

Psychologists, schools, and families have come a long way in their collective understanding of attention-deficit disorder over the past decade. Most of us now understand that to think of ADHD as merely a problem with distraction, or excess energy, is to grossly simplify what is a complex neuropsychological syndrome.

Extensive research has revealed the extraordinary impact of ADHD on the lives of children. Perhaps the most important contribution of scientific research, from a diagnostic perspective, is that inattention and hyperactivity are symptomatic of *executive control impairment*, or what is sometimes termed “executive dysfunction.” This brief article is intended to summarize the relationship between ADHD and executive control, and to highlight the ways in which parents and teachers can assist students whose learning potential is adversely affected by executive dysfunction.

What are Executive Functions?

Psychologists and related neuroscientists refer to executive functions to describe a unique set of mental functions performed by the prefrontal lobes of the cerebral cortex, in conjunction with subcortical regions of the brain (limbic system). It is only within the last decade that executive functions have come to be fully appreciated for their impact on cognitive and emotional functioning, and more specifically, *cognitive inhibition and initiation, self-regulation, and motor output*. In general, executive functions are a constellation of related, yet distinct abilities that provide for intentional, goal-directed action, including planning and organization. Executive functions orchestrate numerous aspects of thought and action.

Operational Definitions:

Please note that executive functions have been described by various researchers using different terms. Although the different vocabularies occasionally lead to confusion, the actual observations of researchers have generally been similar. To better understand how important executive control is, consider the following list of executive functions (Barkley, 1988; McCloskey, 2001):

- Orchestrating short-term or working memory resources
- Organizing the storage of information in long-term memory
- Facilitating retrieval of information from long-term memory
- Managing and regulating speed of information processing
- Inhibiting unwanted behavioral responses
- Directing and sustaining attention while screening out interference
- Interrupting distractions to return to attentional priority
- Regulating social behavior including empathy and social sensitivity
- Facilitating self-awareness
- Applying hindsight and foresight in processing information
- Modifying performance based on feedback

As the above list makes clear, executive functions have a tremendous impact on our capacity to learn new information, perform what we already know, and adapt to new environments and challenges. The development of attentional control, future-oriented intentional problem-solving, and self-regulation of emotion starts in infancy and continues through preschool and school-age years.

However, the demand for executive functions is limited until the upper elementary grades and, most notably, the middle school years (Holmes, 1987). As children make the adjustment from learning specific academic skills (e.g., reading writing, calculating) to applying these skills for learning content areas (e.g., literary analysis, report writing, algebra) the demand for executive control increases dramatically. As children enter middle school, they must also contend with significantly less organizational support than they had in elementary school.

The following table has been suggested (Gioia et.al, 2001) as a guide for understanding how executive function deficits may affect children and adolescents in school:

Executive Function Domains, Definitions, and Associated Behavioral Dysfunction

Eight Skills	Definition	Dysfunction
<i>Initiate</i>	Beginning a task or activity	Has trouble getting started on homework or chores
<i>Inhibit</i>	Not acting on an impulse or appropriately stopping one’s own activity at the proper time	Has trouble “putting the brakes” on behavior; acts without thinking
<i>Shift</i>	Freely moving from one situation, activity, or aspect of a problem to another as the situation demands	Gets stuck on a topic or tends to perseverate
<i>Plan</i>	Anticipating future events, setting goals, and developing appropriate steps ahead of time to carry out an associated task or action	Starts assignments at the last minute; does not think ahead about possible problems
<i>Organize</i>	Establishing or maintaining order in an activity or place; carrying out a task in a systematic manner	Has a scattered, disorganized approach to solving a problem; is easily overwhelmed by large tasks or assignments
<i>Self-monitor</i>	Checking on one’s own actions during, or shortly after finishing, the task or activity to assure appropriate attainment of goal	Does not check work for mistakes; is unaware of own behavior and its impact on others
<i>Emotional control</i>	Modulating/controlling one’s own emotional response appropriate to the situation or stressor	Is too easily upset, explosive; small events trigger big emotional response
<i>Working memory</i>	Holding information in mind for the purpose of completing a specific and related task	Has trouble remembering things, even for a few minutes; when sent to get something, forgets what he or she is supposed to get

ADHD and Learning Disorders

By definition, all children experiencing ADHD have executive control deficits. Of particular importance to parents and teachers is the critical link between executive control and ADHD.

Effective working memory is essential to concentration. Most individuals diagnosed with ADHD have a problem retaining information in working memory due to inattentiveness or impairment in blocking environmental interference. When working memory is impaired, newly learned information is not fully encoded, and is thus unavailable for retrieval later on. All of the executive control deficits indicated above have been observed in people diagnosed with ADHD. Neither ADHD, or disorders of executive function, come in “cookie cutter” forms. Rather, the expression of these syndromes is somewhat unique in each individual. Thus the basic rule in assessing these problems is to detect *patterns* of dysfunction. Of particular importance in assessing attentional problems is a child’s *tonic level* or general state of alertness. When children are understimulated relative to their own threshold for attention, learning and performance will be impaired.

Intervention

Executive control intervention comes in two primary forms: environmental adaptation and psychostimulant medication. Stimulants may provide relief by correcting the underlying neuropsychological deficit in behavioral inhibition. This means that for some individuals, medication makes it possible to block the interference of information competing for a child’s attention so that attention is focused on appropriate priorities.

From a behavioral perspective, teachers and parents can assist those with executive dysfunction by acting as *surrogate executive controls*. This means providing an appropriate level of stimulation while reinforcing directives, goals, and related forms of future-oriented planning, organizing, and thinking.

Acting as a surrogate also involves helping a child to understand the meaningful links between performance and outcome; clarifying for children the consequences of not initiating an action, or not inhibiting various types of environmental interference. Parents and teachers working together can expect to measurably improve a child’s self-awareness by setting the stage for repeated rehearsal, and actively using reinforcement techniques; (as always, reinforcement is most effective when applied *immediately* and *consistently*).

Unfortunately, it is not reasonable to expect intervention benefits to carry over to new places or dramatically new tasks. **Everyone involved in helping those with executive control problems should recognize that related learning challenges and/or behavioral problems are not due to a poor attitude.** Inattention is not defiant or lazy behavior.

Ideally, the “dysexecutive” child will be placed in a learning environment where she or he will receive the type of compensatory instruction that the syndrome requires. Such placement is clearly a challenge in these days of stretched budgets. However, as parents, teachers and mental health professionals, we owe children our energy and advocacy for thoughtful and fair treatment. Our scientific sophistication in understanding the syndrome of ADHD has grown so remarkably that we can no longer dismiss the syndrome’s symptoms as nuisance behavior that a child will outgrow. The learning challenges of ADHD often extend well into the college years. The good news is that we can make a difference by working in a strategic and cooperative manner. Let’s challenge ourselves to make the commitment to helping that this difficult syndrome requires.

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