

Prevalence and Nature of Language Impairment in Children With Attention Deficit/Hyperactivity Disorder

Alyssa DaParma

New York City Department of Education, NY

Donna Geffner

St. John's University, Queens, NY

Nancy Martin

Academic Therapy Publications, Novato, CA

Attention deficit/hyperactivity disorder (AD/HD) is a condition in which it is difficult for an individual to self-regulate, attend, and focus (Geffner, 2005). According to the American Psychiatric Association (APA, 1994), AD/HD occurs more frequently in males than in females, with ratios ranging from 4:1 to 9:1 (depending on the setting, general population, or

clinical population). The APA guidelines for the identification of AD/HD, presented in the *Diagnostic and Statistical Manual—IV (DSM-IV; APA, 2000)*, define AD/HD as having three subtypes: inattention, hyperactivity-impulsivity, and combined. Behaviors associated with each subtype of AD/HD as identified in the *DSM-IV* (APA, 1994) are presented in Table 1.

ABSTRACT: Purpose. The prevalence of receptive and expressive language disorders was explored in children who were identified as having attention deficit/hyperactivity disorder (AD/HD) by medical diagnosis or positive outcome on a questionnaire (McCarney, 1995).

Method. This retrospective study examined the files of 100 children (ages 6–16) who had completed an audiologic evaluation and subtests of the Clinical Evaluation of Language Fundamentals—Fourth Edition (CELF-4; Semel, Wiig, & Secord, 2003) and were diagnosed as having AD/HD. Data regarding the children's performance on the CELF-4 subtests were calculated and were compared to the typical population on whom the test was standardized. It was hypothesized that the children with AD/HD would have a greater prevalence of scaled scores ≤ 4 (-2 SDs) in the following areas: following directions, recalling sentences, rapid naming, formulating sentences, and comprehending spoken language.

Results. A greater proportion of children with AD/HD obtained scaled scores of ≤ 4 on the receptive and

expressive language measures. In receptive language, the children with AD/HD had problems understanding spoken language, following directions and understanding concepts, and understanding grammatical relationships. In expressive language, the children with AD/HD had trouble formulating sentences, recalling words rapidly, and performing word association tasks. In memory skills, the children with AD/HD performed poorly on tasks of recalling/retaining material of increasing length and short units (i.e., numbers).

Conclusion. Children with AD/HD have a greater propensity than children without AD/HD for deficits in receptive and expressive language and memory. A study with a larger population of such children may further confirm these results. Given our findings, it is our belief that speech-language pathologists have a role to play in the assessment and treatment of children with AD/HD.

KEY WORDS: AD/HD, language disorders, receptive language disorders, expressive language disorders, comorbidity of AD/HD and language disorders

Table 1. Diagnostic criteria for attention deficit/hyperactivity disorder (AD/HD; *Diagnostic and Statistical Manual—IV*; American Psychiatric Association, 1994).

<i>Six or more of the following symptoms of inattention have persisted for at least 6 months</i>	<i>Six or more of the following symptoms of hyperactivity-impulsivity have persisted for at least 6 months</i>
<ul style="list-style-type: none"> a) Fails to give close attention in tasks or makes careless mistakes b) Difficulty sustaining attention in tasks or play activities c) Does not seem to listen when spoken to directly d) Does not follow through on instruction and fails to finish school work, chores, or duties in the workplace (not due to oppositional behavior) e) Has difficulty organizing tasks and activities f) Often avoids or is reluctant to engage in tasks that require sustained mental effort g) Loses things necessary for tasks or activities h) Easily distracted by extraneous stimuli i) Forgetful in daily activities 	<ul style="list-style-type: none"> a) Fidgets with hands or feet or squirms in seat b) Leaves seat in classroom or lacks appropriate in-seat behavior c) Plays noisily and does not engage in leisure activities quietly d) Runs about or climbs excessively in situations in which it is inappropriate e) Acts “on the go” f) Can talk excessively g) Can call out answers before questions have been completed h) Has difficulty awaiting turn i) Can interrupt or intrude on others

AD/HD, a condition characterized by inattention, hyperactivity, and impulsivity, is the most prevalent mental health disorder of childhood. It frequently co-occurs with language impairment (LI); estimates of comorbidity range anywhere from 8% to 90% (Cantwell & Baker, 1991; Cohen, 1996; Oram, Fine, Okamoto, & Tannock, 1999). Tannock and Schachar (1996) suggested an overlap of 20% to 60%. Such a widespread range reflects the variety of language deficits observed. Children with AD/HD may present with impaired receptive and expressive language processing (Geffner, 2006; Riccio, Hyndt, Cohen, Hall, & Molt, 1994).

Receptive language deficits in children with AD/HD often include difficulty remembering numbers, words, or lengthy material and difficulty interpreting ambiguous sentences, idioms, or jokes. It has been shown that children with receptive language deficits experience difficulty hearing in noisy environments, which greatly impacts their understanding and clarity of a message, thereby causing word substitution. They may have difficulty understanding the main idea of a presented story or concept, as well as interpreting nonliteral meanings.

Expressive language deficits in children with AD/HD have been found to include inverting syllables or words, difficulty retrieving words in conversation, having trouble expressing emotion, misusing pronouns, producing rambling conversations, and an inability to put thoughts together efficiently (Geffner, 2006). Oram et al. (1999) found that children with AD/HD had particular difficulty with the Formulated Sentences subtest of the Clinical Evaluation of Language Fundamentals—Revised (CELF-R; Semel, Wiig, & Secord, 1987).

Studies have shown that children with AD/HD have impairments in planning, organizing, sequencing, and recalling what they learned previously (Barkley, 1997, 1998; Cutting, Koth, Mahone, & Denckla, 2003; Mariani & Barkley, 1997; Purvis & Tannock, 1997; Westby & Cutler, 1994). Other studies have shown that children with AD/HD are more likely to have a delay in the onset of talking (6%–35%) in comparison to children without AD/HD (2%–5.5%; Hartough & Lambert, 1985). Many students with AD/HD do not exhibit language disorders on traditional measures of vocabulary and syntax. However, they may have problems

in word finding and may still exhibit language learning problems at discourse and metacognitive levels (American Speech-Language-Hearing Association [ASHA], 1997).

Barkley (1996) suggested that students with AD/HD exhibit metacognitive deficits in a variety of domains. Cohen, Vallance, Barwick, and Im (2000) found that of 105 children diagnosed with AD/HD, 36 had LI as a comorbid condition, reflecting problems in both receptive and expressive language. Fifty percent of the other children with different psychiatric diagnoses had a co-occurring language disorder. Further, the population of children with AD/HD and LI performed significantly worse on measures of academic achievement, intellectual functioning, and working memory than the children without LI.

Barkley (1998) theorized that AD/HD may adversely impact children’s language development, causing problems with self-directed speech, internalization of language, and use of language for self-regulation and mental representation. Children with AD/HD encounter more difficulties in higher order executive functioning, such as verbal mediation, planning, and goal-directed behavioral guidance, than in spontaneous speech (Zentall, 1988).

Oram et al. (1999) investigated certain types of standardized language tasks to determine which ones were particularly difficult for children with AD/HD. They compared the performance of three groups of children: those with AD/HD only (AD/HD-only), those with AD/HD and LI (AD/HD+LI), and non-AD/HD controls. Standardized tests used were the Test of Word Finding (German, 1986), the Auditory Analysis Test (Rosner & Simon, 1971), and the CELF-R. The control group performed better on all three tests than either the AD/HD-only group or the AD/HD+LI group, and the AD/HD-only group performed better on all three tests than the AD/HD+LI group. The AD/HD-only group performed poorer than the control group but better than the AD/HD+LI group on the following expressive language subtests from the CELF-R: Formulated Sentences, Word Structure, and Sentence Structure.

Oram et al. (1999) found that tasks requiring high levels of sustained attention, inhibition, working memory, or planning/organization were difficult for AD/HD-only children due to the demands placed on their impaired cognitive functioning, stating that a “genuine language weakness’

also contributed to the scores received by the AD/HD group and the AD/HD + LI group” (p. 77). A growing body of research has demonstrated comorbidities between LI and behavioral/psychological diagnoses. A study by Sharma, Purdy, and Kelly (2008) showed a high rate of comorbidity between central auditory processing disorder and LI in children, yet the influence of an attention deficit disorder was not clearly delineated. Studies that identify specific areas of LI are sparse yet are needed to clarify the relationship among behavior, attention, and language.

Purpose

The purpose of this retrospective study was to examine the prevalence and nature of LI in children with AD/HD. Based on work by Geffner (2005, 2006), it was hypothesized that children with AD/HD would present with compromised receptive and expressive language skills in specific areas such as following directions, comprehending the spoken message, recalling sentences, expressing one’s thoughts, and word retrieval (rapid naming). These skills are crucial for both academic success and effective social interaction. It is of clinical interest to identify LI in this population because there is such a large prevalence of AD/HD in the school-age population. Speech-language pathologists (SLPs) are often the first professional to recognize these children and offer clear remediation to ameliorate the compound nature of AD/HD+LI.

METHOD

This article presents a retrospective study based on information gleaned from a review of client files from the past 5 years at a university speech and hearing center.

Participants

Files were selected of 100 children who met one of the following criteria: (a) their records showed that they had been diagnosed by their physician as having AD/HD before referral to the clinic; or (b) at the clinic, they were positively identified as having AD/HD (using the Attention Deficit Disorders Evaluation Scale, 2nd ed. [McCarney, 1995], a scale that mirrors the *DSM-IV* criteria); and (c) they exhibited behaviors typical of AD/HD in the clinic. No attempt was made to differentiate the subcategories of AD/HD among the study participants. The files indicated whether the children had been administered all or parts of the Clinical Evaluation of Language Fundamentals—Fourth Edition (CELF-4; Semel, Wiig, & Secord, 2003) as part of their initial clinic evaluation. Not all participants were administered all CELF-4 subtests.

The children were between the ages of 6 and 16 years of age, with a mean age of 9.5 years. Children who had been diagnosed with other disorders in addition to AD/HD were excluded from the study. The children were not on any medications when they were tested. The socioeconomic status of clients ranged from middle to upper middle class, as determined by parental education and income as noted

on an intake questionnaire. Some children attended private schools; others were in public education. All files indicated that the children’s intelligence scores were within the average range. Their hearing levels were also within the average range (as tested audiometrically), and all children met developmental milestones at age-appropriate levels. Participants’ identities were confidential, and ethnicity status was not available. All guardians/caregivers of the participants had previously given consent for the records to be used for research purposes.

Test Materials

The children’s records showed that their receptive and expressive language skills had been assessed using the CELF-4, which is a comprehensive measure of language fundamentals that is designed to measure language skills in children ages 5 to 21. There are two versions of the CELF-4: one for children ages 5 to 8;11 (years;months); the second version for ages 9 to 21.

For the purposes of this study, an LI was considered evident if a scaled score for any CELF-4 subtest was two or more standard deviations (≥ 2 *SDs*) below the mean of 10. Therefore, subtest scaled scores of 4 or less (≤ 4) indicated impairment.

Test Battery

At the time the clients were seen at the center, they had been administered some or all of the following CELF-4 subtests:

Receptive language subtests

Concepts and Following Directions. This subtest assesses the ability to interpret verbal directions of increasing length and difficulty.

Word Classes Receptive. This subtest assesses the ability to understand relationships among words.

Understanding Spoken Paragraphs. This subtest assesses the ability to sustain attention and focus while listening to and comprehending spoken paragraphs.

Semantic Relationships. This subtest assesses the ability to interpret sentences that make comparisons, identify location or direction, and specify time relationships, as well as serial order sentences that are expressed in passive voice.

Sentence Structure. This subtest assesses the ability to understand sentences of increasing length and complexity and choose visuals that exemplify the meaning of the sentence and its grammatical structure.

Expressive language subtests

Word Structure. This subtest assesses the ability to apply morphological rules.

Recalling Sentences. This subtest assesses the ability to precisely repeat sentences of increasing length and complexity, without changing the message.

Formulated Sentences. This subtest assesses the ability to devise semantically and grammatically correct sentences of increasing length and complexity using correct syntax when presented with words and pictures.

Word Classes Expressive. This subtest assesses the ability to comprehend associations among pictured words (or

words without pictures) that are related by semantic category features and to explain those relationships.

Expressive Vocabulary. This subtest assesses the ability to name illustrations of people, objects, and actions.

Word Definitions. This subtest assesses the ability to analyze words for their meaning features, define words by referring to class relationships and shared meanings, and describe meanings that are unique to the reference.

Sentence Assembly. This subtest assesses the ability to formulate grammatically acceptable and semantically meaningful sentences by manipulating and transforming given words and word groups.

Number Repetitions. This subtest evaluates the ability to repeat random number sequences both forward and backward.

Supplemental subtests

Word Associations. This subtest evaluates semantic organization and the strategies used to associate and name members of a semantic class rapidly and efficiently for speaking and writing. This subtest also investigates the efficiency of word searching and retrieval.

Rapid Automatic Naming. This subtest examines the ability to process and remember pictures and accurately name the visual stimuli in a fluid and rapid manner.

For this study, children were classified into two groups: those who were considered to have an LI (i.e., having subtest scaled scores of ≤ 4), and those who did not meet that criterion for impairment (i.e., having subtest scaled scores of ≥ 5). The Word Associations subtest is criterion referenced; scores were interpreted according to an age-based criterion cutoff score. Children were classified into two groups: those who scored above the cutoff score (thereby showing no difficulty), and those who scored at and below the cutoff score (indicating a deficit in this skill).

Likewise, the Rapid Automatic Naming subtest uses age-based cutoff scores for two criteria: the number of errors and performance time in seconds. The Rapid Automatic Naming subtest interprets scores in terms of three functional categories: *normal*, *slower than normal*, and *nonnormal*. For this study, children were categorized as those who scored in the normal range (thus, no deficit was evident) and all others (slower than normal and nonnormal) who exhibited difficulties.

Attention

Also present in the children's files were their results from the Attention Deficit Disorders Evaluation Scale, which was completed by the children's parents/guardians and provided a measure of behaviors associated with AD/HD. That scale is based on the definition of AD/HD found in the *DSM-IV* (APA, 1994) and consists of 46 statements that rate the frequency of problematic behavior, with higher scores indicating greater pathology. The scores can further differentiate AD/HD subtypes as inattention, hyperactivity-impulsivity, or combined.

In this study, children were identified as having a form of AD/HD (i.e., inattentive or hyperactivity-impulsivity) either by the results of this test or by having been previously diagnosed by a physician or psychologist.

Data Analysis

Frequency analyses were used to describe the scores obtained in this clinical sample. Because scaled scores are normally distributed, it is possible to compare the proportion of this clinical sample scoring ≥ 2 SDs below the mean with the proportion of the normative population scoring in that range. Because the 100 files chosen for this study indicated that not all children were administered all CELF-4 subtests, the samples sizes used for the subtest analyses varied.

RESULTS

Receptive Language Subtests

Subsets of children in the clinical sample were administered at least one of the receptive language subtests. Table 2 shows the number and proportion of children in each subset scoring ≥ 2 SDs below the mean on the CELF-4 receptive language subtests. The proportion of children scoring in that range exceeded 2% in all five of the receptive language subtests: Concepts and Following Directions, Word Classes Receptive, Understanding Spoken Paragraphs, Semantic Relationships, and Sentence Structure.

The greatest receptive language difficulties seemed to be in the Concepts and Following Directions, Sentence Structure, and Understanding Spoken Paragraphs subtests, with 20.22%, 19.57%, and 11.46% (respectively) of the children scoring ≥ 2 SDs below the mean.

Expressive Language Subtests

As with the receptive language subtests, subsets of children in the clinical sample were administered at least one of the expressive language subtests. Table 3 shows the number and proportion of children in each subset scoring ≥ 2 SDs below the mean on the CELF-4 expressive language subtests.

In a normal curve distribution, it is expected that approximately only 2% of the normal population would score ≥ 2 SDs below the mean, yet in this subset of the clinical sample, the proportion of children scoring in that range exceeded 2% in five of the nine subtests: Word Structure, Recalling Sentences, Formulated Sentences, Number Repetition Forward, and Number Repetition Backwards. The greatest expressive language difficulties seemed to be in Number Repetition Backwards, Recalling Sentences, and Formulated Sentences, with 15.73%, 14.29%, and 9.78% (respectively) of the children scoring ≥ 2 SDs below the mean.

Supplemental Subtests

For the Word Associations subtest, 15.09% of children in the subset scored below the criterion of normal range (8 out of 53 children scored below criterion; see Table 4). For the Rapid Automatic Naming subtest, 13.56% of children in the subset scored below the criterion of normal range (8

Table 2. Results from the Clinical Evaluation of Language Fundamentals—Fourth Edition (CELF–4; Semel, Wiig, & Secord, 2003) receptive language subtests.

	<i>CFD</i>	<i>WCR</i>	<i>USP</i>	<i>SR</i>	<i>SS</i>
<i>N</i> ¹	89	92	96	45	46
Number in subset with scaled scores ≤ 4	18	7	11	3	9
Proportion of sample with scaled scores ≤ 4 ²	20.22	7.61	11.46	6.67	19.57

Note. CFD = Concepts and Following Directions; WCR = Word Classes Receptive; USP = Understanding Spoken Paragraphs; SR = Semantic Relationships; and SS = Sentence Structure.

¹Not all 100 children were administered all of the CELF–4 subtests. ²Proportion of normal curve scoring ≥ 2 SDs below the mean = 2%

out of 59 children scored below criterion). These criterion-referenced scores enable one to compare a student’s performance to an objective standard (criterion) of performance. They are not dependent on a normal distribution of raw scores but rather reflect typical/atypical performance.

DISCUSSION

The present study examined the proportion of children with AD/HD who also showed deficits in receptive and expressive language (defined as CELF–4 subtest scaled scores of ≤ 4). This study also examined the proportion of children scoring within or below that criterion on the Word Associations subtest and the Rapid Automatic Naming subtest. The proportion of children with these difficulties ranged from 6.6% to 20.2% on various receptive language skills and up to 15.7% on various expressive language skills. In contrast, scaled scores of 1 to 4 would be expected in only 2% of the normal population. Clinical impressions regarding specific language skill deficits were substantiated by measures obtained on specific subtests. It was hypothesized that this population would show deficits in specific areas of language; namely, following directions, comprehending spoken language, organizing and formulating thought/sentences, word retrieval (rapid naming), and recalling sentences.

Receptive Language Subtests

For Concepts and Following Directions, 20.22% of the AD/HD population obtained scaled scores of ≤ 4 . For Sentence Structure, 19.57% obtained scaled scores of ≤ 4 . For Understanding Spoken Paragraphs, 11.46% obtained scaled scores of ≤ 4 . For Semantic Relationships, 6.67% obtained scaled

scores of ≤ 4 . For Word Classes Receptive, 7.61% obtained scaled scores of ≤ 4 . Thus, the hypothesis was validated, with even greater findings of deficits than proposed.

Expressive Language Subtests

For Formulated Sentences, 9.78% of the AD/HD population obtained scaled scores of ≤ 4 . For Recalling Sentences, 14.29% obtained scaled scores of ≤ 4 . For Number Repetition Backwards, 15.73% obtained scaled scores of ≤ 4 . Other subtests (Word Structure and Number Repetition Forward) yielded smaller differences from the norm but nevertheless had a higher proportion than expected (4.26% and 5.49%, respectively). Thus, the hypothesis was validated, with additional deficits noted in recalling smaller units such as numbers, particularly recalling them backward, which is an organizational skill.

Supplemental Subtests

For Word Associations, 15.09% of the sample scored below the criterion, and 13.56% scored below the criterion on the Rapid Automatic Naming supplemental subtest.

Overall Findings

These findings support this study’s hypothesis. They also are consistent with observed clinical behaviors and prior research reports of other authors. For instance, Barkley (1997, 1998) and Westby and Cutler (1994) found LI in organizing, sequencing, and recalling information in a population of children with AD/HD.

The criteria in the *DSM–IV* (APA, 2000) cite a typical behavior of individuals with AD/HD as “does not seem to

Table 3. Results from the CELF–4 expressive language subtests.

	<i>WS</i>	<i>RS</i>	<i>FS</i>	<i>WC</i>	<i>V</i>	<i>WD</i>	<i>SA</i>	<i>NRF</i>	<i>NRB</i>
<i>N</i> ¹	47	98	92	92	59	32	44	91	89
Number in subset with scaled scores ≤ 4	2	14	9	1	1	0	1	5	14
Proportion of sample with scaled scores ≤ 4 ²	4.26	14.29	9.78	1.09	1.69	0.00	2.27	5.49	15.73

Note. WS = Word Structure; RS = Recalling Sentences; FS = Formulated Sentences; WC = Word Classes; V = Vocabulary; WD = Word Definitions; SA = Sentence Assembly; NRF = Number Repetition Forward; and NRB = Number Repetition Backwards.

¹Not all 100 children were administered all of the CELF–4 subtests. ²Proportion of normal curve scoring ≥ 2 SDs below the mean = 2%.

Table 4. Results from the CELF-4 supplemental subtests.

	WA	RAN
<i>N</i> ¹	53	59
Number in subset scoring below cutoff criterion	8	8
Proportion in subset scoring below cutoff criterion	15.09	13.56

Note. WA = Word Associations; RAN = Rapid Automatic Naming.

¹Not all 100 children were administered all of the CELF-4 subtests.

listen when spoken to directly.” This behavior may in fact reflect a deficit in comprehending spoken language, which is a finding that is supported in this study. Perhaps when one defines the characteristics of AD/HD, mention should be made of a higher risk of LI. Such LI may include deficiencies in any of the following areas:

- Word-finding skills needed for speaking and writing (as per the Word Associations and Rapid Automatic Naming subtests)
- Word retrieval for automatic and accurate confrontational naming (as per the Rapid Automatic Naming subtest)
- Focusing and understanding during verbally presented material of increasing length in order to retain information for memory and learning (as per the Understanding Spoken Paragraphs subtest)
- Interpreting directions of increasing length and detail; memory for referencing important information; principles such as first, middle, next, and so forth (as per the Concepts and Following Directions subtest)
- Understanding sentences and the relationships among spoken language (as per the Sentence Structure subtest)
- Recalling information during tasks such as listening, note taking, and learning vocabulary (as per the Recalling Sentences subtest)
- Recalling number repetition (backwards), which is a groundwork of attention, sequencing, and organization (as per the Number Repetition Backwards subtest)
- Applying basic rules of grammar, revealing language deficits in form (as per the Word Structure subtest)

Clinical Implications

Study results showed that measures of receptive and expressive language provide information pertaining to the language functions of children with AD/HD. A measurable prevalence of specific language deficits shown in this review of clinical records may be reflective of language functions in a larger population of children with AD/HD. These data demonstrate specific areas of LI in this clinical sample.

By virtue of having selected files from a speech and hearing center, the prevalence of comorbidity is likely to be higher than that found in a random sample. Because

this was a retrospective study, a limitation resulted in the inability to question children and their families for further information.

It is the authors' assertion that it would be good practice when, upon diagnosis or suspicion of a child with AD/HD, a professional test the client's receptive and expressive language to target typical deficits. SLPs have a role to play in providing a formal assessment for language function in children diagnosed with AD/HD by identifying areas of weakness for remediation. It is recommended that if any health professional diagnoses AD/HD in a child, the child should be referred to an SLP. On the other hand, it may be beneficial for the SLP to make behavioral observations and appropriate referrals for AD/HD evaluation before or following a language assessment.

CONCLUSION

On measures of receptive and expressive language, children with AD/HD in this study showed specific difficulties in areas beyond what would be expected in a normal population. In conclusion, this study confirmed that a clinical sample of children diagnosed with AD/HD had measurable deficits in receptive language in the following areas: concepts and following directions, word classes receptive, understanding spoken paragraphs, semantic relationships, and sentence structure. This sample had a higher incidence of impairments on specific measures of expressive language: Formulated Sentences, Number Repetition Backwards, and Recalling Sentences, with atypical performance on Rapid Automatic Naming and Word Associations.

These findings are consistent with prior reports in the literature that cited areas of deficit to include working memory, language organization, following directions, word relationships, auditory comprehension, and syntax.

Limitations of the study include a relatively small sample size of a clinical population. To gain a better understanding of the receptive and expressive language deficits of the population, a larger epidemiological sample of children with AD/HD is needed. Future research should address the following questions: Do children on medication perform differently on tests of language function? What is the nature of their written language? Do subgroups of children with AD/HD (inattentive vs. hyperactive) share similar deficits? What are the specific LIs in a younger population of children with AD/HD as compared to an older population (i.e., adolescent)? Given the language deficits in this population, there is a role for SLPs to play in the assessment and treatment of children with AD/HD.

REFERENCES

- American Psychiatric Association. (1994). *Diagnostic and statistical manual of mental disorders* (4th ed.). Washington, DC: Author.
- American Psychiatric Association. (2000). *Diagnostic and statistical manual of mental disorders* (4th ed., text revision). Washington, DC: Author.

- American Speech-Language-Hearing Association.** (1997). *Roles of audiologists and speech-language pathologists working with persons with attention deficit hyperactivity disorder* [Position statement]. Available from www.asha.org/policy.
- Barkley, R. A.** (1996). Attention-deficit/hyperactivity disorder. In E. J. Mash & R. A. Barkley (Eds.), *Child psychopathology* (pp. 63–112). New York, NY: Guilford Press.
- Barkley, R. A.** (1997). Behavioral inhibition, sustained attention, and executive function: Constructing a unifying theory of AD/HD. *Psychological Bulletin, 121*, 65–94.
- Barkley, R.** (1998). Attention-deficit hyperactivity disorder. *Scientific American, 179*, 44–49.
- Cantwell, D. P., & Baker, L.** (1991). *Psychiatric and developmental disorders in children with communication disorder*. Washington, DC: American Psychiatric Press.
- Cohen, M. J.** (1996). *Auditory/verbal and visual/spatial memory in children following arterial temporal lobectomy*. Paper presented at the International Neuropsychological Society, Chicago, IL
- Cohen, N. T., Vallance, D. D., Barwick, M., & Im, N.** (2000). The interface between ADHD and language impairment: An examination of language, achievement, and cognitive processing. *Journal of Child Psychology and Psychiatry and Allied Disciplines, 41*(3), 353.
- Cutting, L. E., Koth, C. W., Mahone, E. M., & Denckla, M. B.** (2003). Evidence for unexpected weaknesses in learning in children with attention-deficit/hyperactivity disorder without reading disabilities. *Journal of Learning Disabilities, 36*, 259–269.
- Geffner, D.** (2005). *Attention deficit/hyperactivity disorder: What professionals need to know*. Eau Claire, WI: Thinking Publications.
- Geffner, D.** (2006). Language and auditory processing problems in AD/HD. *The AD/HD Report, 14*, 1–6.
- German, D. J.** (1986). *Test of Word Finding*. Allen, TX: DLM Teaching Resources.
- Hartsough, C. S., & Lambert, N. M.** (1985). Medical factors in hyperactive and normal children: Prenatal, developmental, and health history findings. *American Journal of Orthopsychiatry, 55*, 190–210.
- Mariani, M., & Barkley, R.** (1997). Neuropsychological and academic functioning in preschool children with attention deficit hyperactivity disorder. *Developmental Neuropsychology, 13*, 111–129.
- McCarney, S. B.** (1995). *Attention Deficit Disorders Evaluation Scale* (2nd ed.). Columbia, MO: Hawthorne Educational Services.
- Oram, J., Fine, J., Okamoto, C., & Tannock, R.** (1999). Assessing the language of children with attention deficit hyperactivity disorder. *American Journal of Speech-Language Pathology, 8*, 72–80.
- Purvis, K. L., & Tannock, R.** (1997). Language ability in children with attention deficit hyperactivity disorders, reading disabilities, and normal controls. *Journal of Abnormal Child Psychology, 25*, 133–144.
- Riccio, C. A., Hyndt, G. W., Cohen, M. J., Hall, J., & Molt, L.** (1994). Comorbidity of central auditory processing disorder and attention deficit hyperactivity disorder. *Journal of the American Academy of Child and Adolescent Psychiatry, 33*, 849–856.
- Rosner, J., & Simon, D. P.** (1971). The Auditory Analysis Test: An initial report. *Journal of Learning Disabilities, 4*, 384–392.
- Semel, E., Wiig, E. H., & Secord, W.** (1987). *Clinical Evaluation of Language Fundamentals—Revised*. New York, NY: The Psychological Corporation.
- Semel, E., Wiig, E. H., & Secord, W.** (2003). *Clinical Evaluation of Language Fundamentals—Fourth Edition*. San Antonio, TX: The Psychological Corporation.
- Sharma, M., Purdy, K., & Kelly, A.** (2008). Co-morbidity of auditory processing, language, and reading disorders. **Journal of Speech, Language, and Hearing Research, 7**. doi: 10.1044/1092-4388.
- Tannock, R., & Schachar, R.** (1996). Executive dysfunction as an underlying mechanism of behavior and language problems in attention deficit hyperactivity disorder. In J. H. Beitchman, N. J. Cohen, N. M. Konstantareas, & R. Tannock (Eds.), *Language, learning and behavior disorders: Developmental, biological, and clinical perspectives* (pp. 128–155), New York, NY: Cambridge University Press.
- Westby, C. E., & Cutler, S. K.** (1994). Language and AD/HD: Understanding the bases and treatment of self-regulatory deficits. *Topics in Language Disorders, 14*, 58–76.
- Zentall, S. S.** (1988). Production deficiencies in elicited language but not in the spontaneous verbalization of hyperactive children. *Journal of Abnormal Child Psychology, 16*, 657–673.

Contact author: Alyssa DaParma, New York City Department of Education, P36K, 2045 Linden Boulevard, Brooklyn, NY 11207.
E-mail: alyssa.daparma@gmail.com