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## Editors' Comment

*Writing is difficult for many students. For students with Attention-Deficit/Hyperactivity Disorder (ADHD) writing is even more difficult. Many children and adolescents with ADHD also have a learning disability which affects their academic achievement, and is particularly apparent when they are required to produce written work. The demands of writing are complex; children must first master the basic skills of motor coordination, spelling, and sentence formation. They must then coordinate these basic skills with higher level skills such as planning, organizing, reviewing, and revising when they are required to put their thoughts on paper. For children and adolescents with ADHD who often have problems in focusing, sustaining attention, and self-regulation, writing can be an unpleasant and overwhelming task. They are apt to develop a negative mind set and to avoid written work. Systematic intervention in the early grades to help children acquire solid fluency and speed in handwriting and spelling skills will forestall problems in the later grades when these skills should be automatically applied to the production of effective written work.*

*In this issue of the NYU Child Study Center Letter we discuss the components of the basic skills underlying writing, the demands of producing the well formulated written expression productions expected in middle and high school, and the special challenges to students with ADHD. Examples of helpful approaches are provided.*

HSK/AG

## The Development of Writing Abilities in Children with Attention-Deficit/Hyperactivity Disorder

### Introduction

Children who are diagnosed with ADHD have difficulties with attention, organizational skills, hyperactivity, and impulsivity, though any individual child with ADHD may not show difficulties in all of these areas. Children with ADHD may experience difficulties in several areas of functioning – behavior in the home and in other settings, social skills development, and achievement in school. Children with ADHD have also been shown to lag behind their peers in reading, spelling, and arithmetic. Estimates suggest that approximately 15-25% of children diagnosed with ADHD also have a learning disability. Less attention has been paid, however, to the specific learning disability of writing, though there is reason to believe, based on research as well as clinical observation, that children with ADHD are at risk for problems associated with writing development. As with any complex skill or set of skills, writing should be viewed as multifaceted in that the mastery of more basic skills contributes to the positive development of higher order skills. The three major components of writing that will be reviewed in this CSC Letter are handwriting, spelling, and paragraph and essay writing with a particular focus on why children with ADHD have difficulty.

### Handwriting

Handwriting is a skill that is emphasized, and hopefully mastered, in grammar school. For all children with or without ADHD, difficulties with handwriting negatively affect development of other areas of writing.

Children who have difficulty with handwriting tend to avoid writing tasks, develop a mindset that they cannot write, and spend less time on other aspects of writing such as planning and organizing their ideas. Various sub-skills are important in handwriting ability.<sup>1</sup>

What's involved in writing? Children must be able to:

- transfer symbols and words into motor movements that re-create those letters and words
- have enough control over their fine motor movements to write legibly
- process information through the sense of touch to help guide a pencil across the page
- learn to maintain in their long-term memory the visual images of letters and words as well as the motor patterns that reproduce them.

### Manuscript vs. cursive

Children who have difficulty with handwriting tend to rely exclusively on manuscript or print writing for a longer period of time than other children. The transition to cursive writing can be an arduous and taxing one. However, when children learn cursive handwriting, even those who have had handwriting difficulties, they tend to become better at writing. Writing cursively tends to minimize errors in spatial judgment, such as variability in the spacing between letters within words; to minimize letter reversal errors; and sometimes leads to better spelling as the child

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writes words as a whole as a rhythmic process rather than having to think about and record each individual letter when printing.

### Evaluating children's handwriting

It is important to examine how children form letters, the spacing between and within words, their ability to keep their writing on the line and to write with a consistent size and slant. Children with poor handwriting may show spacing that is too wide or too crowded, too small or too big, and too heavy or too light. Their writing may appear broken, shaky, or excessively slanted. Speed is another important aspect of handwriting. Children who are able to write quickly while maintaining legibility show an overall higher quality of essay writing. Quick handwriting is essential in taking notes, which in turn provides the information needed to complete assignments and study for tests.<sup>2</sup>

### Motor coordination

Studies have shown that approximately half of all children with ADHD also exhibit deficits in motor coordination, compared to a rate of approximately 10% in children without ADHD.<sup>3</sup> Children and adolescents with ADHD tend to make jerky movements and have a difficult time balancing out demands for speed and accuracy.<sup>4</sup> In other words, they may write quickly with reduced legibility or, when they focus on legibility, they write excessively slowly. When using a pen or pencil, children with ADHD tend to use higher force and less accurate pencil strokes.<sup>5</sup> Paradoxically, they tend to become less accurate in their pencil movements when the demands for accuracy increase. For example, when required to write in a smaller amount of space or to use paper with smaller spacing between the lines, children with ADHD may show increased difficulty maintaining accuracy. Those ADHD children who show symptoms of hyperactivity and impulsivity have greater handwriting difficulties compared to other forms of ADHD that include symptoms primarily associated with inattention and disorganization.

Overall, when it comes to handwriting, children with ADHD show decreased letter and word legibility and larger writing, and they require more time to copy information than peers. Although many children with ADHD take medication to help alleviate some symptoms, it is not clear whether or not their handwriting reliably improves with medication.

### How to help

For students with poor handwriting development, it is important to obtain intervention to assist them, particularly in the early grades. Intervention needs to be systematic, consistent, and fun. A learning specialist or occupational therapist can utilize various activities to help children practice and master handwriting skills. For example, an activity called "Alphabet Practice" systematically takes children through the process of early handwriting development by modeling handwriting for them, having them trace and then copy letters, and then produce those letters on their own. An activity called "Alphabet Rockets" encourages increased writing fluency by having children try to beat their previous completion time. There is evidence to suggest that handwriting intervention can lead to improvement in legibility, writing fluency, content, sentence structure, and the quantity of writing a child will ultimately produce. Given the significant contribution that handwriting makes to the overall processes of written expression, it is certainly important that this skill be mastered.<sup>6</sup>

### Spelling

In learning to spell, children generally proceed through a predictable sequence in which they initially tend to write the consonants in words and leave out the vowel. They generally over-rely on using the sounds that they hear in words to help them spell the words. As spelling skills improve, words become more recognizable, and spelling errors become limited to soft vowel sounds and double consonants within words.

Once the skills that help them sound out words are mastered, children usually rely on their visual memory of what the words look like, a skill that enables them to spell irregular words that do not follow predictable patterns. For mature spellers, errors may persist for unfamiliar and irregular words, though they can spell most words within their lexicon. Difficulties with spelling may be due to any number of different functions in processing and manipulating the individual sounds of language. Children may have difficulty accurately hearing words presented to them or in phonological awareness, which affects their ability to discriminate sounds from one another and to rhyme or blend individual sounds together to form whole words. In the course of learning to spell, children also begin to develop a memory for the motor movements necessary to spell; thus, in the course of normal development words begin to take on a life and memory of their own. As with handwriting difficulties, children with ADHD tend to show poorer achievement than their peers in spelling, with estimates suggesting that approximately 25% of children with ADHD exhibit a spelling disorder.<sup>3</sup>

### How to help

Spelling instruction should be multifaceted. Children with ADHD and learning disabilities tend to learn better through direct instruction as opposed to their non-disabled peers who may more readily learn rules for spelling through incidental learning and without much repetition. When spelling difficulties occur in association with a reading difficulty, it is obviously necessary for basic reading skills to develop before spelling skills. Interventions generally include learning and practicing sound-symbol associations and learning to spell words of a similar nature in related groups. Using rhyming games and other activities that make spelling more fun are essential. As with handwriting, when spelling improves other aspects of written expression improve.

## Written expression

The process of producing sentences, paragraphs, and lengthier writing production requires integration of basic skills. Depending upon the teacher and the curriculum, there are different emphases placed on the development of written expression skills. Some teachers choose a more traditional approach that places higher demands on spelling, using adjectives to be more descriptive, composing topic sentences, following grammatical rules, and encouraging varied and rich vocabulary selection. Improvements in writing are facilitated by correcting students' work and encouraging them to use that feedback in future writing assignments. Other teachers adopt a more process-oriented approach, which emphasizes the thinking process. Writing is seen as a problem-solving process during which the writer needs to gather information and communicate his ideas effectively and appropriately to a specific audience. Certainly, both of these approaches have their merits and are not mutually exclusive.

### Individual differences

Not all children with writing difficulties or writing strength are alike; many combinations of skills contribute to effective writing. Children may show competence or difficulty with any number of combinations of these skills. In examining the narrative writing of fourth and fifth graders in a regular education curriculum, Wakely and colleagues<sup>7</sup> identified various subtypes of writers. While many children examined were developing average or above average skills for how well they communicated their ideas, grammar, and spelling, other children struggled with some combination of writing skills. Potential areas of difficulty included clarity of the ideas expressed, awareness of writing conventions, grammar and sentence structure, and spelling. Overall, this study provides evidence that the difficulties children experience with writing may vary from child to child. In addition, it suggests that the type of intervention provided should depend upon the specific

difficulties that the students have. In other words, one type of writing intervention will not necessarily be helpful to all children.

### ADHD and written expression

Specific aspects of ADHD may contribute to difficulty in written expression skills. Symptoms of inattention may include difficulty attending to detail, sustaining attention over long periods of time, listening to directions, organizing tasks, keeping materials organized, and putting forth sustained mental effort. Symptoms of hyperactivity and impulsivity may include fidgetiness, difficulty remaining seated, blurting out answers in class, excessive impatience, and making inadvertent careless errors. A preponderance of ADHD symptoms puts children with ADHD at risk for difficulty in acquiring written expression skills. As noted, written expression is a complex process that requires one to attend to many facets of the task at the same time. When children are producing a paragraph, they need to focus on handwriting, spelling, punctuation, word choice, grammar, the sequencing of their ideas, and whether or not their writing ultimately matches the demands of the task. Good writing requires a high degree of planning, organization, and sustained mental effort. It is obvious that a hyperactive and impulsive child might have problems in integrating these functions.

## Executive functioning and children with ADHD

Executive functioning skills are what help us accomplish more complex tasks. They are the skills that help us proceed from point A to point E, so to speak, when there are multiple steps involved in a process. Executive functioning skills enable one to set goals, plan steps to achieve those goals, work through the plan, and self-monitor performance along the way to ensure that they are on target. Executive functioning skills also include flexibility in thinking and behavior necessary to change one's

approach when the initial efforts are not being productive. Various studies have shown that when one compares a group of ADHD children to other children without ADHD, there are deficiencies in the ability to quickly generate ideas for problem solving, to make good use of strategies on memory tasks, to be flexible and hold multiple rules in mind, to problem solve and plan ahead before acting, and to remain persistent for the duration of the tasks.<sup>3</sup> Some researchers stress the importance of executive controls such as planning and self-monitoring as important components of the writing process.<sup>8</sup> Attention also plays an important role in this model as well, as one needs to initiate attention towards the task at hand, maintain it, and switch it flexibly from one aspect of the task to another. Working memory refers to one's "cognitive work space" – how we hold information in mind and mentally manipulate that information to help us complete tasks. Executive skills, combined with appropriate language development, produce a good outcome for written expression development. Some studies indicate that executive functioning skills play an important role in the process of writing, particularly impulse control, planning, and the ability to fluently generate ideas and systematically scan one's memory.<sup>9</sup> Thus, children with ADHD, who are at risk for executive functioning difficulties, may experience more difficulty with the complex process of written expression that relies on many of these skills.

There has been surprisingly little research examining the development of written expression skills in children, adolescents, and adults with ADHD. Based on the data available, it is reasonable to speculate that the known difficulties ADHD children have with executive functioning skills will interfere with the development of this complex process of written expression. At least one study that has examined the quality of writing in college-aged individuals with ADHD<sup>10</sup> shows that college students who show a combination

of ADHD and a learning disability seem to struggle the most compared to their peers, though individuals with ADHD alone still show poorer writing abilities than college students with no disability. ADHD college students show a generally poorer quality of writing and tend to write less than other college students. Thus, it appears that for those individuals with ADHD who experience writing difficulties throughout childhood these difficulties persist even into adulthood. Research reports also suggest that more explicit instruction is needed to assess and assist individuals with learning disabilities to develop better writing skills, and it is likely that many children with ADHD require the same approach.

### Program example

In order to address the development of sentence, paragraph, and essay writing, the University of Kansas Center for Research on Learning publishes a curriculum that represents one example of a structured writing intervention.<sup>11</sup> As with other good strategies that help children with various kinds of learning difficulties, the writing intervention takes into account the fact that some children have difficulty processing instructions and that they need more complex tasks to be broken down into more manageable steps. The intervention intends to help children learn and remember rules for good writing and provides structures to follow and tools to use that facilitate writing development. While it is beyond the scope of this letter to describe in detail such an intervention, the following examples serve to illustrate some of the strategies used, though they should be seen as only a small part of the larger, more comprehensive intervention. As with each aspect of the writing process, sentence writing is taught in a structured step-by-step manner. One strategy used helps students to systematically help them explore the idea they wish to communicate as well as the words and sentence structure that will help them communicate that idea effectively. Important components of the paragraph writing intervention

include helping children to generate and list ideas related to their topic, to plan their point of view and what verb tense they will use, and to think about how they will sequence their ideas and transition from one idea to another. When it comes to essay writing, children are encouraged to think about what they already know about this topic and then to gather additional information. More complex diagramming tools are used to help students organize their ideas with a strong emphasis on helping students transition from one idea to another within the paragraph as well as transitioning from one paragraph to the next in a fluid and systematic way. While there is concrete evidence to suggest that children with learning disabilities benefit from such an approach, this has not yet been formally explored with children who struggle with ADHD. However, given information we do know about these children, it is reasonable to conclude that a structured step-by-step approach that offers much support and encouragement along the way can help to facilitate the development of written expression skills.

### Summary

Several points can be made based on the material presented here. First, motor coordination weaknesses that children with ADHD commonly experience put them at risk for handwriting problems. Difficulty with this first stage of writing development would put any child at risk for difficulties developing other writing skills. Second, it is clear that in general children with ADHD show a higher incidence of learning disabilities whether they are associated with reading, math, or writing. Third, it is very likely that executive functioning skills play an important role in the normal development of writing abilities. It is also very likely that children with ADHD show an executive functioning deficit. These deficits put the ADHD child at risk for producing disorganized writing and likely contribute to a high degree of avoidance and reduction in writing

output. Virtually all of the symptoms typically associated with ADHD put these children at risk for difficulties completing any number of other complex tasks. Though there may very well be challenges along the way for children with ADHD in their pursuit of writing skills, some well developed interventions that may be helpful in overcoming these difficulties are available.

<sup>1</sup>Graham, S. (1999). Handwriting and spelling instruction for students with learning disabilities: A review. *Learning Disability Quarterly*, 22, 78-98.

<sup>2</sup>Peeverly, S.T. (2006). The importance of handwriting speed in adult writing. *Developmental Neuropsychology*, 29, 197-216.

<sup>3</sup>Cited in Barkley, R.A. (2006). *Attention-Deficit Hyperactivity Disorder – Third Edition*. New York: Guilford.

<sup>4</sup>E.g. see Eliasson, A.C., Rosblad, B. & Forssberg, H. (2004). Disturbances in programming goal-directed arm movements in children with ADHD. *Developmental Medicine & Child Neurology*, 46, 19-27.

<sup>5</sup>Schoemaker, M.M. et al. (2005). Deficits in motor control processes involved in production of graphic movements of children with ADHD. *Developmental Medicine & Child Neurology*, 47, 390-395.

<sup>6</sup>Graham, S., Harris, K.R. & Fink, B. (2000). Is handwriting causally related to learning to write? Treatment of handwriting problems in beginning writers. *Journal of Educational Psychology*, 92, 620-633.

<sup>7</sup>Wakely, M.B. et al. (2006). Subtypes of written expression in elementary school children: A linguistic-based model. *Developmental Neuropsychology*, 29, 125-159.

<sup>8</sup>Hayes, J.R. (1996). A new framework for understanding cognition and affect in writing. In

CM Levy & S Ransdell (Eds.), *The science of writing* (pp. 1-27). Mahwah, NJ: Lawrence Erlbaum.

<sup>9</sup>Altemeier, L. et al. (2006). Executive functions in becoming writing readers and reading writers: Note taking and report writing in third and fifth graders. *Developmental Neuropsychology*, 29, 161-173.

<sup>10</sup>Gregg, N. et al. (2002). Discourse complexity of college writers with and without disabilities: A multidimensional analysis. *Journal of Learning Disabilities*, 35, 23-40.

<sup>11</sup>For a review of this program see Schumaker, J.B. & Deshler, D.D. (2003). Can students with LD become competent writers? *Learning Disability Quarterly*, 26, 129-141.

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