norms can be useful in educational and vocational planning, where evaluating progress over time may be best done by comparing an individual with ASD to other persons with ASD, rather than the general population. They suggested that using the national standardization sample in treatment planning may lead to unrealistic and unattainably high goals. Irrespective of the approach taken, or the presence or absence of normative data from individuals with ASD, there is an evident need for clinicians and educators to carefully consider the challenges of both administration and interpretation of standardized assessments for pre- and nonlinguistic communicators with ASD.

5.3 Implications for Research and Practice

Considerations of both benefits of using standardized assessments to inform screening, diagnosis, treatment planning, and evaluation for pre- and nonlinguistic communicators with ASD and their serious challenges, lead to implications for clinicians and researchers working with this population. Here, we present these implications as recommendations drawn from the clinical and research literature. Many of the recommendations are consistent with requirements for a good assessment for all individuals with ASD, as outlined at the start of the chapter. Furthermore, the recommendations are consistent with the principles of the Individuals with Disabilities Education Act (IDEA), which governs the provision of services to children and youth with disabilities in the United States, and stipulates that all children with disability should have access to non-biased comprehensive assessment of skills and needs (U.S. Department of Education, 2015). Our aim here is to highlight the specific implications for assessing pre- and nonlinguistic communicators with ASD.

5.3.1 Determine the Purpose of the Assessment

The first step, prior to considering the use of standardized assessments, is to define the purpose of the assessment. Will the assessment be conducted for diagnostic, goal setting, intervention planning, or evaluation purposes? Will the results be used for clinical decision making, as part of research, or both (Kasari et al., 2013)? The answers will help to determine whether a brief assessment or full battery will be required and whether the assessments will need to be repeated over time to monitor the individual's progress (Paynter, 2015). If repeat administration will be required, the test will need to be sensitive to change in pre- and nonlinguistic communicators, without violating procedural requirements, and cater for the individual's age at both the initial and follow-up assessments (Paynter, 2015). For children with ASD who are prelinguistic communicators, an assessment such as the CSBS that focuses specifically on the development of skills within the prelinguistic period (e.g., joint attention, non-verbal communicative acts) may be more sensitive to change than a standardized speech-language assessment targeting a broader developmental period from 0 to 6 years (e.g., PLS-5).

The second step is to consider the information that is already available to avoid unnecessary duplication of assessments that could invalidate the tests used, be inefficient, and most importantly, place unnecessary burden on the individuals being assessed and their families. It is recommended that all relevant stakeholders, including individuals with ASD wherever possible, discuss the options for assessment available and work together to identify the elements for a comprehensive and appropriate battery that is most likely to yield relevant and meaningful information. For example, when assessing an adult with ASD presenting with nonlinguistic

communication skills for the purpose of treatment planning, it is very unlikely that there would be a need to administer a cognitive assessment if this has been done previously, given the fact that IQ has been found to be stable over time (Howlin, Savage, Moss, Tempier, & Rutter, 2014) and any minor change in scores is unlikely to lead to a meaningful shift in intervention approach. By carefully considering the purpose of the assessment and collating all existing relevant information, the standardized assessments that are most appropriate and informative will become evident, and the skills and expertise within the team required to administer and interpret them will be identified (Kasari et al., 2013).

5.3.2 Use Multiple Sources of Information

Obtaining multiple sources of information enhances assessments for any of the following purposes: (a) better understanding of the individual and their family, (b) obtaining or clarifying an initial diagnosis, (c) documenting an individual's diagnosis and support needs in order to access services, or (d) intervention planning and evaluation (Perry et al., 2002). In this way, the assessment process will yield both quantitative and qualitative information about the individual's communication strengths, needs, and participation level across his or her full range of everyday interactions and environments (Texas Statewide Leadership for Autism Training, 2013). Ozonoff et al. (2005) highlighted the risks associated with not using multiple sources of information. They noted that because diagnostic observation measures (e.g., Autism Diagnostic Observation Scale) rely on assessment of current behavior, they may not account for behaviors that occur in other environments, or occurred previously in the individual's developmental history that are relevant to current diagnosis (e.g., regression of communication skills). Similarly, some behavior relevant to assessment may occur too infrequently to be observed during the assessment session. Therefore, parent report will be critical to identifying and understanding these behaviors (Ozonoff et al., 2005). For children who are prelinguistic communicators, for example, this could include the parents' observation of the frequency, forms, and functions of communicative acts that the child produces at home in relation to familiar objects and activities (e.g., requesting favorite DVD by handing it to mum, pointing to a photo of the family dog on the fridge and then to the dog) that are unlikely to occur in the clinic.

But what should a comprehensive assessment of communication skills in prelinguistic individuals with ASD include? In 2006, the National Institute of Deafness and Other Communication Disorders brought together a group of researchers to develop guidelines for evaluating communication development in young children with ASD. The group recommended that assessments include information from three key sources: naturalistic language samples, parent report, and direct standardized assessments (see Tager-Flusberg et al., 2009). They noted that although standardized assessments can be used to assess phonological, grammatical, lexical, and pragmatic aspects of language, very few are available for

children under 2 years of age, while naturalistic language samples will likely yield the most valid information. The group did not consider the availability of standardized communication assessments for nonlinguistic adolescents and adults with ASD, but, as outlined previously, few options are currently available. It would seem then that the use of standardized assessments with prelinguistic communicators with ASD requires supplementation with non-standardized naturalistic methods of assessment, as described in Chap. 6.

5.3.3 Adapt Assessments If Appropriate

In selecting, administering, and scoring standardized assessments, careful consideration is needed of the potential value of adapting administration procedures, keeping in mind that these will invalidate the use of comparative norms. Surprisingly, despite the widespread use of standardized assessments in the ASD research literature and general acknowledgement of the challenges, to date few researchers have provided specific examples of the challenges faced in administering standardized assessments to individuals with ASD or suggested practical adaptations for doing so. An exception was provided by Matson and Smith (2008, p. 69) who noted

> . . .we have anecdotally had considerable difficulty in obtaining usable IQ data at initial intake for many children with ASD that we assessed. Children often will not make eye contact, do not show the necessary level of compliance with the task, and in other ways fail to comply with testing. It is doubtful that we are the only researchers who have encountered this problem.

Fortunately, there is growing acknowledgement of the issue. Paynter (2015), for example, put forward a series of recommendations for adapting standardized assessments with children with ASD. The following is a summary of her recommendations:

- Prior to the assessment:
  - Select a time and location for testing that is most likely to best "fit" the individual's and his or her family's needs, preferences, and routine. The goal here is to cause minimum disruption to regular activities so as to avoid or reduce anxiety that may impact on the assessment experience and outcomes.
  - Consider the assessment environment, including avoiding any sensory sensitivities (e.g., fluorescent lights, busy waiting rooms) the individual may have. Note that if the purpose of the assessment is to diagnose ASD, the presence of these behaviors will be relevant to diagnosis and so should be managed rather than avoided completely.
  - Provide the individual with a social story prior to the assessment that explains, using pictures, what will occur during the session.
  - Prepare assessment materials (e.g., toys in the test kit) in a way that will reduce the time between administration of each item.

- During the assessment:
  - Use a visual work schedule to help support the individual's comprehension of what will happen during the assessment. Reinforcers for on-task behavior and completing work can be provided at regular intervals, but should not be provided contingent upon the child's response to test items.
  - If necessary, reduce or remove distractions in the assessment room (e.g., pot plants, pencil holders) and arrange the furniture to help organize and settle the individual (e.g., placing table against a wall to create a natural barrier on one side).
  - If necessary, ask a parent, teacher, or significant other to be responsible for managing any off-task or challenging behavior so that the assessor can focus on item administration. Agreement will need to be reached prior to testing on what this person is and is not able to do during the session, to avoid providing prompts that may invalidate the assessment.
  - Given that an individual with ASD may not be motivated to complete test items in order to please the examiner, identify reinforcers that are specific to the individual that are likely to motivate him or her to complete test items. However, it is recommended that these items not be related to special interests or highly desirable items that the individual may not be willing to relinquish in order to complete the next item.
  - Use breaks within the assessment to reward on-task behavior, rather than waiting for challenging behavior to occur.
  - Encourage the individual to assist with packing away test items, to avoid distraction between administering items and consider using a "finished box" to signal the completion of items.
  - In situations where the assessor (or parent/significant other) suspects that the individual being assessed may respond to an alternative administration of the item (e.g., by simplifying language or using a phrase used at home instead of that stipulated in the administration booklet), consider first administering the item according to the manual, and then administering the adapted instruction.

Perry et al. (2002) also proposed adaptations that may be appropriate when administering standardized assessments to individuals with ASD that they consider to be valid. These include (a) allowing parents and significant others to be present during testing; (b) administering the assessment on the floor, table, or elsewhere in the room; (c) starting at the point in the scale that is most likely to increase participation in testing rather than determining the basal in the prescribed manner; (d) providing the instruction as per the manual, and then an adapted instruction, to "test the limits"; (e) replacing an object in the test kit with a preferred object to increase motivation and compliance, in cases where the individual's action on the item is relevant rather than the object itself; (f) providing gentle physical prompts to encourage the individual to engage with the test stimulus (e.g., helping child form pointing finger in a picture identification task); (g) teaching the process of completing the task through several repetitions with reinforcement prior to administering the items; and (h) completing testing over multiple sessions.

Perry et al. (2002) argued that such adaptations are valid because they enable the assessor to determine if the individual has the skill rather than if she or he can produce the skill under a set of specific conditions. Further, the use of adaptations reduces the impact of irrelevant and arbitrary factors (e.g., sensitivity to fluorescent lights) that are not relevant to the assessment of the skills in question. By giving the individual every opportunity to demonstrate the skill under both standardized and adapted conditions, Perry et al. suggested that parents and significant others may be more accepting of the validity of the results, thereby making them more socially relevant. Furthermore, they suggested that this approach to assessment ensures that clinically useful information about the person's skills and needs, the level of support required to complete tasks, and responses to teaching, is collected. For pre- and nonlinguistic communicators with ASD who may struggle to complete standardized assessments, this ecologically valid and clinically relevant information is likely to be the most useful information to arise from the assessment for the purposes of intervention planning.

5.3.4 Interpret Results Accurately

Paynter (2015) and Perry et al. (2002) both emphasized that adaptations to the standardized administration procedure should be recorded, with items administered in an adapted manner possibly excluded from scoring, and that results need to be interpreted accordingly. Yet, even if no adaptations are used, the interpretation of standardized assessment results for pre- and nonlinguistic communicators with ASD requires substantial expertise. Clinicians require a sound knowledge of psychometric testing principles as well as the knowledge, skills, and experience necessary to translate findings into clinically relevant findings and recommendations.

According to Kasari et al. (2013), it is important not to place too much emphasis on standard scores when interpreting the test results of minimally verbal individuals with ASD, including those who are pre- or nonlinguistic. They noted that an individual may perform differently on two tests of the same construct (e.g., IQ), depending on the skills they have been taught, such as in their early intervention program (e.g., being taught to follow instructions using Applied Behavior Analysis), and the test requirements (e.g., whether it requires the child to follow a series of instructions or to engage in semi-structured play with materials). Instead, they suggested that raw scores may be more useful in charting progress over time, as long as these pertain to clinically relevant behaviors (e.g., number of words produced, as measured by the McArthur Bates Communicative Development Inventories). Both pros and cons have been reported regarding the use of age-equivalent scores for determining the extent of developmental delay and measuring progress for individuals with ASD. A benefit of age-equivalent scores is that they provide a descriptive index for a child's development, even in situations where a child does not obtain a proper basal (Paynter, 2015). However,

age-equivalent scores are inappropriate for older children, adolescents, and adults, and it appears to have been generally accepted that they should not be entered into statistical analyses (Kasari et al., 2013; Paynter, 2015; Perry et al., 2002).

Central to the need for accurate interpretation is the importance of providing accurate, timely, sensitive, and informative feedback on assessment results to parents, caregivers, and significant others. Due to the challenges of using standardized assessments with pre- and nonlinguistic communicators, the assessment process can be difficult for parents and caregivers. Standardized assessments tend to highlight the difficulties the person is experiencing, the structured environment may lead to an increase in challenging behaviors, and parents and caregivers may question the validity and relevance of the tools being used. Consequently, it is imperative that parents and caregivers collaborate on the selection of assessment tools; that the purpose, benefits, and limitations of each assessment tool be discussed prior to administration; and that results be interpreted and translated into clinically-relevant terms. The presentation of test results, whether they be standard, raw scores, or age-equivalent scores, or some form of growth score, requires consideration with reference to the individual's use of the behaviors in question in everyday contexts.

In order to consider the real-life implications and meaning of assessment results, multiple sources of information are required. However, Ozonoff et al. (2005) noted that there may be disagreement in the findings across these multiple assessments with regard to the individual's strengths, needs, current functioning, and level of participation. To illustrate, parents might report that a child uses a verbal label for a favorite toy at home, even though childcare center staff have never heard it. Similarly, parents might report more frequent episodes of challenging behavior if they are experiencing personal stress at home, than are reported by staff in an early intervention center. Ozonoff et al. suggest that these should be treated as separate pieces of information that are all equally relevant in establishing a comprehensive and accurate picture of the individual being assessed.

5.4 Conclusion

Standardized assessments have an important role to play in assessing the learning needs and outcomes for prelinguistic and nonlinguistic individuals with ASD. They have the potential to improve screening and diagnosis accuracy, to help build a detailed picture of each individual's learning strengths and needs, and to contribute to treatment decision making and evaluation. However, for individuals with pre- and nonlinguistic communication, a number of issues need to be considered regarding the selection, administration, interpretation, and reporting of information gained through standardized assessments. A key challenge facing clinicians is the lack of standardized assessments for nonlinguistic adolescents and adults with ASD. It is recommended that, where available, the use of standardized assessments should form just one aspect of a holistic and collaborative assessment, conducted with a

clear purpose and requiring (a) multiple assessment tools, (b) the involvement of all key professionals and stakeholders, and (c) to the extent possible, the direct involvement of the individual with ASD. Such an approach is likely to lead to a well-informed, respectful, and ultimately successful approach to promoting the learning, independence, well-being, and social participation of each individual with ASD and his or her family.

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