Assessment Considerations for College Students With Autism Spectrum Disorder

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As more students identified with autism spectrum disorders (ASD) graduate high school and aspire to a college education, the need for intervention and support targeted to their needs has become apparent. Designing effective programs of support rests on comprehensive and appropriate assessment. This article provides a critical review of areas to consider in clinical assessment of language, communication, and related areas by the speech–language pathologist working with adolescents and young adults attending, or planning to attend, postsecondary education. Findings of this critical review indicate a growth in research investigating speech, language, communication, and social abilities in adults with ASD. Although the literature provides relatively little explicit evidence for selecting assessments for adults with ASD, the research does provide guidance on areas important to include in a comprehensive assessment. Guidance for planning an assessment, including both formal and informal tools, is provided. Key words: ASD, autism, college students, assessment, transition

As the population of young adults with autism spectrum disorders (ASD) grows (Centers for Disease Control and Prevention, 2015), more individuals with ASD are on a path toward earning a college degree. Although intellectual disabilities and behavioral challenges may preclude enrollment in postsecondary education for some students with ASD, others are intellectually and otherwise capable of performing in a college environment. They can and should be encouraged to pursue higher education.

To maximize the chances of success and avoid setbacks, prospective students with ASD may need individualized supports and interventions (Hewitt, 2011). To establish a clear direction for designing interventions, assessments must be planned to garner information that will be relevant. Transition planning for post-high school is mandated for students with disabilities by the age of 16 years, so there is an opportunity for targeted assessments in high school. Assessment also could be provided in colleges and universities with programs in speech–language pathology or by private practitioners who work with adolescents and young adults.

The need for better services, more research, and evidence-based clinical guidelines is now widely recognized and is beginning to receive more attention from funding and advocacy groups (e.g., Autism Speaks offers a Community Grant in Young Adult/Adult Services; Autism Speaks, 2015). Couzens et al. (2015) discussed the state of support for college students whose disabilities may appear to be hidden, including autism. They reported that assessments in general are difficult to obtain, expensive, and often inadequate for planning appropriate supports. Although research remains in its infancy, resources are beginning to be developed targeted to the unique needs...
needs of adults (e.g., Simone, 2010; Winner & Crooke, 2011) and to enhance resources for transition planning (Filler & Rosenshein, 2008).

No standardized protocol exists currently for assessing adults with ASD in relationship to the language and communication demands of postsecondary education. Therefore, this article aims to provide background information and an overview of research pertinent to understanding areas of potential challenge for young adults with ASD. The goal is to help practitioners focus on potential need areas as documented in the literature. To the extent possible, the article also provides a review of the existing evidence regarding appropriate instruments for assessing language, social cognition, and related areas within the scope of practice of the speech–language pathologist (SLP). It also discusses other assessments potentially relevant for which evidence is lacking. Finally, it provides guidance for when referrals may be needed for additional assessments in areas pertinent to college success and independent functioning that lie outside the scope of practice of speech–language pathology.

FUNDAMENTAL CONSIDERATIONS FOR SUPPORTING COLLEGE STUDENTS WITH ASD

In planning to provide services for young adults on the autism spectrum, often a comprehensive assessment is needed, as assessments conducted in secondary school may be outdated and/or not have sufficient detail to develop a plan for supports and potential intervention. The following areas are important to consider, although not all students will need a comprehensive evaluation in all areas: speech sound disorders; voice, resonance, and prosody; fluency; language and communication; cognitive aspects supporting communication and adaptive functioning (e.g., executive functioning; attention); and psychosocial aspects, including independence and knowledge of college expectations.

In planning an assessment for an adult on the autism spectrum, the aforementioned areas provide an outline of potential need areas for the SLP to consider in developing an assessment protocol. In some areas, there may be a need to refer students to other professions (e.g., related to psychological diagnoses such as attention-deficit disorders [ADD]). In addition, developing a suitable plan of action requires consideration of a student’s unique characteristics and circumstances, including special interests, career aspirations, previous experiences in independence in the community, capacity for self-management and self-advocacy, and the impact of any comorbid disorders. Formal and standardized testing can be relevant in understanding patterns of strengths and challenges. Given the broad spectrum of profiles present in individuals with ASD, informal assessments individually crafted for a student’s unique circumstances will be cornerstones of effective plans for supports.

SPEECH DISORDERS

Speech sound disorders

Among individuals with ASD who do not have concomitant severe disabilities, articulation and phonology have been described as relative strengths, with error rates among children not outside those reported for the general population (Kjelgaard & Tager-Flusberg, 2001; Shriberg et al., 2001a). Shriberg et al. (2001a) found residual errors to be more common than expected, however, in adolescents with ASD, with 33% qualifying as showing persistent speech sound disorders. Cleland, Gibbon, Peppé, O’Hare, and Rutherford (2010) found not only that some children with ASD had articulation disorders but also that those scoring within normal limits on standard scores on a test of articulation showed residual errors. Some of these were nondevelopmental errors such as nasal emission on stops. In general, it is expected that all speech sounds would be acquired by middle childhood, so any persistent errors in adults
are of concern. A review of the literature conducted by Flipsen (1999) showed that among studies using the strongest methods to investigate persistent speech sound errors in individuals with a history of speech sound disorder, approximately 2% showed persisting errors into young adulthood. Thus, it is important to assess current status even in individuals who may not have been receiving intervention.

Individuals with residual errors in the later developing phonemes such as /r/ may or may not present with intelligibility concerns, but atypical speech sound production is likely to place students at a disadvantage in social and professional interactions. Thus, all residual phonological/articulatory errors are of concern. The findings of Cleland et al. (2010) support a careful analysis of errors to uncover any unusual patterns. Practically speaking, it is urgent to address significant intelligibility issues, as such deficits may substantially limit vocational opportunities. Individuals with ASD may have had years of therapy previously, or perhaps minor articulation errors were never addressed. In preparation to give the best possible start to a college experience, assessment of speech sound disorders is warranted. There remains the possibility that, despite limited guidance in the literature for treatment in adults with ASD, newer approaches to remediation using technology might result in improved outcomes if never tried before. Further encouragement for exploring this area is the emerging evidence in the broader population of individuals with speech sound disorders, suggesting visual approaches such as ultrasound-based treatments may have merit for persistent errors (Byun & Hitchcock, 2012; Cleland, Scobie, & Wrench, 2015; Hitchcock & MacAllister Byun, 2015; Lipetz & Bernhardt, 2013; Preston, Brick, & Landi, 2013).

Best practice in assessing phonological-articulatory ability would entail the elicitation of phonemes via single-word probes as well as the collection and analysis of connected speech samples. Connected speech provides sufficient data to perform a complete analysis that single-word elicitations cannot support (Miccio, 2002). Data on percent consonants correct (PCC) through the age of 18 years range from 97.5% to 99.2% in a connected sample of 100 unique words (Austin & Shriberg, 1997, as reported by Rvachew & Brousseau-Lapré, 2012). Thus, it would be expected that college students should be close to ceiling and a PCC score below 98% would indicate cause for concern. Rvachew and Brousseau-Lapré (2012) offered a comprehensive resource for collecting and analyzing language samples for PCC and many other phonological measures, as well as guidelines for identifying treatment targets, which can be a useful resource in developing appropriate assessments for adults, despite the lack of normative information.

**Voice, resonance, and prosody**

Differences in resonance, including hypernasality, vocal quality, and prosodic impairment, have been reported in ASD (see Paul, Shriberg, et al., 2005, for a review). Paul, Shriberg, and colleagues list “monotonic or machine-like intonation, aberrant stress patterns, deficits in pitch and intensity control, and differences in voice quality” (pp. 861–862) as features seen in ASD. Yet, although clinical descriptions of prosody and related areas in ASD often emphasize unusual patterns as a feature of the disorder, research has found mixed results, where many aspects of receptive and expressive prosody are not distinguished from typically developing peers (Diehl & Paul, 2013; Filipe, Frota, Castro, & Vicente, 2014; Globerson, Amir, Kishon-Rabin, & Golan, 2015; Paul, Augustyn, Klin, & Volkmar, 2005).

According to Carpenter (2013), “abnormal volume, pitch, intonation, rate, rhythm, stress, prosody or volume in speech” (p. 2) could be considered an exemplar for the DSM-5 (American Psychiatric Association, 2013) diagnostic criterion of “poorly integrated verbal and nonverbal behavior.” The Autism Diagnostic Observation Schedule-2 (ADOS-2) includes an item on *Speech Abnormalities Associated With Autism*. Features listed in that item include intonation, volume, rhythm,
and rate. The scoring for a 2 (most abnormal) includes speech that is slow, rapid, jerky, and/or with inappropriate pitch and stress (Lord et al., 2012). Yet, this is not an item that is included in the diagnostic scoring algorithm for the test, suggesting that prosodic impairment is not sufficiently pervasive to be used as a diagnostic feature of ASD. Its presence on the test, on the contrary, speaks to concern that the test authors find it relevant to consider as part of a diagnostic total picture.

Both production and receptive processing of stress patterns may be affected in ASD (Paul, Shriberg, et al., 2005). Such a deficit leaves students with ASD at risk for failure to produce intelligible utterances if stress is unmarked or incorrectly marked, as well as to understand information carried by stress. Stress is an important feature of lexical organization in English, and specific attention to its properties has been documented in typically developing infants as young as 8 months (Skoruppa, Cristia, Peperkamp, & Seidl, 2011).

Researchers are beginning to document adverse adaptive effects of difficulties with prosody. Paul, Shriberg, et al. (2005), for example, found that stress and resonance differences adversely affected listeners' perceptions of the communicative competence of individuals with ASD. Overall, the literature indicates that prosody is potentially of significance and therefore the SLP is advised to include a description of prosodic capabilities and any anomalies.

A formal assessment instrument for prosody was devised by Shriberg, Kwiatkowski, Rasmussen, Lof, and Miller (1992), the Prosody-Voice Screening Profile. This has been applied to individuals with ASD in several studies (Paul, Shriberg, et al., 2005; Shriberg et al., 2001b). A technical report describing this measure is available for download at http://www.waisman.wisc.edu/phonology/pubs-tech.html. The dimensions used in this instrument for prosody are phrasing, rate, and stress. The dimensions for voice are loudness, pitch, and quality (laryngeal and resonance). Reference data are available in the technical report, and further information on clinical application is available in McSweeny and Shriberg (2001). One drawback may be that extensive training is needed to obtain reliability on the protocol; in the absence of such training, clinicians may still find utility in examining a speech sample using the parameters identified by the authors of this instrument and reporting findings using these categories.

**Fluency**

Recent research has begun to provide evidence to support the clinical impression that three types of disfluencies occur at higher rates in the population with ASD than in the typical population (Scott, Tetnowski, Flaitz, & Yaruss, 2014; Shriberg et al., 2001b; Sisskin & Scott, 2007; Sisskin & Wasilus, 2014). Shriberg et al. (2001b) and Scott et al. (2004) both found that adolescents with Asperger syndrome (as it was then called) showed stuttering disfluencies. Children and adults with ASD exhibit both stuttering-like and non-stuttering-like disfluencies, as well as atypical disfluencies, particularly word-final stuttering and word insertions. The latter two are rarely seen in individuals who do not have ASD. For individuals noted to exhibit disfluencies, an assessment should be conducted to determine their frequency and whether they are stuttering-like, non-stuttering-like but above expected frequency, or atypical. Scott et al. (2014) described an expository text-based elicitation protocol that they advocated as a taxing context calculated to stress the capacity of the system. Their rationale was that it, therefore, would be most representative of contexts that might negatively affect fluency. Participants viewed a science video and were provided the following instructions:

For this part, you’re going to tell me about the video. You’re going to try to tell me as completely as you can. You’re going to try to talk for about five minutes. Some of that time you may be thinking, and that’s just fine. Anything they told you about or showed you on the video, or anything you heard about or saw on the video is fair to talk about. Whenever you are ready you can start. (Scott et al., 2014, pp. 80–81)
Scott et al. (2014) analyzed the resulting samples. They also scored the Stuttering Severity Instrument–Third Edition (Riley, 1994), which requires a read passage and a conversation. They cautioned, however, against relying on this instrument alone for assessment, as they found, along with others, that this may overidentify stuttering in children with ASD.

Although the literature on intervention for stuttering in ASD is sparse, Brundage, Whelan, and Burgess (2013) reported a case study showing a positive response to stuttering therapy in an adult with ASD. The importance of attending to fluency issues is underlined by the potential that exists for increased detrimental impact on adaptive functioning when stuttering is mixed with the social-pragmatic communication disorders seen in ASD. For example, in the author’s clinical experience, a student on the spectrum was a junior in college before he would order food at a restaurant on his own, owing to fear of stuttering. Such case reports support the importance of considering fluency when completing an assessment of readiness for independent living in a campus environment.

LANGUAGE DISORDERS

Fundamentals: Morphology, syntax, and semantics

It was common in years past to hear statements that language in individuals with ASD would be expected to be commensurate with IQ. Tager-Flusberg et al. (1990) summarized the literature at that point as showing a consensus that “autism does not involve a primary impairment in either phonology or syntax” (p. 2). Furthermore, their findings in early language development supported this conclusion. Since that time, however, the presence of comorbid language impairment in a subset of the population with ASD has been documented. Kjelgaard and Tager-Flusberg (2001) investigated language abilities in children with ASD from the ages of 4 to 13 years and found that even among their participants with IQs within the normal range, a substantial number showed impairments in vocabulary and syntax. Despite the evidence for potential language impairment in ASD, evidence-based formal and informal means of assessment for adults are lacking. Santhanam and Hewitt (n.d.) in a systematic review of the language assessment literature for ASD found only two articles between 1995 and 2013 that included adults as participants. There is a clear need for more research on language and communication among adults with ASD, both basic and clinically applied.

Despite the gap in the literature, formal language assessments may yet be helpful in identifying areas of strength and challenge in fundamentals of language. Tests that go across the entire age range are rare, with more choices for vocabulary (the Peabody Picture Vocabulary Test–4 [PPVT-4], Dunn & Dunn, 2007, and the Expressive Vocabulary Test–2, Williams, 2007, for example) than for morphosyntax, with many tests only normed up to 21 (the Comprehensive Assessment of Spoken Language [CASL], Carrow-Woolfolk, 1999, and Clinical Evaluation of Language Fundamentals-4, CELF-4, Semel, Wiig, & Secord, 2004, are examples). For traditional college-age students, these assessments fall within their age ranges; for older students, they could be used in a nonstandardized way, comparing results with norms for the oldest age ranges for the test. Although results of broad-brush formal language testing are not necessarily informative for goal development, documentation of language weaknesses would be important in planning and provide direction for further probing using language sampling.

It must be noted that any application of a formal assessment to individuals with ASD must take into account whether it has been appropriately normed on the population. Although most test makers employ full-range sampling (McFadden, 1996), which includes individuals with disabilities such as ASD, the reality is the actual number of individuals with ASD sampled in any test is small. Consider, for example, PPVT-4. For the age ranges...
2–18 years, the total number of participants with ASD included in the norming sample was four (Dunn & Dunn, 2007). Nonetheless, for participants able to tolerate the fatigue and boredom of a lengthy set of battery-type tests, relevant basic information on their language abilities may be obtained.

A new option that may have promise for beginning college students with ASD is the Test of Integrated Language and Literacy Skills (TILLS; Nelson, Plante, Helm-Estabrooks, & Hotz, 2016). The TILLS is standardized for students from the ages of 6 through 18 years. The authors report a special study in the technical manual conducted with 79 students with ASD (mean age = 12 years 3 months; range = 6 years 2 months to 18 years 8 months) compared with an age- and sex-matched group of 79 students with typical development (12 girls and 67 boys in each group). Results showed that many subtests of the TILLS were sensitive to the language difficulties of the students with ASD, with the lowest scores earned on Social Communication, Vocabulary Awareness, Story Retelling, Listening Comprehension, and Reading Comprehension, all of which have implications for students preparing for college.

The major reason to explore language abilities further in fundamental realms is to uncover subtle deficits that may impede college success. Students attending colleges that employ an admissions process will have taken standardized tests of aptitude, such as the SAT, or attainment, such as the ACT. These are likely to screen out individuals with continuing frank deficits in vocabulary and syntax. Whether subtle deficits exist that could have an impact is, however, worthy of consideration. As noted earlier, formal testing is not best suited for uncovering subtleties. Individuals with a history of language disorders, and/or literacy impairments suggestive of underlying language weaknesses, are more likely to benefit most from detailed probes. Literature on late-developing aspects of semantic and morphosyntactic development may shed light on areas fruitful to examine.

Speech-language pathologists planning to conduct informal probes can draw on a literature for adolescents, including individuals with ASD. As summarized by Nippold (2014), during adolescence, gains are seen in “abstract nouns, adverbal conjuncts, metacognitive verbs, and morphologically complex nouns and adjectives” (p. 27). All these elements are prominent in literate language and important in higher order literacy required for reading and writing in college. Nippold (2014) offers suggestions for sampling in contexts such as expository text that might be helpful for probing literacy-related linguistic knowledge. Another potentially relevant task is described by Nippold (2014), the Peer Conflict Resolution Task (Nippold, Mansfield, & Billow, 2007). This task involves responding to a scenario in which peers are involved in a conflict. It can elicit higher level language using abstract vocabulary and structures and also higher order social communication reasoning, relevant for assessing pragmatics.

A detailed language sample analysis focusing on morphosyntax could examine length of utterance in words, T-units, or C-units, clausal density, and clause types (e.g., nominal and relative clauses have been shown to be particularly challenging for individuals with language impairments; Nippold, Mansfield, Billow, & Tomblin, 2009). Scott (2014) offered a thoughtful perspective on what should be addressed in later language development with adolescents—one might extrapolate her remarks into the early college years and possibly into adulthood. Higher order syntax, especially within expository text contexts, are two areas that she argued need attention to prepare students for academic success. In the semantic realm, abstract and literate vocabulary is functionally critical for college success; Nippold (2014) summarized research on metacognitive verbs, which have been shown to lag in development in adolescents and young adults, including those with ASD. Suggestions for assessment and guidelines for normative information for language sampling for adolescents can be found in Nippold (2014).
and in the advanced language chapters of the textbook by Paul and Norbury (2011).

As emphasized throughout this section, the impact on literacy and overall academics of unaddressed language impairments is potentially serious. In my clinical experience, we have not identified morphosyntactic or vocabulary goals as critical need areas in college students on the spectrum. I could not say whether this reflects that by chance students referred to our clinic have relatively strong skills in these areas or that the needs in other areas are so great as to overshadow their language deficits. Examination of the most recent clinical goals and educational supports the student had in high school is one way to focus on areas of weakness. Furthermore, as noted earlier, college admissions procedures may screen out students with significant language disorders. Not all colleges use selective admissions procedures; therefore, if a clinician is consulting with students admitted to open admissions colleges and community colleges, the profile of students might be markedly different from that in selective institutions. In that case, closer scrutiny of language fundamentals would be warranted.

Pragmatics, social communication, and social knowledge

Social challenges and pragmatic deficits are among the core impairments of ASD (American Psychiatric Association, 2013); they are also among the most difficult to quantify. Adults with ASD may present with adequate skills in one-on-one conversations focused on their concerns or topics of interest to them. In other settings, however, where more subtle social rules apply and there is no clear discourse structure, deficits may be much more clear. In my clinical experience, it is not uncommon to have a student referred to our clinic who appears very competent in an initial interview. Yet, these same students are struggling to make friends, to communicate with professors, or to successfully participate in team-based class assignments. Thus, deficits may exist that are not apparent on the surface.

Winner (2011) described a spectrum of ability in ASD in perspective taking, where students with ASD going to college would usually fall under her category “Impaired Interactive Perspective Takers.” For individuals with this profile as described by Winner (2011), basic perspective taking in predictable environments has been mastered, in that they may know there are social rules to follow and that other people have points of view that may differ from their own; yet, in fluid and complex social environments, they show difficulties, which are often most apparent in negotiating interactions with their peers. Winner (2007) has developed a “double interview” protocol that can assist in evaluating an adult’s ability to engage in appropriately sophisticated reciprocal engagement. In this protocol, many college students with ASD experience no difficulty in the first half of the interview where they are required to respond to questions about themselves. When the tables are turned, however, most adults with ASD, as reported by Winner (2007) and also in the author’s clinical experience, cannot conduct a similar interview of the clinician about the clinicians’ interests and experiences. Although this is not a standardized assessment, this format provides an efficient way to assess pragmatic abilities descriptively in a challenging task.

To probe sophisticated language abilities, developing realistic tasks relevant to everyday functioning is important. The Peer Conflict Resolution task of Nippold et al. (2007; also described in Nippold, 2014) referenced earlier is one such task. Another fruitful discourse context for pragmatic assessment is a mock job interview. These offer a context that can be intrinsically motivating to students, as it usually fits well with their own aspirations for internships and jobs. A wide range of abilities is needed in a job interview. Individuals with ASD may perform poorly due to difficulty understanding the point of view of others. They may also be challenged to inhibit their desire to focus exclusively on their own interests and opinions. The ability for social-emotional reciprocity that is one of the core impairments

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in ASD can interfere with the ability to determine what information is relevant. During a job interview, the interviewee must reflect on what is appropriate as well as what might be of interest and impressive to the interviewer. For example, one student in a mock interview for a job at a hardware store stated that her "intelligence and logical reasoning abilities would enable her to assist customers in the most efficient manner." Although such a talent is impressive and possibly relevant, the way the student worded it makes her appear arrogant; moreover, the choice of words is pragmatically off in someone seeking a retail sales position. In another example from my clinical experience, a student started talking about why he hated Shakespeare during a mock interview for a geology internship position. This student struggled both with communicative reciprocity and perspective taking, as well as impulse control and knowing when humor is appropriate. These two students were overly loquacious, but others may have difficulty coming up with enough to say, yet be unaware that brief replies may be interpreted as lack of interest in the job.

Although unstandardized, an informal protocol of this nature can reveal deficits that would not be seen in a less sophisticated task. Moreover, information gleaned from challenging discourse tasks can be germane to formulating clinical goals. Most college students with ASD are anxious to secure internships and jobs and are keenly aware of the importance of interviews. Students reluctant to engage in learning to engage in purely social discourse, out of a disdain for "small talk" and social niceties, may be quite willing to work hard to present themselves well in an interview context. The benefit of social skills in connecting with others who do not interest them may not be obvious, but gainful employment is a social context that speaks to their desires for self-determination and independence.

An emerging literature on narratives in language assessment for ASD suggests that this is another context that can offer insight into higher order pragmatic competence. Research on fictional storytelling has for the most part shown that ability to include obligatory story grammar elements in children with ASD is on par with age-matched peers, although work investigating comprehension of fictional narrative has shown deficits relative to controls (see Barnes & Baron-Cohen, 2012, for a review). To try to resolve these apparently conflicting findings, Barnes & Baron-Cohen (2012) reexamined previously collected fictional narratives of adults with ASD and controls using a more detailed coding scheme. Their codes were devised to determine whether story retell elements related to key "big picture" aspects of a story or were micro details. For example, a detail that "the floor was white tile" would receive a lower score than "it takes place in a hospital room," because the latter would capture an important aspect of setting missed by the former. They found that adults with ASD told narratives with fewer elements scored as capturing "big picture" aspects. The participants with ASD provided accurate details, but compared with typical controls, the details were more often delinked from the overall story plot. If a clinician elects to analyze a fictional narrative sample, Barnes and Baron-Cohen's (2012) coding scheme may provide more insight than typical story grammar analyses.

An alternative to fictional elicitations in narrative assessment is to elicit a narrative of personal experience (McCabe & Rollins, 1994). Narratives of personal experience at first blush might seem easier than fiction, as they are drawn from participants' own prior experiences. However, recent work indicates that this genre may prove more challenging than fiction. The structure of narratives of personal experience must be generated by the teller, whereas the structure of fictional stories is predetermined. Moreover, a narrator must consider what details to share of his or her experience by considering the listener's prior knowledge, likely interest in the topic, and what is "newsworthy" to share. These decisions require subtle social knowledge and perspective-taking abilities that are core deficits in ASD (McCabe, Hillier, & Shapiro,
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Rollins (2014) found that adults with ASD showed difficulty with this task and provides an assessment technique to elicit and analyze personal experience narratives of adults.

In addition to language sample-based and informal assessments of pragmatics, there are some options for standardized testing. Formal tests of pragmatics per se normed for adults are scarce (e.g., the Test of Pragmatic Language is only normed through the age of 18 years; Phelps-Terasaki & Phelps-Gunn, 2007). Tests of social skills are more widely available, and some have adult norms, for example, the self-scoring Social Responsiveness Scale (Constantino & Gruber, 2012), a scale designed to measure symptoms associated with autism. The CASL (Carrow-Woolfolk, 1999) is normed through the age of 21 years and thus may prove useful, especially the subtests on inferencing, pragmatic judgment, and meaning from context. Occasionally, clinicians may elect to use an assessment that is not normed for the age of the client being assessed in order to have a formal protocol to examine. The research literature uses the raw scores from the Inferencing subtest from the Test of Language Competence–Expanded (Wiig & Secord, 1989) to investigate inferencing in adults (see, e.g., Bodner, Engelhardt, Minshew, & Williams, 2015). Inferencing overall and especially in social-emotional contexts has been shown to be affected in ASD (Bodner et al., 2015). This might be considered an aspect of receptive pragmatics, and use of the items in this test in this informal way may prove informative, especially if students score below the norms for the oldest age group on which the test was normed.

One means of nonstandardized assessment that does not require the clinician to devise materials from scratch is to draw on handouts and other tools used in intervention for social communication and cognition. For example, Winner (2005) offered a set of worksheets in the realm of what she termed social thinking, many of which might be adapted to assess pragmatic and social communication knowledge. Some of these worksheets ask the student to rate what is expected versus unexpected in a range of pragmatic contexts, and such worksheets could baseline the student’s ability to show insight into others’ perspectives. Baker (2006) offered a set of complex social scenarios designed to enhance social communication and prosocial behavior in adolescents and adults on the spectrum, and scenarios from such materials could be devised as baseline probes in an assessment of social knowledge.

Assessing nonverbal communication also may be important in a comprehensive overview of pragmatic abilities. Aspects of prosody and fluency may affect nonverbal communication, so careful description of those realms would be called for as noted earlier in the section on speech disorders. For example, eye contact may be affected not just by ASD but also by secondary behaviors related to stuttering. A purely descriptive approach to assessment of nonverbal communication would be the only alternative for expressive aspects, as formal tests are scarce or absent. In addition to eye gaze, assessment should consider aspects such as posture, proximity to listener, whether facial expressions of a variety of emotions are directed to the listener, as well as overall demeanor and affect. Particular attention to gestures may be warranted, as deficits in emphatic and descriptive gestures are highly diagnostic of ASD (Lord et al., 2012); descriptive gestures depict the referent in some manner (e.g., indicating size or direction); emphatic gestures accompany speech but do not have a particular referent (e.g., tapping the table for emphasizing a point); and conventional gestures are those that are socially determined in each culture (e.g., waving for a greeting). The smooth and natural integration of gestures into discourse assists the speaker in engaging the listener and may be overlooked in favor of more obvious aspects of pragmatics.

Receptive processing of nonverbal cues may be equally if not more important than their expression, given the importance of nonverbal signaling in complex social interactions. Ascertaining abilities in this realm is...
more challenging. One test that has been devised for facial expression is the Reading the Mind in the Eyes Test (Baron-Cohen, 2001). This is available on the Web at various sites (e.g., https://www.questionwritertracker.com/quiz/61/Z4MK3TKB.html; note that this site sends users to Facebook to share with friends, so use with caution in a clinical setting). It provides total correct score, mean correct score for adults, and mean correct score for adults with ASD. It also provides immediate feedback visible to the test taker on correctness as items are answered. Results may prove helpful in working with clients toward better understanding of what they may be missing in human interactions and may prove a good starting point for helping them understand the utility of honing skills in this area. Other more informal means for assessing knowledge of nonverbal cues might be devised using live demonstrations or videos. Whereas such an approach suffers from difficulty of interpretation lacking normative guidance, the use of video self-modeling is an emerging evidence-based practice for fostering language and social knowledge development in ASD (Bellini & Akullian, 2007). Baselining performance using video in the discourse contexts selected for pragmatic assessment could be a useful means for determining a client’s insight into his or her strengths and weaknesses, and what direction therapy should take.

**Language learning disorders and literacy**

As noted by Kjelgaard and Tager-Flusberg (2001), language disorders may be present in individuals with ASD and thus language-based literacy impairments may be present. Weaknesses in executive functioning and central coherence (Happé & Frith, 2006; Semrud-Clikeman, Fine & Bledsoe, 2014) may lead to difficulty with complex tasks requiring cognitive flexibility, and higher order college-level reading and writing certainly qualify as such tasks. Some individuals may not be diagnosed with learning disabilities prior to college, perhaps because they were not sufficiently challenged by curricula in their K–12 education. An undiscovered weakness may emerge when they confront higher order college expectations. Undiagnosed, previously unknown literacy disorders/weaknesses may be revealed as reading and writing tasks become more complex. Thus, a full battery of assessments targeting literacy may be warranted, especially if a student is showing early signs of struggle in courses requiring a lot of reading and writing.

Of particular note for clinicians seeking to address language impairments and literacy is the newly published **TILLS** (Nelson et al., 2016). As noted previously, the **TILLS** has norms through the age of 18 years and thus has the potential to be used with first-year college students normatively. For those with ongoing higher order literacy concerns, even in the absence of normative information, it may be useful as a descriptive measure. See Richards (2015) for more on writing in college students with disabilities.

**COGNITIVE AREAS SUPPORTING COMMUNICATION**

As noted earlier, executive functioning deficits have been documented in ASD. Such deficits may have a significant impact on college success (Hewitt, 2011). The first year of college involves adjusting to novel environments and much lower structure than that in high school. As students enter into this new place with an exponential increase in expectations for self-determination, they must use their resources to make decisions about managing their day-to-day lives that often were never in question when living at home. They may have a wide range of choices on basics such as where and when to eat. They may not have the skills or awareness to take care of their belongings, including looking after expensive items such as phones and laptops, as well as managing more mundane items such as doing laundry. All these life changes coincide with major shifts in the educational setting and expectations. Increased need for study time is coupled with increased autonomy in deciding how to use one’s time.
Assessment for College Students With ASD

students who are academically talented and highly motivated may make a successful academic transition without need for special supports. Students with more significant challenges, especially in executive functioning and attention, may struggle.

A new college student must navigate expectations that are much less well defined and differ substantially not just from subject to subject but also professor to professor. When to study, how to study, how to access course materials, how to work in groups, how to complete assignments in a timely manner . . . the list of decisions is lengthy. Executive functioning and ADD may be critical to assess in order to develop effective supports for some students. Speech–language pathologists can collaborate with other professionals to conduct these assessments or make referrals as necessary. They also may integrate attention to these aspects with their assessment of language and cognitive communication. Executive functioning in particular impacts cognitive aspects of communication, and SLPs carry out assessments in the area.

Assessments of executive functioning specific to ASD are not available; however, some assessments of executive functioning are widely used by SLPs that were developed for other populations. They may prove useful in a comprehensive assessment. The Functional Assessment of Verbal Reasoning and Executive Strategies (MacDonald & Johnson, 2005) is one example, developed for individuals with traumatic brain injury. This offers an assessment that increases in complexity and investigates subtle aspects of social knowledge and complex reasoning using real-world scenarios. Although the score can be used only cautiously at best, a qualitative analysis could provide insight into difficulties in this area.

Individuals with a preexisting diagnosis of ADD/attention-deficit/hyperactivity disorder (ADHD) are at risk for difficulties with self-management, organizing, and study skills. For those without a diagnosis who exhibit signs, a referral to a psychologist or psychiatrist for assessment is warranted. Similarly, individuals on the spectrum are at risk for a wide range of psychiatric problems beyond ADHD, including anxiety, depression, and bipolar disorder (Leyfer et al., 2006).

For some individuals now in college, medical management for these disorders that was previously effective, such as daily prompts and reminders to take medication and refill prescriptions, may have relied on family support at a level difficult or impossible to implement in a college residence hall. Counselors who had established effective relationships and interventions for a student may no longer be available owing to distance once students leave for college. Other students who may not have experienced a prior psychiatric episode might develop anxiety or depression under the stress of moving to the new college environment. Ways to address these concerns and consideration of psychosocial aspects of successful transition to college challenges are discussed more fully in the next section.

PSYCHOSOCIAL ASPECTS

A thorough case history, with detailed information about educational, psychological, and medical history, is a cornerstone of effective planning for supports that are individualized and meaningful. Information on Section 504 plans, Individualized Education Programs (IEPs), and other supports and interventions received during secondary education should be collected. Psychosocial history, including the student’s personal interests, family background, wider network of supports, and experiences with volunteer and paid work, can be relevant to understanding what strengths and challenges the student may bring to the college experience.

Beyond these more apparent and standard elements, it is critical to engage in an open-ended conversational exchange as part of the initial interview, where the student’s perspective is sought at every opportunity, using best practices in person-centered planning (Michaels & Ferrara, 2006). Aspects that should be addressed in this interview relative to the student’s preparation for college include the following:
• Educational and career goals;
• Motivation to attend college;
• Concerns about previous educational and social experiences;
• Hobbies and interests;
• What support network currently exists and how the student will access that network while in college;
• Previous experiences with independence and community living and self-advocacy;
• Previous experiences and views of self-disclosure of their diagnosis, to educators, support staff, and/or peers; and
• Anything the student believes is important to share.

When family members are present, it may impact the flow of the interview. Family dynamics are of interest and worth noting, but in this transitional experience, establishing the student as the client is critical. Thus, every opportunity to refer to the student as the primary decision maker should be seized. Students who had IEPs in middle and high schools may have participated in transition planning meetings. Such experiences may prepare them as self-advocates to some extent, but the reality of the college experience shifts the power dynamic in decision making dramatically. College students on the spectrum may not pursue supports at all if they perceive the offered assistance as imposed or overly controlling.

As part of the interview, knowledge of college life should be ascertained. Aspects important to explore relative to college life include the following:
• Current living situation (in residence hall, with roommate, commuter);
• Ability to identify and make use of resources on campus, including student organizations, the library, technology support, the counseling center, legal services, business offices, advisors, recreation and sports, health and wellness programs, and so forth;
• Ability to navigate the campus and surrounding community;
• Status vis-à-vis office of disability services—nature of accommodations, if any, is student aware of them and/or making use of them;
• Major, class schedule, current academic standing;
• Interactions with academic advisors, faculty, residence hall advisors;
• Access to and facility with technology (adaptive and otherwise); and
• Study and time management strategies and habits.

This list is not exhaustive, and the unique circumstances of each campus should be taken into account when gathering information. Expectations for familiarity with all of this will depend on whether a student has already been on campus for some time or is still in the planning stage of a transition. A range of books and resources targeted to college success may be accessed to assist in developing a comprehensive list of questions. As an example, Mapping Your Future Inc. (2015), a nonprofit organization directed at all college-going students, offers a wide range of tips and lists of questions to help a student plan for college, with questions that might be useful in framing an assessment of knowledge of college life (https://mappingyourfuture.org/successincollege/goals.cfm).

Depending on the stage in his or her postsecondary experiences, a student’s most pressing current concerns could range from economic to social to academic. In ascertaining a student’s current abilities and concerns in these areas, it may be helpful to employ a questionnaire focused on quality-of-life issues (e.g., the Quality of Communication Life Scale, Paul et al., 2004). There are also self-advocacy curricula and resources (e.g., Paradiz, 2008) that have tools for self-assessment. Transition planning resources that be of use include assessment guidelines and checklists for the student to fill out (e.g., Filler & Rosenshein, 2008). Making use of resources specifically dealing with college and ASD (e.g., Wehman, Smith, & Schall, 2009; Wolf, Brown, & Bork, 2009) can provide guidance on what to ask to probe knowledge of postsecondary educational rights and responsibilities of students.
SUMMARY

A welcome upswing has occurred in recent years in basic and applied research pertaining to the needs of adults with ASD. Nonetheless, clinicians remain challenged to find resources to help them plan appropriate assessments for this population. In this article, clinicians are encouraged to design highly individualized assessments that target students’ concerns and needs, offer a comprehensive picture of current status, and ultimately provide useful clinical direction.

It is important to recognize the huge differences between secondary and postsecondary contexts, as failure to do so may place a student at risk (Hewitt, 2011). As the complex neuroscience underlying ASD becomes clearer (Williams et al., 2013; Williams, Minshew, & Goldstein, 2015), the need for supports even among many who appear on the surface to be well prepared for college also has become clearer. Findings indicate that even when study participants with ASD show performance on a processing task comparable with that of typically developing students, neuroimaging may reveal that the adults with ASD are working much harder to achieve the same result. Extrapolating from results of this line of research (Williams et al., 2015), it may well be that students with ASD who can function in a highly structured context with supports may stumble when the structure is less obvious and the supports less available. The best starting place for developing targeted interventions and supports is a thorough assessment. It is encouraging to find an increasing number of resources that can be used to perform the critical first step of assessment, which will optimize the likelihood of a successful college experience for students with ASD.

REFERENCES


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