

Editorial: The Role of Intellectual Processes in the *DSM-V* Diagnosis of ADHD

In May 1968, the American Psychiatric Association published the second edition of its *Diagnostic and Statistical Manual of Mental Disorders (DSM-II)*. Under the category of behavior disorders of childhood and adolescence, a condition referred to as hyperkinetic reaction of childhood (or adolescence) was described as a problem “characterized by over activity, restlessness, distractibility and short attention span, especially in young children; the behavior usually diminishes in adolescence” (American Psychiatric Association, 1968, p. 50). The manual noted that these conditions “are more stable, internalized and resistant to treatment than transient situational disturbances but less so than psychoses, neuroses and personality disorders” (p. 50). Beyond these guidelines, this manual provided little in the way of normative comparisons, statistical analyses, or methods of data collection. It was assumed that the diagnosis was made based on the characteristics described and/or observed by parents, teachers, and the diagnostician.

Thirty-two years later, the text revision of the fourth edition (*DSM-IV-TR*) of the diagnostic and statistic manual of the American Psychiatric Association (2000) was published. In the interim, the diagnostic manual grew from 134 to 943 pages. The diagnosis of hyperkinetic reaction of childhood evolved and is now referred to as ADHD. The original description of eight lines grew to a set of diagnostic criteria and accompanying descriptions filling 8 pages. Yet the diagnostic process remained unchanged—ADHD is evaluated on the basis of the correspondence of behavioral characteristics described by parents and *DSM* criteria.

The essential feature of ADHD is currently described as a “persistent pattern of inattention and/or hyperactivity-impulsivity that is more frequently displayed and more severe than is typically observed in individuals at a comparable level of development” (American Psychiatric Association, 2000, p. 85). The current diagnostic criteria contain five parts (A through E). Part A contains the often-cited 18 diagnostic symptoms; Part B requires that symptoms must cause impairment before age 7; Part C that impairment must be present in two or more settings; Part D that there is clear evidence “of clinically significant impairment in social, academic or occu-

pational function” (American Psychiatric Association, 2000, p. 93); and finally, Part E requires that symptoms should not occur exclusively during the course of other conditions or be better accounted for by other mental disorders. One of those conditions mentioned, pervasive developmental disorder, has already been found to frequently be comorbid rather than a rule out for ADHD (Frazier et al., 2001; Goldstein & Schwebach, 2004). ADHD grew from a simple description to a set of diagnostic criteria based on an effort to provide empirical, statistically valid and reliable descriptors (McBurnett et al., 1999).

Though a citation is made in the *DSM-IV-TR* that those with ADHD may demonstrate variability in IQ, the diagnostic criteria continue to reflect behavioral rather than cognitive manifestations. The quest to provide a cognitive profile for ADHD using traditional, general ability measures employing verbal and nonverbal tests or a variety of neuropsychological measures has been generally unsuccessful. However, we believe careful consideration should be given to the emerging research relative to cognitive processes. Cognitive processes could be incorporated into the *DSM-V* diagnostic criteria for ADHD. As the *DSM-V* will not be published until at least 2012, there is more than sufficient time to begin an organized course of research toward this end.

Subtypes of ADHD

It is widely accepted that there are two sets of behaviors associated with the diagnosis of ADHD. ADHD combined type (ADHD-C), which is associated with the role of “executive functions” and, ADHD inattentive type (ADHD-I), which is associated with selective attention problems. And of course, there is a group of children with ADHD-C and ADHD-I as well as those with comorbid learning disabilities. An understanding of the cognitive processing components of these groups may help with diagnosis and also facilitate the design of effective educational and behavioral treatments. In this editorial, we present one theory of conceptualizing and measuring these psychological processes. We acknowledge our pro-

fessional interest in this model (Naglieri, 1999) and note that this is but one of several models that can be studied.

ADHD and cognition

Children with ADHD-C are characterized as having poor behavioral inhibition (Barkley, 1997). Their symptoms include, for example, problems with inhibition of prepotent responses, which limits control of behavior; poor planning and anticipation; reduced sensitivity to errors; poor organization; impaired verbal problem solving and self-directed speech; poor rule-governed behavior; poor self-regulation of emotion; problems developing, using, and monitoring organizational strategies; and self-regulation and inhibition problems (Barkley, 2003). These children are sometimes described as showing difficulty with executive functions or metacognition, which has been associated with the prefrontal lobes (Roth & Saykin, 2004; Seidman et al., 2004). If ADHD-C is conceptualized as a failure of self-control within the context of prefrontal lobe functions (see Goldberg, 2001), then a connection between the disorder and the conceptualization of cognitive processes such as those described by Naglieri and Das (2005), which in turn is based on the seminal work of A. R. Luria (1980), can be made.

Luria (1980) described three “functional units” of the brain. The function of the first unit is regulation of cortical arousal and attention, the second codes information using simultaneous and successive processes, and the third provides for strategy development and use, self-monitoring, and control of cognitive activities. It is the third functional unit that is relevant to ADHD-C. This functional unit is associated with the prefrontal areas of the frontal lobes of the brain. Luria (1980) stated that “the frontal lobes synthesize the information about the outside world . . . and are the means whereby the behavior of the organism is regulated in conformity with the effect produced by its actions” (p. 263). The cognitive processes associated with this unit provides for the programming, regulation, and verification of behavior and is responsible for behaviors such as asking questions, solving problems, self-monitoring, regulation of voluntary activity, conscious impulse control, and various linguistic skills, such as spontaneous conversation (Luria, 1973). The third functional unit provides for the most complex aspects of human behavior, including personality and consciousness (Das, 1980). Goldberg (2001) succinctly summarizes this frontal lobe dysfunction as “poor planning and foresight, combined with diminished impulse control and exaggerated affective volatility” (p. 179). This conceptualization of processes forms the basis of the Planning,

Attention, Simultaneous, Successive (PASS) theory described by Naglieri and Das (2005).

ADHD-C

Naglieri (2005) summarized the research on samples of children with ADHD-C. These studies have indicated that children with ADHD-C earn average scores on all measures of PASS except planning (Dehn, 2000; Naglieri, Goldstein, Iseman, & Schwebach, 2003; Naglieri, Salter, & Edwards, 2004; Paolitto, 1999 **PLS PROVIDE REFERENCE**). It is important to note that Naglieri et al. (2003) also reported that children with ADHD-C had a different PASS profile than those with anxiety disorders. Most recently, Van Luit, Kroesbergen, and Naglieri (2005) found that Dutch children with ADHD-C also earned their lowest score on measures of planning. These results support the view of Barkley (1997) that ADHD-C involves problems with behavioral inhibition and self-control, which is associated with poor executive control (planning as described by Goldberg, 2001; Naglieri & Das, 2005). These findings are particularly noteworthy because they are in contrast to profiles reported for children with reading disabilities (low on successive processing) and anxiety disorders (no PASS weakness) and suggest a profile different than those for children who have ADHD-I.

ADHD-I

Barkley (2003) notes that the predominantly inattentive type of ADHD-I reflects impairment in selective attention and that these children appear daydreamy, hypoactive, passive, apathetic, lethargic, confused, and sluggish, as well as socially passive and withdrawn. Luria’s (1973) description of the first functional unit has relevance to this type of attention deficit because it provides the brain with the appropriate level of arousal or cortical tone and directive and selective attention. When a multidimensional stimulus array is presented to a person who is then required to pay attention to only one dimension, the inhibition of responding to other (often more salient) stimuli, and the allocation of attention to the central dimension, depends on the resources of the first functional unit. Luria (1973) stated that optimal conditions of arousal are needed before the more complex forms of attention involving “selective recognition of a particular stimulus and inhibition of responses to irrelevant stimuli” (p. 271) can occur. This is different from inhibition needed to control behavior (a problem for those with ADHD-C) in that attentional inhibition means focus on

relevant stimuli and resistance to responding to distractors in the environment. This is perhaps best illustrated by the familiar description of children with ADHD-C who can attend to their favorite computer game but have considerable problem staying on task in the classroom. They can attend because ADHD-C is characterized as having a failure of behavioral control, whereas ADHD-I is described as having a failure of selective attention. Unlike the research on ADHD-C, there have been no studies involving PASS processes for children with ADHD-I, but some descriptions using case studies are reported (see Naglieri & Pickering, 2003). Additionally, initial research (Das, Snyder, & Mishra, 1992) suggests a strong relationship between teachers' rating of attentional behavior in the classroom and performance on attention as measured by the Cognitive Assessment System. This is, obviously, an area where more research is needed.

We agree with Barkley (2003) that children with ADHD-I are probably better conceptualized as having a separate disorder, but it seems even more important to question the very title of ADHD-C. Why should children characterized as having poor behavioral inhibition (Barkley, 1997) be described as suffering from an attention deficit? Using such a descriptor leads to the logical assumption that these children are poor in attention (as in the ADHD-I). It would be more logical and consistent with the symptomology to describe children with ADHD-I as attention deficit because they do have problems with selective attention, but those with ADHD-C require a different label, perhaps not having an attention deficit but rather a self-regulation deficit.

Implications for Diagnosis

We propose that assessment of cognitive processing should be considered to play an essential role in the *DSM-V* assessment and diagnosis of ADHD-C and ADHD-I so that children who are identified possess cognitive characteristics consistent with the subtypes of the disorder. The tests used must be well-standardized measures with demonstrated reliability and validity. Determination of *DSM-V* ADHD would in part require assessment by a highly trained assessment professional who would communicate his or her results to a physician if treatment using medication is to be considered.

It will be imperative to differentiate between children who have a weakness in basic processing relative to their overall level of functioning from those who are also impaired relative to an average person standard (see Naglieri, 1999, 2000, for more discussion of the topic of relative and cognitive weaknesses). This two-dimensional ap-

proach ensures that the child with a disorder in cognitive processing is weak relative to his or her own overall level and relative to peers and that the area of weakness is substantially below normal. Children who have a cognitive weakness are very likely to also have academic failure (Naglieri, 2000).

Implications for Intervention

Children with a cognitive weakness in planning (possibly ADHD-C) or attention (possibly ADHD-I) could qualify for special educational services as having a specific learning disability because current IDEIA **PLS WRITE OUT** (2004) law defines a specific learning disability as

a disorder in one or more of the basic psychological processes involved in understanding or in using language, spoken or written, which disorder may manifest itself in the imperfect ability to listen, think, speak, read, write, spell, or do mathematical calculations. (602(30)(A))

A child with ADHD with a planning or attention (or both) cognitive weakness with impaired academic functioning should be considered eligible for special educational services. This would allow these children the opportunity to receive academic instruction that takes into consideration their need to be more strategic and planful (ADHD-C) or better manage their focus of attention and resistance to distraction (ADHD-I) when engaged in academic activities.

The differentiation of children who have a cognitive processing weakness and the constellation of symptoms that indicate ADHD-C or ADHD-I from children who have all the symptoms but do not have a cognitive processing weakness has considerable implications for both research and educational practice. We propose that children with a cognitive weakness require specialized academic instruction that takes into consideration their particular learning needs. In contrast, children who demonstrate the symptoms without the cognitive weakness appear to have the "ability" to perform and may primarily require environmental and behavioral management.

The implications a cognitive weakness in planning or attention has for intervention are considerable, but there is a need for more research in this area. There is a research base on which to discuss the relationships between planning and academic instruction, but research is needed regarding attention and instruction. A series of research studies have been conducted that indicate that children who are poor in planning can be taught to be more planful

when they complete academic tasks and that facilitating the strategic completion of classroom work positively affects academic performance. This line of research began with the work of Cormier, Carlson, and Das (1990) and Kar, Dash, Das, and Carlson (1992), who taught children to discover the value of strategy use. They demonstrated that children who performed poorly on measures of planning demonstrated significantly greater gains than those with higher planning scores. This research was extended by Naglieri and Gottling (1995, 1997). These authors demonstrated that learning-disabled children's use of strategies or plans could be facilitated, resulting in improved performance in math calculation. Those studies were further extended by Naglieri and Johnson (2000). They reported that children with a cognitive weakness in planning improved considerably over baseline rates, whereas those with no cognitive weakness improved only marginally in classroom math performance. Most recently, Iseman (in press) compared regular instruction to planning facilitation for two groups of students with ADHD-H and found that those who received the planning facilitation method consistently outperformed the regular instruction group on classroom math worksheets (effect sizes = 0.6 vs. 2.4 for regular and planning facilitation, respectively) as well as math fluency (0.1 vs. 1.3) and numerical operations tests (-0.2 vs. 0.4). This study in particular suggests that children with ADHD-C should receive instruction that takes into consideration their particular cognitive processing need.

Taken as a whole, these studies suggest that children who are poor in planning and poor in math calculation improved considerably when provided an intervention that helped them better use their planning processes and be less impulsive and more thoughtful and reflective when completing academic work. It is important to note that this line of research has also been extended to reading comprehension (Haddad et al., 2003), further suggesting that teaching children with an understanding of their PASS cognitive processing profile can have a positive and significant effect on their academic performance.

How should we approach intervention of ADHD-I? Papadopoulos, Das, and Parrila (2003) suggested using PASS Reading Enhancement Program (PREP; Das, YEAR) to help manage impaired selective attention and reading as well. The PREP tasks (see Das, Naglieri, & Kirby, 1994; Naglieri & Das, 2005) improve attention in two ways. First, PREP activities decouple performance from punishment because every attempt at a solution is rewarded, increasing the intrinsic motivation. Attention is facilitated by the motivating character of the tasks combined with constant and positive feedback from the in-

structor. Second, attention and planning are reinforced in this training program. Thus, attention is improved by replacing anxiety and fear of punishment in learning situations and reducing distraction by a behavioral approach. Although PREP has been found to be effective for children with PASS weaknesses (see Naglieri & Das, 2005, for a summary), further research is needed on the utility of PREP for children with ADHD-I.

Practical Issues

When researchers and practitioners attempt to determine if children with ADHD have difficulty with the processes associated with, for example, the frontal lobes, called planning by some and executive functioning by others, the tests they use to assess this concept must have good reliability and validity. Researchers should carefully examine the processing demands of their tests to help clarify their use for ADHD diagnosis. For example, Naglieri and Das (1997) found that the Tower of Hanoi task, which is often described as a measure of executive functioning, correlated strongly with both planning and successive processing. This means that using such a tool would likely find low scores for children with ADHD-C who have low planning but also children with reading disabilities, which are associated with poor successive processing (Das et al., 1994; Naglieri, 1999). It may be necessary, therefore, to carefully examine the validity of various methods that have been previously used from a cognitive processing perspective that is relevant to ADHD.

We are also not suggesting that practitioners find yet another way to interpret subtest performance from traditional IQ and neuropsychological tests nor some type of cross-battery approach to interpretation of the cognitive processing problems in planning and attention discussed here. There is a well-known history of the failure of traditional measures to show sensitivity to the cognitive problems often seen in children with ADHD (see Barkley, 1997). Additionally, well-standardized measures are necessary to ensure that the variables included in any study can be adequately evaluated. Many neuropsychological and experimental tasks have not undergone the rigorous process of test development and standardization, yet they are used in research to determine the characteristics of children and adults with attention deficits. We stress the need for psychometrically strong measurement in all research and practice. Because of the importance diagnosis of ADHD has for a child, it is equally important that the measures employed in the diagnosis meet professional standards and practices.

Summary

We are advocating for consideration of an evolutionary, perhaps some might say revolutionary, change in the *DSM-V* diagnosis of ADHD-C and ADHD-I that must include the historical, behavioral, academic, and relevant cognitive components of this disorder. A critical dimension of this approach is to differentiate those who have behaviors associated with ADHD-C and ADHD-I with cognitive weakness and those who have the behaviors without cognitive weakness. This will allow for continued research on differentiated treatment planning. There is much work to do for *DSM-V*, but we suggest that adding the theoretical perspective of cognitive processes into the diagnosis of ADHD may hold a critical key to better understand and treat individuals with attention deficits. For these reasons, we strongly urge those who will formulate and validate the *DSM-V* to consider cognitive processing characteristics as part of the diagnostic criteria for ADHD.

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