

Stuttering and Autism Spectrum Disorders: Assessment and Treatment

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ABSTRACT

Dual diagnoses of autism spectrum disorders (ASDs) and stuttering have been reported in the literature, but little is known about how often they co-occur, the best practices for assessment, and even less about intervention. In this article, we gathered the data available on these issues and compiled and analyzed the sparse findings to offer suggestions for assessment and treatment. This article begins with a glossary of terms to promote consistency and understanding. Next, suggestions for assessment are provided along with a work sheet to document fluency breakdowns and monitor change. Suggestions for language and cognitive issues are also provided with a sample worksheet. Finally, an outline and explanation of stuttering/fluency goals for clients with these dual diagnoses are included. Case studies of two individuals who stutter and are diagnosed with ASD are presented to provide exemplars of how to assess and treat individuals with these dual diagnoses. Caveats on how to work with individuals with ASD and fluency disorders, based on our current understanding, are presented in the conclusion.

KEYWORDS: autism, autism spectrum disorders, stuttering, fluency, disfluency

Learning Outcomes: As a result of this activity, the reader will be able to (1) explain the prevalence of fluency disorders and ASD in combination; (2) apply appropriate principles when evaluating clients suspected of having a dual diagnosis of stuttering and ASD; (3) explain the process for establishing goals for treating individuals with a dual diagnosis of stuttering and ASD; (4) discuss how to apply the principles used to discuss exemplar and future cases of individuals with a dual diagnosis of stuttering and ASD.

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Stuttering is known to exist in combination with other disorders. One of the first studies to show this, Blood and Seider,¹ surveyed 650 speech-language pathologists (SLPs) across the United States and found at least one additional speech, language, hearing, learning, emotional, neurogenic, or other disorder in 68% of the cases reported. In addition, more than 24% had two or more accompanying diagnoses. This study of children aged 14 and younger indicated that as many as 11% of these diagnoses were in a category that included emotional, social, and cognitive disorders simply labeled as “other.” This was one of the first studies indicating the possible concomitance of stuttering and autism spectrum disorder (ASD).

A much later follow-up study² found similar results. In this survey study that included 2,628 children who stutter, 62.8% of children had at least one concomitant disorder, 0.8% of who presented with a diagnosis of “autism.” With stuttering prevalence in children estimated to be as high as 5%, this would indicate an estimated prevalence of stuttering and autism in about 0.04% of children. We would suggest an even higher number, but due to our experiences in a university clinic and a children’s medical center, we may see more children with multiple challenges due to the abundance of “second opinion” evaluations we are asked to provide for “difficult cases,” and the high number of referrals from multidisciplinary medical clinics. Nonetheless, there is certainly documentation of stuttering and ASD coexisting in children.

Beyond investigations exploring the prevalence of stuttering and ASD, there are a few studies that have identified the symptoms associated with this dual diagnosis. Scaler Scott et al³ studied the types and percentages of nonfluencies in children diagnosed as being on the autism spectrum, children who stutter, and a control group. Although there were significant differences in the percentage of stuttering behaviors between children in the “stuttering” group and children in the “autism spectrum” group, all of the children who stuttered met the criteria for a clinical diagnosis of stuttering, but 4 of the 11 participants from the autism spectrum group also met the criteria for a stuttering diagnosis. The authors did note, however, that the types of stuttering behaviors

in the autism spectrum group were qualitatively different. Specifically, children in the ASD group showed several word-medial and word-final disfluencies that are not typically seen in children who *only* stutter. In an earlier case study, Scaler Scott et al⁴ found similar types of word-final and word-medial disfluencies in an adult who had multiple diagnoses including stuttering, attention-deficit hyperactivity disorder, and ASD. The authors bring up an important distinction in that some of these fluency breakdowns can include stuttering-like disfluencies (SLDs) that are *typical* of stuttering, other SLDs that may seem *atypical*, cluttering, and/or normal disfluencies. A brief review of the terminology will be important to distinguish these behaviors for the purpose of this article. This guide for terminology used in this article is provided to help the reader, as inconsistencies in labeling are abundant in the literature.

DEFINITIONS

Nonfluency refers to any type of breakdown in fluency whether the breakdowns are SLDs or non-stuttering-like disfluencies (NSLD), typical or atypical in nature.⁵

SLDs are part-word repetitions, single-syllable word repetitions, prolongations, and blocks. They are typically present at the beginning of words, phrases, or sentences.

NSLDs (sometimes called “typical” or “normal” disfluencies) are breakdowns in fluency that are not stuttering in nature. These include interjections, multi-syllable word repetitions, phrase repetitions, revisions, incomplete phrases, or broken words.

Atypical SLDs consist of the part-word repetitions, single syllable word repetitions, prolongations and blocks seen in stuttering that occur in unexpected places, like word-medial or word-final positions.

Atypical NSLDs are those NSLDs that occur in unexpected places. These may appear within words or at the end of words and can also include mid-word insertions.

Cluttering is another type of fluency disorder that is marked by a rapid-sounding rate that impacts intelligibility. The speech rate may be within normal limits overall, but include short

segments of rapid speech, where sounds or syllables are collapsed or omitted. Meaning can be difficult to discern due to excessive nonfluencies that are not stuttering in nature. Cluttering may include NSLD (i.e., filler words, revisions, phrase repetitions) that can be atypical in nature. Cluttering may also be marked by lack of clarity due to the failure of pronouncing all sounds and/or syllables in words (i.e., over-coarticulation), and/or pauses in places not expected grammatically, resulting in a “jerky” sounding speech.⁶

All types of nonfluencies are summarized in Table 1.⁷⁻⁹

SPEECH SYMPTOMS IN CHILDREN WHO STUTTER WITH A DIAGNOSIS OF AUTISM SPECTRUM DISORDER

Several studies have identified the symptoms seen in children with a dual diagnosis of stuttering and ASD. Healey et al¹⁰ presented a case study of a school-age boy with ASD. They noted the occurrence of atypical SLD, specifically word-final SLD (e.g., “light-t-t-t”). Plexico et al¹¹ studied the disfluency characteristics of eight children with ASD, aged 3 to 5 years. The authors coded speech samples for SLDs, other disfluencies (NSLDs), and atypical dis-

fluencies (atypical SLD and atypical NSLD). The atypical nonfluencies consisted of final sound and syllable repetitions, between syllable insertions, broken words, and final sound prolongations. Seven of the eight participants produced stuttering like (SLD) and other atypical nonfluencies (atypical SLD and atypical NSLD). The other participant did not produce any atypical SLD or atypical NSLD. Brundage et al¹² described an individual who stuttered and was diagnosed with ASD. They noted that in addition to SLD, the client demonstrated social and pragmatic disorders/differences.

The research on atypical SLD and atypical NSLD (e.g., word-final repetitions such as “what-at-at”) is sparse; however, atypical SLD and atypical NSLD are reported within the ASD population. These disfluencies are rarely observed in children who stutter or children with typical development.¹³ It has been suggested that atypical SLD and atypical NSLD may be fundamental characteristics in a cluster of ASD symptoms.¹⁴ Thus, the speech characteristics of individuals who stutter and have a diagnosis of ASD must be carefully documented. This documentation must include more than the standard counts of stuttering and other surface behaviors included in most stuttering evaluations. The assessment must also

Table 1 All Types on Nonfluencies

Nonfluency type	Example	Stuttering or disfluency
Interjections	My <i>um</i> dog’s name is Sherry	Disfluency ^a
Part-word repetition	My <i>d-d-d-d</i> dog is a poodle	Stuttering
Word repetition	<i>She-she-she</i> is silver	Stuttering ^b
	She is <i>silver-silver-silver</i>	Disfluency ^b
Phrase repetition	<i>She likes-she likes</i> to play	Disfluency ^a
Revision	<i>I like-I love</i> my dog	Disfluency ^a
Incomplete phrase	<i>She is</i> -oh I forgot how old	Disfluency ^a
Broken word	The dog is <i>ru(pause)-nning</i> fast	Disfluency
Prolonged sounds	<i>Sssssssssilver</i> is a pretty color	Stuttering
Tense pause ^c	<i>.....(pause with tension)</i> I’m done	Stuttering
Word-final disfluency	Please put- <i>ut-ut</i> the book here	Atypical disfluency
Mid-word insertion	Can you spea- <i>n</i> -k about that?	Atypical disfluency

Note: The nonfluency is in bold italics.

^aOften seen in excess in cluttering.

^bWord repetitions of one-syllable are generally considered as stuttering and word repetitions of multi-syllable words are disfluencies.⁸

^cAlso referred to as blocks, stoppages, or fixations.

include a description of the speech and concomitant behaviors observed, including their types and locations. In our clinical practice, we include very simple tasks such as single-word repetition, single-syllable naming, and single-syllable reading. Including multiple modality tasks (repetition, naming, and reading) can sort out which modality may be difficult for those with ASD. Scaler Scott has suggested that this type of thorough assessment can pinpoint specific areas of difficulty for individuals with ASD.¹⁵ Scaler Scott further suggests that longer and more complex speech samples must also be collected that include phrases, sentences, monologue, dialogue, and other conversation tasks. Descriptions of fluency breakdowns should also be provided. A suggested method and worksheet for evaluating nonfluencies in children with ASD is provided in Table 2.

An example for one task/activity on the table (i.e., one-syllable word repetition) is as follows. Let's say a client completed a word-repetition task with 10 single-syllable words and repeated 7 of the words with no fluency breakdown, but produced one word with a block (".....{*silent pause with tension*}boy"), one part-word repetition ("dog-g-g-g"), and one interjection ("um-shoe," a typical NSLD). The evaluator would enter the relevant information in the "one-syllable word repetition" task/activity row. Specifically, this sample would be entered as containing 20% SLD (".....boy," a typical SLD, and "dog-g-g-g," an atypical, word-final SLD). That is, the client stuttered on 2 of the 10, or 20%, of the repeated words; so, 20% would be entered in the %SLD column. The "um-shoe" would be entered as 10% in the %NSLD column. Descriptions of these behaviors also should be documented in the "typical SLD and typical NSLD description" columns. In this case, B1 (block) would be circled (for ".....boy") and Int (interjection) would be circled (for "um-shoe"). The average length of the block (in this case ~2 seconds) would also be entered in the "description of typical SLD and typical NSLD." We would also enter the "atypical SLD" ("dog-g-g-g") in the "atypical SLD..." and atypical NSLD description" column. In this case, WF would be circled for the word-final repetition ("dog-g-g-

g") with an average of three repetitions per unit (rep/unit). The interjection ("um-shoe") would be described in the "description of typical SLD and typical NSLD." The "Int" would be circled with an average time descriptor (i.e., approximate length in seconds and number of times "um" was repeated, i.e., one). If physical concomitants were noted during this task, they would be described in the "description of physical concomitants column" in the same row. This type of description would be completed for each representative task/activity for the individual being evaluated. Once again, this type of complete assessment of speech tasks is recommended by Scaler Scott and others. Table 2 can be used to summarize speech fluency data from any or all of the tasks/activities listed, along with additional observations of tone, rate, pitch and prosody, secondary behaviors, the client's ability to modify speech, and suggestions or goals for intervention.

LANGUAGE SYMPTOMS IN CHILDREN WHO STUTTER WITH A DIAGNOSIS OF AUTISM SPECTRUM DISORDER

In addition to the speech symptoms described in children with ASD who stutter, it is important to note that there are likely to be language and social impairments in these children as well. The majority of children with ASD present with language impairments and struggle with pragmatic functioning, navigating social proximity, and reading social cues.¹⁶ This can include skills and abilities related to executive function.^{15,16} In her description of executive functioning in individuals with ASD, Scaler Scott explains how these individuals can be "overreactive" or "under reactive" to external stimuli. For these reasons, a person with ASD may be overreactive to light stimuli, for example, and may be troubled by bright lights or flashing lights. Similarly, a person with ASD may be overreactive to input from a therapist. For example, the client with ASD may produce inappropriate responses to therapist prompting that are typical in many treatment programs for stuttering (e.g., "remember to use your stretchy speech"). This can result in a potentially non-compliant client. Therefore, these issues must

Table 2 Speech Evaluation of Suspected Fluency Disorder in Children with ASD

Task/Activity	% SS	% Nonfluency	Type Circle all that apply	Description Circle all that apply
One-syllable word repetition			PWR, SSWR, Pr, BI Int, MSWR, PR, Re, IP, BW	WI, WM, WF ___sec; ___rep/unit (avg.)
One-syllable word reading			PWR, SSWR, Pr, BI Int, MSWR, PR, Re, IP, BW	WI, WM, WF ___sec; ___rep/unit (avg.)
One-syllable word naming			PWR, SSWR, Pr, BI Int, MSWR, PR, Re, IP, BW	WI, WM, WF ___sec; ___rep/unit (avg.)
Multi-syllable word repetition			PWR, SSWR, Pr, BI Int, MSWR, PR, Re, IP, BW	WI, WM, WF ___sec; ___rep/unit (avg.)
Multi-syllable word reading			PWR, SSWR, Pr, BI Int, MSWR, PR, Re, IP, BW	WI, WM, WF ___sec; ___rep/unit (avg.)
Multi-syllable word naming			PWR, SSWR, Pr, BI Int, MSWR, PR, Re, IP, BW	WI, WM, WF ___sec; ___rep/unit (avg.)
Sentence repetition			PWR, SSWR, Pr, BI Int, MSWR, PR, Re, IP, BW	WI, WM, WF ___sec; ___rep/unit (avg.)
Sentence reading			PWR, SSWR, Pr, BI Int, MSWR, PR, Re, IP, BW	WI, WM, WF ___sec; ___rep/unit (avg.)
Sentence description			PWR, SSWR, Pr, BI Int, MSWR, PR, Re, IP, BW	WI, WM, WF ___sec; ___rep/unit (avg.)
Sentence formulation			PWR, SSWR, Pr, BI Int, MSWR, PR, Re, IP, BW	WI, WM, WF ___sec; ___rep/unit (avg.)
Paragraph reading			PWR, SSWR, Pr, BI Int, MSWR, PR, Re, IP, BW	WI, WM, WF ___sec; ___rep/unit (avg.)
Monologue with familiar			PWR, SSWR, Pr, BI Int, MSWR, PR, Re, IP, BW	WI, WM, WF ___sec; ___rep/unit (avg.)
Monologue with unfamiliar			PWR, SSWR, Pr, BI Int, MSWR, PR, Re, IP, BW	WI, WM, WF ___sec; ___rep/unit (avg.)
Dialogue with familiar			PWR, SSWR, Pr, BI Int, MSWR, PR, Re, IP, BW	WI, WM, WF ___sec; ___rep/unit (avg.)
Dialogue with unfamiliar			PWR, SSWR, Pr, BI Int, MSWR, PR, Re, IP, BW	WI, WM, WF ___sec; ___rep/unit (avg.)
Other: (describe)			PWR, SSWR, Pr, BI Int, MSWR, PR, Re, IP, BW	WI, WM, WF ___sec; ___rep/unit (avg.)
Other: (describe)			PWR, SSWR, Pr, BI Int, MSWR, PR, Re, IP, BW	WI, WM, WF ___sec; ___rep/unit (avg.)
Other: (describe)			PWR, SSWR, Pr, BI Int, MSWR, PR, Re, IP, BW	WI, WM, WF ___sec; ___rep/unit (avg.)
Other: (describe)			PWR, SSWR, Pr, BI Int, MSWR, PR, Re, IP, BW	WI, WM, WF ___sec; ___rep/unit (avg.)
Description of tone, rate, pitch, prosody:				
Description of secondary behaviors:				
Ability to modify speech:				

Abbreviations: ASD, autism spectrum disorder; BI, block; BW, broken word; Int, interjection; IP, incomplete phrase; MSWR, multi-syllable word repetition; PR, phrase repetition; Pr, prolongation; PWR, part-word repetition; Re, revision; SSWR, single-syllable word repetition; WF, word final; WI, word initial; WM, mid-word.

Notes: ___sec = average length of block, prolongation, or interjection; ___rep/unit = average number of repetitions per unit.

be evaluated as part of a holistic approach when evaluating the ASD client who also stutters.

SLPs and researchers have used multiple assessment tools to document the language, social, and play characteristics of individuals with ASD and stuttering. One of the more widely used standardized tests of language is the Clinical Evaluation of Language Fundamentals (CELF-4).¹⁷ Many other standardized tests tapping into multiple developmental domains are used when evaluating children with ASD and stuttering. For example, Plexico et al¹¹ used the Mullen Scales of Early Learning (MSEL),¹⁸ Communication and Symbolic Behavior Scales Developmental Profile (CSBS DP),¹⁹ and a structured play sample. The MSEL is a standardized evaluation for children birth to 68 months of age and was used to evaluate the cognitive development of children through visual reception, fine motor, and receptive and expressive language tasks. Table 3 contains a brief form that clinicians can use to summarize language, cognitive, social, play skills, and executive function skills of individuals who stutter and have ASD.

Most SLPs are familiar with assessments for language, cognitive, social, and play skills, but are less familiar with executive functioning assessments. For this reason, Scaler Scott¹⁵ has described the relevant activities related to areas of executive function that can be related to fluency goals. These include tasks related to cognitive flexibility (i.e., generating multiple solutions to speaking problems, e.g., “if someone does not understand your question, how could you say it in a different way”), working memory (i.e., using a memory game that involves visualizing while speaking or listening, e.g., “show me how to get to the cafeteria if this hall

way is closed” [while showing a map of the school]), retrieval (i.e., categorization, or generating synonyms or antonyms, e.g., “if you get stuck on the word cupcake, what’s another word to tell someone what you want?”), response inhibition (i.e., filtering distractions while speaking, e.g., “I’m going to turn on and listen to a song while you tell me how things went in school today”), and self-monitoring (activities that require monitoring of one’s own and other’s speech, e.g., “let’s talk about school and you raise your hand every time that you stutter or every time that I stutter”). Since there is a great deal of variance in the symptoms, severity, limitations, and strengths of those with ASD, Table 3 is meant to serve as a guideline for summarizing assessments and observations of areas that could impact stuttering. Not all areas need to be evaluated, but Table 3 could be used to track potential limitations or solutions for those presenting with a fluency disorder.

QUALITY OF LIFE MEASURES FOR EVALUATING STUTTERING AND AUTISM SPECTRUM DISORDERS

As is the case with all clients who stutter or have other fluency disorders, current theories suggest that the impact of stuttering extends well beyond just speaking and can affect the individual’s quality of life. Although information about quality of life can be gathered through interviews with the client, their family, their teachers, and others in their life, tools like the Overall Assessment of the Speaker’s Experience of Stuttering (OASES)²⁰ are commonly administered. The OASES is based on a series of questions that the client answers related to general information about stuttering, a

Table 3 Summary of Language and other Skills when Evaluating Children who Stutter and ASDs

Area of assessment	Test/Observation used	Results
Language (includes expressive, receptive, and pragmatics)		
Social skills		
Cognitive skills		
Play skills		
Other		

Abbreviation: ASDs, autism spectrum disorders.

speaker's reactions to stuttering, communication in daily settings, and overall quality of life. The OASES focuses on stuttering and how it impacts daily life through a series of approximately 60 questions (depending on the age of the client) that are answered on Likert-type scaled questions. Although some ASD individuals may lack some of this personal insight (or be able to communicate it in this format), it can serve as an important baseline for how stuttering affects daily life. The strength of this tool is that there are versions for school-age children, teens, and adults, although none specifically for those with ASD who stutter. At times, we also ask some of the OASES questions of parents and caretakers to evaluate how they see stuttering impacting the life of their family member. The questions on the OASES can also serve as a beginning point to delve deeper into thoughts and feelings about stuttering.

SUMMARY OF ASSESSMENT PRINCIPLES WHEN EVALUATING STUTTERING AND AUTISM SPECTRUM DISORDERS

The general philosophy of assessing an individual with ASD who also has a suspected fluency disorder is to evaluate all sources and behaviors that can impact communication and stuttering. This holistic view is aimed at providing an overall picture of the person with ASD who stutters and to use this information to comprehensively identify the specific factors impacting the client's communication. For this reason, most of our evaluations will include the following:

1. Information gathered from a thorough case history form.
2. Interview information from the client.
3. Interview information from the parent, caretaker, and others who are in close contact.
4. Thorough assessment of speaking across settings and contexts (see Table 2).
5. Assessment of language, cognitive, and executive functions (see Table 3).
6. Quality-of-life measures.

The results from this profile can provide guidelines for intervention based on the beha-

aviors, skills, strengths, and limitations of the individual (and their family) to holistically address their communication needs in relevant contexts. Treatment approaches and goals can then be established on the basis of the results of the evaluation rather limited by a particular therapy philosophy or approach.

TREATMENT FOR CHILDREN WHO STUTTER AND A DIAGNOSIS OF AUTISM SPECTRUM DISORDER

Although there is ample research on how to treat stuttering disorders and on treatment for children with ASD, there is very sparse literature on treatment when the diagnoses are dual. This is not surprising as a survey conducted by Scaler Scott et al.²¹ revealed that SLPs report they have limited knowledge and even less certainty in their abilities to treat the stuttering in children with ASD. In addition, it is noteworthy that the SLPs surveyed in the study had between 5 and 8% of children who stutter on their caseloads with an additional diagnosis of ASD. Furthermore, a large proportion of SLPs stated that they were uncomfortable in setting goals or in helping these children generalize their goals.

Following in-service training modules, the SLPs surveyed showed improved confidence in these same areas. The areas covered in the in-service training included identifying all nonfluencies by type (see Table 1), pattern analysis to determine target treatment area(s); see Table 2), developing goals based on pattern analysis, and developing treatment methods based on a profile. SLPs likely feel this way due to a lack of training in dual diagnoses and a scarcity of reports of outcomes in the literature.

One of the few treatment reports was documented by Brundage et al.¹² They reported some success in treating a teen with diagnoses of both ASD and stuttering. The method of intervention was based on the Fluency Rules Program for stuttering²⁰ and used an ABAB design. It was hypothesized that this intervention program might be successful due to the rigidity (rule following behaviors) of individuals with ASD. The Fluency Rules Program for stuttering is based on following a specific set of rules (e.g., use of a slow rate of speech, saying a word only once). Results showed significant

reduction of stuttering during in-clinic tasks and outside-of-clinic tasks. In addition to the philosophy of the Fluency Rules Program, goals were established based on implementing treatment at a level where fluency breaks down. This is consistent with our view of building a profile of skills based on a holistic and comprehensive assessment as described in the previous section (also see Tables 2 and 3).^{21,22}

Another case is reported by Tetnowski et al of a child who presented with typical and atypical stuttering and a diagnosis of ASD.²³ The child was treated with stuttering modification strategies for identification and adjustment of stuttering,²³ and teaching strategies that were specified for the cognitive learning style of children with ASD.²⁴ Following treatment, the child showed a reduction in typical and atypical stuttering behaviors, and also showed increased efficiency in overall communication as documented by an increase in speech rate. Once again, these goals would be documented by using the suggested speech evaluation protocol (see Tables 2 and 3) and the suggestions for language and social evaluation (see Table 3). The documentation for setting goals and providing treatment for children with stuttering and ASD is indeed limited; however, evaluating all of the aspects of the individual that can impact communication need to be considered. Tables 2 and 3 can serve as guides. The following sections will present case studies that document assessment and treatment for children suspected of these dual diagnoses and can serve as prototypes moving forward.

CASE STUDY 1 (ASSESSMENT AND GOAL SETTING)

Pete, a 15-year-old boy who has been followed up periodically since he was 9 years old, presented with moderate stuttering behaviors and a high level of SLD and NSLD. A majority of Pete's SLDs were accompanied by facial grimacing, head nods, and increased tension. In addition, Pete struggled with pragmatic functioning (e.g., turn-taking strategies during conversation, inappropriate changing of conversation content, e.g., talking about baseball when the topic was family pets) consistent with the diagnosis of ASD. He is a sophomore

in high school where he is doing well academically and is involved with the band.

His parents reported an increase in non-fluent speech behaviors which began about a year ago and have continued consistently. Pete is aware of his decreased fluency over the past few months. Pete is not currently enrolled in school-based speech therapy and has not consistently worked on his SLD (through previously introduced tools including pausing and stretching/prolonging his speech) for over a year.

Following guidelines for his speech assessment (Table 2), the results indicate an overall nonfluency rate of 8% based on a monologue task, where 5.36% were classified as SLDs. Specific SLD behaviors included part-word repetitions, single-syllable repetitions, and prolongations. His prolongations were approximately 2 to 3 seconds in length. NSLD behaviors consisted of interjections. In addition, several of his SLDs were atypical and included word-final part-word repetitions (e.g., "school-ool-ool"; "show-ow-ow"), with two to three repetitions per unit. All of Pete's nonfluencies (both SLD and NSLD) drastically increased when he used more elaborate linguistic structures, when he felt pressure to talk, and when he increased his rate of speech. Portions of the entire profile noted in Table 2 are replicated in Table 4 to show how this profile would be reported clinically. For example, if the evaluation was based on single word, phrase, sentence, monologue, and dialogue tasks, the behaviors would be noted in each row with the descriptions provided. As an example, the excerpt from the total profile for conversation task is reproduced in Table 4. Once the area of fluency breakdown is identified (in this case at the monologue level with an unfamiliar individual), the clinician should identify fluency-inducing behaviors that can potentially modify nonfluencies. In this case, using pausing and prolonged speech were identified as strategies that would decrease nonfluencies. This is noted in the "ability to modify speech" section of Tables 2 and 4. It was further noted that Pete was highly stimulable for decreased tension and increased fluency (at the monologue level) with the use of fluency techniques including pausing, easing into words/phrases, and

Table 4 A Sample of Case 1 (Pete) Using the Speech Assessment Profile

Task/Activity	% SS	% Nonfluency	Type	Description
			Circle all that apply	Circle all that apply
Monologue with unfamiliar	5.5%	8.0%	PWR, SSWR, Pr, BI Int, MSWR, PR, Re, IP, BW	WI, WM, WF ___sec; ___rep/unit (avg.)
Other: (describe)			PWR, SSWR, Pr, BI Int, MSWR, PR, Re, IP, BW	WI, WM, WF ___sec; ___rep/unit (avg.)

Description of tone, rate, pitch, prosody: within normal limits

Description of secondary behaviors: facial grimacing, head nods, increased tension while stuttering, and speeding up at the start of a stuttered syllable

Ability to modify speech: Pete reported that he was aware of strategies that had been previously taught to control his speech. These included the use of pausing and stretching to control the rate and tension of his speech. During the evaluation, he was able to demonstrate these strategies at the short-phrase level. Pete was highly stimuable for decreased tension and increased fluency with the use of fluency techniques including pausing, easing into words/phrases, and reducing his pattern of speeding up at moments of stuttering

Abbreviations: BI, block; BW, broken word; Int, interjection; IP, incomplete phrase; MSWR, multi-syllable word repetition; PR, phrase repetition; Pr, prolongation; PWR, part-word repetition; Re, revision; SSWR, single-syllable word repetition; WF, word final; WI, word initial; WM, mid-word.

Notes: ___sec = average length of block, prolongation, or interjection; ___rep/unit = average number of repetitions per unit.

reducing his pattern of speeding up at moments of stuttering. Thus, appropriate goals would be the use of pausing, easing into words/phrases, and reducing rate to modify his speech. It would be appropriate to begin these tasks at the phrase level (since this is the level where nonfluencies were first noted) and progress to a conversation level as noted during his speech evaluation. These strategies were described for his parents and were successful in reducing stuttering behaviors (as noted in the profile).

As noted by Scaler Scott et al,¹⁹ SLPs report often having difficulty in setting goals for individuals who present with stuttering and ASD. A complete and thorough evaluation for clients is necessary for suggesting appropriate goals and is particularly critical for individuals diagnosed with ASD who can present with a wide range of cognitive and social abilities. Pete is functioning at a higher level of cognitive ability than many individuals with a diagnosis of ASD. This was evident from information gathered from past IEPs (Individualized Education Plan [IEP]) and an interview with his parents. For these reasons, the following guidelines were suggested.

Pete's intervention should actively include the entire family in an effort to increase retention of the material presented. The family

requires frequent and ongoing communication with the SLP to ensure that therapy goals are reinforced at home. Pete and his family need to demonstrate a strong understanding and comfort level with any specific strategies and/or activities in a controlled therapy setting prior to using them in novel settings. In addition, a home-practice program should be developed to increase the likelihood of carry-over, especially since Pete does not react negatively to direct prompts for skill use, so will benefit from such cues from his parents.

Intervention should incorporate systematic and gradual approximations of behaviors which eventually extend to outside environments and provide opportunities to master strategies in a controlled fashion. The therapist should explain the goals to Pete with clear and concise directions to maximize his understanding. In addition to using concrete examples and visual/tactile cues, the therapist should address Pete's awareness of when and how his speech is being interrupted and his ability to self-monitor. Since Pete had some experience (and prior success) with fluency-enhancing therapy (the use of fluency techniques including pausing, easing into words/phrases, and reducing his pattern of speeding up at moments of

stuttering), these were targeted for intervention at this time.

Specific goals to be addressed as part of speech therapy should include the following:

- To increase Pete's knowledge of the speech production process, stuttering (SLD), and people who stutter:
 - Pete will name and demonstrate the core stuttering behaviors (part-word repetitions, prolongations, and blocks).
 - Pete will identify three fluency facilitators (pausing, easing into words/phrases, and reducing his pattern of speeding up at moments of stuttering) which serve to make talking easier.
- To increase Pete's ability to self-monitor his speech:
 - Pete will raise one finger when he identifies the start of a moment of stuttering during 5-minute conversations.
 - Pete will identify where in the speech process his speech is being disrupted during 10-minute conversations with the clinician (e.g., Pete was noted to have more stuttering as length and complexity increased, i.e., during longer and more complex utterances; therefore, he was encouraged to highly monitor his speech during longer sentences).
 - Pete will identify specific behaviors that he is doing leading up to, during and after a stuttering moment during 10-minute conversations with the clinician (as it was during longer utterances that he would increase the rate of his speech).
 - Pete will identify moments when he is speaking quickly or times when he is producing increasingly long phrase/sentences during 10-minute conversations with the clinician.
- To increase Pete's ability to modify his speech to increase fluency:
 - Pete will use controlled talking to increase fluency by modifying the timing and tension of the initial vowels of words/phrases progressing along a linguistic hierarchy.
 - Pete will demonstrate and explain the use of pausing at natural phrase boundaries to reduce the rate of speech and to allow for

increased time to organize and formulate his thoughts progressing along a linguistic hierarchy.

- Pete will complete daily challenges where he uses either controlled talking or pausing in real-life settings and records his progress.
- These goals should be explained to Pete's family and monitored by the SLP.

The goals were implemented in the school system as recommended with considerable success noted. No follow-up testing was completed for this case as he received services in his home school district. It is used here to demonstrate how assessment can lead to development of practical goals for individuals with ASD and stuttering.

CASE STUDY 2 (TREATMENT)

An excellent case was presented by Sisskin.²³ The case described was that of a 7.2-year-old male who had had an onset of stuttering at age 4 and a diagnosis of high functioning ASD. Language skills were evaluated by standardized language tests such as the Clinical Evaluation of Language Fundamentals (CELF-4)¹⁶ where he scored at the 94th percentile. In addition, the Social Language Development Test – Elementary (SLDT-E)²⁶ indicated below-average abilities overall and particular challenges with inferencing. He was also noted to have difficulty with “perspective taking.” Parent and clinician reports indicate inflexibility and poor self-regulation. Total nonfluency rate was 19.8% with 13.1% stuttered syllables consisting of typical stuttering (part-word repetitions and single-syllable word repetitions) and atypical stuttering (final part-word repetitions). Disfluencies consisted of interjections, revisions, and phrase repetitions. Atypical disfluencies also existed that included final-phrase repetitions (e.g., “I am going to the store-*to the store-to the store.*”).

Treatment took place twice weekly for 8 weeks at a university clinic. Specific methods and goals included the following:

- Teaching strategies consistent with cognitive learning styles in ASD.

- Use of materials that were of high interest, such as video games and apps.
- Specific intervention and programming were centered around:
 - Identification (identifying when SLD occurred).
 - Correction (modification of moments of stuttering; traditional stuttering modification strategies, i.e., the client was asked to progress through cancellation, pull-out, and preparatory sets).
 - Programmed transfer and generalization (moving through a structured hierarchy of difficulty).

Of note, including materials of high interest were carefully selected so as not to be of such great interest that introduction of strategies for identifying and modifying SLDs would be impossible. The results yielded a reduction in atypical stuttering and disfluency (final part-word repetitions reduced from 8.4 to 1.5%; final-phrase repetitions reduced from 4.3 to 0.2%). Speech rate efficiency increased from 79 syllables per minute (spm) to 126 spm. In addition, he had a reduction of disfluencies not targeted in remediation (i.e., initial part-word repetitions decreased from 3.7 to 0.4%). These results were maintained and documented through an in-clinic sample 3 months post therapy, two home samples recorded post therapy, and a second in-clinic sample recorded 1 year posttherapy. This case demonstrated the importance of combining (1) priorities for improved communication, (2) what matters to the individual, (3) adjustments in session design, and (4) developing individualized teaching strategies. These goals for intervention, developed following a complete assessment, indicate that clients with a dual diagnosis of ASD and stuttering can successfully respond to appropriate therapies.

CONCLUSIONS AND CAVEATS

In summary, stuttering and other fluency disorders can indeed coexist with a diagnosis of ASD. There is a wide range of nonfluent behaviors that exist in children with ASD; so, it is of the utmost importance to note and thoroughly describe the specific types and fre-

quencies of fluency breakdowns that occur. Variations of nonfluencies can include *typical SLD*, *atypical SLD*, and *NSLD*. Therefore, a complete profile and description of ALL fluency breakdowns should be part of the assessment. Knowing where fluency breaks down and how to modify those breakdowns accordingly is key to determining where to begin intervention. Trials of specific fluency-inducing strategies should also be documented to note which strategies may be the most successful in improving fluency and/or decreasing stuttering.

1. Language and social skills are typical components of assessment for children with ASD. For this reason, language and social skills should be considered as part of a complete assessment for these individuals. Although our examples drew from standardized language tests, observation of behaviors and informal assessment in real-life settings can be used as a supplement. For example, Pete's family knew that he responded better to short, direct requests, rather than complex directions. Although this may not be revealed through a standardized test, the family had used this strategy for many years, as was noted during observation with Pete and confirmed in a parent interview. Decontextualized standardized tests offer the strength of comparisons to a norm referenced group; however, qualitative analyses offer the option of incorporating more authentic, individualized behavior evaluation.^{26,27} Only with this knowledge can appropriate intervention goals be established.
2. At this point, there are no randomized control studies reviewing the success of interventions for children presenting with ASD and stuttering. Limited case history reports indicate successful programming and intervention for these individuals. These data suggest that stuttering behaviors can be decreased. Less information is available on improvements in social and language skills. However, due to the likelihood of their existence, they should be included in treatment plans. Provision of additional detailed information is beyond the scope of this article, but the authors refer readers to excellent resources noted by Scaler Scott.¹⁵

Specifically, tasks related to inhibiting responses, cognitive flexibility, self-monitoring, and taking another's perspective are particularly helpful.

3. Since ASD often includes impairments in social behaviors, families, teachers, and other school-based SLPs should be educated and trained as part of treatment and carryover programs. These skills could be documented and summarized in Table 3 and are noted in the goals.

Clearly, there is a need for further study in individuals presenting with diagnoses of ASD and stuttering. SLPs show discomfort and a lack of knowledge in treating these individuals, but researchers have demonstrated that comfort levels and confidence can be improved with appropriate training. The suggestions for the assessment of speech skills, the assessment of language skills, the samples of appropriate goals, and trial interventions can help increase our knowledge and skills in these areas.

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REFERENCES

1. Blood GW, Seider R. The concomitant problems of young stutterers. *J Speech Hear Disord* 1981;46(01):31–33
2. Blood GW, Ridenour VJ, Qualls CD, Hammer CS. Co-occurring disorders in children who stutter. *J Commun Disord* 2003;36(06):427–448
3. Scaler Scott K, Tetnowski JA, Flaitz JR, Yaruss JS. Preliminary study of disfluency in school-aged children with autism. *Int J Lang Commun Disord* 2014;49(01):75–89
4. Scaler Scott K, Grossman HL, Abendroth KJ, Tetnowski JA, Damico JS. Asperger syndrome and attention deficit disorder: Clinical disfluency analysis. In: Au-Yeung J, Leahy MMeds.. *Proceedings of the Fifth World Congress on Fluency and Fluency Disorders in Dublin, Ireland*. 2007: 273–278
5. Van Borsel J, Tetnowski JA. Fluency disorders in genetic syndromes. *J Fluency Disord* 2007;32(04): 279–296
6. Schulte K, Louis KO St.. Defining cluttering: the lowers common denominator. In: Ward D, Scaler ScottKeds.. *Cluttering: Research, Intervention and Education*. East Sussex: Psychology Press; 2011: 233–253
7. Darley FL, Spriestersbach DC. *Diagnostic Methods in Speech Pathology*. New York: Harper & Row; 1978
8. Ham RE. What are we measuring? *J Fluency Disord* 1989;14:231–243
9. Tetnowski JA, Scaler Scott K, Rutland BF. Fluency and fluency disorders. In: Damico JS, Muller N, Ball MJeds.. *The Handbook of Speech-Language Pathology*. 2nd ed.Oxford: Wiley-Blackwell; 2021: 414–444
10. Healey KT, Nelson S, Scaler Scott K. A case study of cluttering treatment outcomes in a teen. *Proc Soc Behav Sci* 2015;193:141–146
11. Plexico LW, Cleary JE, McAlpine A, Plumb AM. Disfluency characteristics observed in children with autism spectrum disorders: a preliminary report. *Perspect Fluen Fluen Disord* 2010;20(02):42–50
12. Brundage SB, Whelan CJ, Burgess CM. Brief report: treating stuttering in an adult with autism spectrum disorder. *J Autism Dev Disord* 2013;43(02):483–489
13. Yairi E, Ambrose NG. *Early Childhood Stuttering: For Clinicians by Clinicians*. Austin, TX: Pro-Ed; 2005
14. Santulli M, Parish-Morris J, Ferguson E, Bateman L, Schultz R, Donaher J. *Certain Disfluencies Distinguish the Speech of Children with ASD*. Baltimore, MD: International Society for Autism Research; 2016
15. Scaler Scott K. *Fluency Plus: Managing Fluency Disorders in Individuals with Multiple Diagnoses*. Thorofare, NJ: Slack Inc; 2018
16. Friedman L, Sterling A. A review of language, executive function, and intervention in autism spectrum disorder. *Semin Speech Lang* 2019;40(04):291–304
17. Semel E, Wiig E, Secord WS. *Clinical Evaluation of Language Fundamental*. 4th ed.Upper Saddle River, NJ: Pearson; 2008
18. Mullen E. *The Mullen Scales of Early Learning*. Circle Pines, MN: American Guidance; 1995
19. Wetherby AM, Prizant BM. *Communication and Symbolic Behavior Scales Developmental Profile—First Normed Edition*. Baltimore, MD: Paul H. Brookes; 2002
20. Yaruss JS, Quesal RW, Coleman C. *Overall Assessment of the Speaker's Experience of Stuttering (OASES)*. McKinney, TX: Stuttering Therapy Resources; 2016

21. Scaler Scott K, Block S, Reeves N, Nelson S. Speech dysfluency and autism in the schools. *Proc Soc Behav Sci* 2015;193:223–227
22. Runyan C, Runyan S. A fluency rules therapy program for young children in the public schools. *Lang Speech Hear Serv Sch* 1986;17:276–284
23. Tetnowski JA, Richels C, Shenker R, Sisskin V, Wolk L. Treating stuttering and concomitant issues: case studies. Paper presented at: Annual Conference of the American Speech-Language-Hearing Association; November 16, 2011; San Diego, CA
24. Tetnowski JA, Richels C, Shenker R, Sisskin V, Wolk L. When the diagnosis is dual: stuttering and concomitant disorders. *ASHA Lead* 2012;17(02): 3–8
25. Van Riper C. *The Treatment of Stuttering*. Englewood Cliffs, NJ: Prentice-Hall; 1975
26. Mesibov GB, Shea V, Schopler E et al. *The TEACCH Approach to Autism Spectrum Disorders*. New York: Springer; 2005
27. Bowers L, Huisingh R, LoGiudice CM. *Social Language Development Test*. Austin, TX: Pro-Ed; 2016



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