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ABSTRACT

This policy brief describes attention deficit hyperactivity disorder (ADHD) as involving three characteristics: inattention, impulsivity, and hyperactivity. The brief reviews the causes of ADHD, including the belief that it is primarily an inherited, neurobiological disorder. The effects of ADHD on children are discussed and may include: other learning, behavioral, emotional, and developmental problems; memory and organizational problems; poor self-esteem and poor social adjustment; and school failure. The diagnosis of ADHD is reviewed, including observed neurobiological differences in individuals with ADHD. The multiple methods used to diagnose ADHD are described, including: (1) interviews with the parents and child; (2) direct observation in various settings; (3) a battery of achievement and psychometric tests; and (4) feedback from parents, teachers, and others about the child's behavior. The brief addresses how ADHD is treated and the determination that a multimodal approach is best. Recommendations for schools include: procedures for identifying a student with ADHD should allow enough time to gather adequate information; modifications and accommodations should be made to assist students with ADHD; and interventions need to be proactive and focus on the prevention of negative behavior. (Contains 39 references.) (CR)

Policy Briefs

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UNDERSTANDING AND IDENTIFYING CHILDREN WITH ADHD: FIRST STEPS TO EFFECTIVE INTERVENTION

To the average person, behavior* is a matter of choice, control, and will. Although we may not want to, we can turn off the football game to finish that report for work. When we're angry and would like to tell off a coworker, we can use self-control to keep quiet for the sake of workplace harmony. We can rely on our willpower to resist that second piece of pie, and if we fail, we can just try harder next time. We assume everyone shares these abilities. That's why the average administrator or teacher may find it difficult to understand the behavior of children with Attention-Deficit/Hyperactivity Disorder (ADHD).

Individuals with ADHD are neurobiologically different from the average person[1], and this difference interferes with their ability to inhibit, control, and direct behavior in response to environmental and situational demands[2]. The student with ADHD who runs to the window when a passing car honks or watches students passing in the hall instead of finishing math is no more choosing to disobey the rules or the teacher than the blind child is choosing not to see the blackboard.

ADHD ranks as "the most common neurobehavioral disorder of children,"[3] affecting five percent[4] (or more[5]) of the school-age population. This is one compelling reason for policymakers to know what ADHD is and understand how it affects children. Children with ADHD need supportive policies and administrative structures to help them achieve education goals and meet standards for learning. This paper discusses the characteristics and causes of ADHD, how it is diagnosed and treated, how it affects children and school performance, its history, and long-term outcomes. The next issue in the series will focus on specific school accommodations that build academic success.

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WHAT IS ADHD?

ADHD is a neurobiologically based disorder characterized by inappropriate levels of three observable behaviors: inattention, impulsivity, and hyperactivity.[6] It includes three primary subtypes based on these behaviors: Predominantly Inattentive Type, Predominantly Hyperactive-Impulsive Type, and Combined Type.[7] (See box for identifying criteria.) Because they rarely display hyperactivity, children with the Predominantly Inattentive Type may be overlooked or thought to be "just lazy or unmotivated."[8]

Barkley—one of the world's foremost researchers on ADHD—believes that all three characteristic behaviors result from a deeper, underlying problem.[12] "The primary problem," he says, "is really one of inhibiting behavior or controlling the impulse to respond to a situation."[9] This inability to delay a response interferes with executive functions "critical to developing self-control and directing behavior toward the future." It affects an individual's ability to delay gratification, reflect on events (hind-

The purpose of this brief is to help policymakers understand Attention-Deficit/Hyperactivity Disorder (ADHD) and its effects on students. It is the second in a series of Policy Briefs about ADHD, a disorder characterized by excessive degrees of inattention, impulsivity, and hyperactivity. An earlier brief addressed the legal responsibilities of schools to serve students with ADHD. The third in the series will focus on school-based interventions and accommodations.

* The term behavior as used in this paper, refers strictly to Merriam-Webster's (10th Edition) definitions b and c, meaning "anything an organism does involving action and response to stimulation," and "the response of an individual . . . to (the) environment." It is NOT used to mean conducting oneself properly, as in good or bad behavior.

sight, foresight, and insight), separate fact from feeling, exercise willpower and self-discipline, analyze and synthesize information, connect actions to consequences, use self-speech to follow rules and regulations, and organize behavior to achieve future goals.[9]

In other words, children with ADHD have a dysfunctional "hold" button. They cannot stop their responses to events and situations long enough to think about and modify what they are saying or doing. They may be able to recite classroom rules, for example, but in the heat of the moment they are unable to stop, think about the rules, and alter their behavior. Therefore, their action in this case results not from willful disobedience but from the inability to apply their skills and knowledge at the "point of performance."[10]

Hallowell and Ratey[11] also view ADHD as a problem of inhibition and disinhibition. They note that individuals with ADHD "don't mean to do the things (they) do, and ... don't do the things (they) mean to do."

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What Causes Attention Deficit Disorder?

ADHD may have several different causes.[3,12,13] Most experts, however, believe that it is primarily an inherited, neurobiological disorder. Family studies—especially studies of twins and adopted children—support this position.[14,15] Other causes include external factors such as complications during pregnancy and birth, illness, lead poisoning, injury, and prenatal drug exposure.[3,12,13,15] Researchers have discovered a possible link between ADHD and thyroid disorders that may account for a small percentage of cases.[16,17,18] Regardless of the cause, individuals with ADHD inherit or acquire brains that function differently from those of the general population.[3]

Many studies demonstrate the neurobiological features of ADHD—depressed cerebral glucose metabolism, neurotransmitter deficiencies, abnormal brain wave patterns, and structural differences.[1,3,19] Where the problem originates, however, and how brain systems interact to produce the characteristic behaviors are the focus of ongoing research.

Since most people from time to time appear impulsive, inattentive, or overly active, ADHD may represent one end of a spectrum of neurological variation.[20] Just as normal differences in height and weight are ignored in most social situations, so, too, are neurological differences—unless they precipitate troublesome situations, as is often the case with ADHD.

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How Does ADHD Affect Children?

ADHD can cause mild to severe impairment. The disorder can be so debilitating that affected students can be accommodated at school under three federal statutes: (1) the Individuals with Disabilities Education Act, Part B [IDEA]; (2) Section 504 of the Rehabilitation Act of 1973; and (3) the Americans with Disabilities Act of 1990 [ADA].[21]

In the school-age ADHD population, boys outnumber girls three to one.[22] Some experts feel that girls may be underdiagnosed, while minorities—especially African Americans and Hispanics—may be overdiagnosed.[14]

ADHD frequently coexists with other learning, behavioral, emotional, and developmental problems.[14] These include learning disabilities—particularly reading, writing, spelling, and math—speech and language disorders, conduct disorder, oppositional defiant disorder, mood disorders, and anxiety disorders. ADHD also affects memory—especially working memory—and organization.[3]

Untreated ADHD can lead to poor self-esteem and poor social adjustment.[23,24,25] Children with ADHD commonly experience interpersonal difficulties and peer rejection, and have been shown to "elicit negative reactions from almost everyone...,"[3] including more negative feedback from teachers.[23,24]

ADHD occurs across all levels of intelligence, yet even bright or gifted children with ADHD may experience school failure.[3] Despite natural ability, their inattentiveness, impulsivity, and hyperactivity often result in failing grades, retention, suspension, and expulsion. Without proper diagnosis, accommodations, and intervention, children with ADHD are more likely to experience negative consequences.

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How Does ADHD Affect School Performance?

The neurobiological factors associated with ADHD figure into a child's overall school performance. ADHD characteristics can fluctuate from hour to hour and from day to day, causing a distinctive inconsistency in performance often mistaken for indifference or lack of effort.[3,12] As a result, teachers and parents often tell children with ADHD, "I know you can (do this work, stay in your seat, etc.) because I've seen you do it before." The demands of the situation also affect performance; ADHD symptoms become more obvious on tasks requiring sustained effort, inhibition, organization, and self-regulation.[22]

Brain-imaging studies of adults with ADHD by Zametkin and colleagues at the National Institute of Mental Health revealed significant reductions in the brain's glucose metabolism in "...areas...shown to be involved in the control of attention and motor activity."[26] Zametkin points out that disorders of the affected regions "often result in inattentiveness, distractibility, and an inability to inhibit inappropriate responses." For example, the premotor cortex—one affected area—helps individuals respond voluntarily to external cues, and is crucial for suppressing "relatively automatic responses" to stimuli.[27] Underactivity of this brain region could therefore cause behaviors such as "calling out in class, verbal interruptions, and, in general, acting before thinking."[26]

Deficiencies of neurotransmitters, the brain's chemical messengers, may also play a major role in ADHD behaviors.[19] Researchers have studied one family of neurotransmitters in particular—the catacholamines (norepinephrine and dopamine).[28] These neurotransmitters affect parts of the brain that "(1) regulate motor inhibition and control and (2) project into the areas of the frontal lobes that organize and regulate goal-directed attentive behavior."[29] The frontal lobes, comprising 40 percent of the brain area, are the seat of behaviors such as "developing goal-directed plans (... bringing homework materials home from school),... allocating resources (sitting down and getting busy on homework), and ...inhibiting behaviors that interfere with goal achievement (watching TV)."[1]

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The inability to inhibit impulses and control behavior increases the risk of school failure. The organizational structure of most schools requires that children be able to sit still, remain quiet, work independently, organize and keep track of materials, monitor their time and performance, and follow rules and directions. A child's ability to meet these environmental and situational demands in part determines school success.[30]

Children with ADHD, because of neurological impairment, have difficulty regulating their behavior to meet such demands, yet grading and discipline policies hold them accountable and punish those who do not comply. They need to be taught that they are accountable for their actions, but punishment for academic or social behavior beyond their control is both unhelpful and inappropriate.

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How Is ADHD Diagnosed?

No single medical or psychological test for ADHD currently exists. Although researchers have observed neurobiological differences in individuals with ADHD, the procedures used to gather such information are too expensive and too risky, and the results thus far have been too inconclusive, to justify routine testing of children. Instead, diagnosis depends on observing and assessing behavior, the by-product of brain function. Teachers similarly judge student learning by evaluating behavior—through demonstrations of what students know and are able to do—rather than by directly observing the changes in the brain that occur with learning.

Diagnosing ADHD requires a comprehensive, professional assessment. It may be conducted either privately by a physician, psychiatrist, or psychologist, or through the public schools by a qualified professional employed for this purpose. In either case, the individual conducting the assessment uses multiple methods and instruments to gather the information needed for a diagnosis. These usually include (1) interviews with the child's caretakers and the child, if appropri-

ate, to determine the nature and scope of the child's difficulties and to rule out other causes, such as medical, emotional, or family problems; (2) direct observation of the child in various settings; (3) a battery of achievement and psychometric tests; and (4) feedback from parents, teachers, caregivers, and others about the child's behavior across situations.[6]

Parent and teacher observation typically plays a key role in assessment. To gather accurate data about a child's behavior, several behavior rating scales have been developed specifically for ADHD. Parents and teachers observe the child in various settings over a specified time period and use the rating scales to report what they see to the evaluator. The child, depending on his or her age, may be asked to complete similar ratings.

After collecting information from all sources, the professional in charge of assessment analyzes the results to determine if the child's behavior meets diagnostic criteria for ADHD set forth in the *Diagnostic and Statistical Manual of Mental Disorders* (DSM-IV). The DSM-IV, published by the American Psychiatric Association, contains guidelines to help psychologists and psychiatrists diagnose mental disorders. To meet DSM-IV criteria, behavior must be maladaptive and inconsistent with the child's developmental level. This distinction is important, since behavior that is normal for a young child may be abnormal for an older child. There must be evidence of clinically significant impairment, and the impairment must be evident in two or more settings, must have been present for at least six months, and must have appeared before age seven.[7]

Some question the validity of these diagnostic procedures and criteria. They caution that ADHD "is so vaguely defined, it is tailor-made for bogus claims."[31] However, the new DSM-IV has narrowed criteria and tightened diagnostic procedures by requiring the impairment to be clinically significant and present in two or more settings.

Concerns about diagnosis may be answered by research now underway at the National Institute of Mental Health to locate a gene responsible for ADHD.[32] If researchers are successful, a blood test could one day confirm the diagnosis of ADHD in many cases, ending some of the suspicion and skepticism surrounding the disorder and current diagnostic methods.

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ADHD cannot be cured, but education and treatment can help individuals cope with their disability and succeed at home, school, and work.

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Early diagnosis. Early identification and intervention can help children with ADHD avoid negative outcomes in school. To make sure that disabled children are prepared to begin school, Part H of the Individuals with Disabilities Education Act (IDEA) requires that states provide evaluation and early intervention services for infants and toddlers through a multidisciplinary, interagency program. The Preschool Grant Program in Part B of IDEA provides these evaluation and early intervention services to preschoolers. Parts H and B have overlapping Child Find requirements: Part H policies and procedures must be consistent with those set forth in Part B. State departments of education have the responsibility to oversee compliance with Child Find requirements for both Parts H and B.[33]

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How Is ADHD Treated?

ADHD cannot be cured, but education and treatment can help individuals cope with their disability and succeed at home, school, and work. Most experts believe that ADHD is best treated through a multimodal approach that involves parents and caretakers, teachers, medical and mental health professionals, and the child. It includes educating parents, teachers, and the child about ADHD; training parents and teachers to use appropriate behavioral and academic interventions at school and at home; applying proper accommodations in the classroom; and providing medication, counseling, and social skills training, if needed.[6,10,13] Effective treatment depends on the collaboration of informed, trained teachers and parents.

Many children with ADHD take medication, especially the stimulants Ritalin, Dexedrine, and Cylert. From 60 to 90 percent of students with ADHD—two to six percent of the entire elementary school population—are treated with stimulant medication.[34] In most children, these medications can provide a short-term decrease in characteristic behaviors—inattention, impulsivity, and hyperactivity; however, they have not been shown to provide long-term benefits (such as improved academic

achievement and social adjustment) or to improve higher-order thinking processes.[34]

The U.S. Department of Education cautions that medication does not replace the need for effective classroom practices that aim to improve learning and achievement. Children with ADHD—medicated or not—benefit most from proper instruction, accommodations, and interventions.[35]

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Is ADHD Something New?

Because ADHD has received lots of media attention recently, many people believe it's something new, or just the latest mental health fad. Actually, only its name and the public's awareness of it are new: symptoms of the disorder have been around for centuries.[11] It has been recognized as a medical condition and reported in the literature since the beginning of this century.[13]

ADHD's present prominence in schools may be due to increased public awareness, greater cognizance of schools' legal responsibilities to serve children whose education is adversely affected by the disorder, and new expectations for all students. First, recent media coverage and articles in professional journals have helped parents and teachers learn more about ADHD. Second, schools have increased efforts to locate, identify, and evaluate all children suspected of having ADHD on the basis of a 1991 memorandum from the U. S. Department of Education[36] clarifying schools' legal obligation. Finally, current school reform efforts have set high standards for all students, including the disabled. Students who once dropped out of school to work on farms or in factories are now expected, with help, to achieve academically and graduate from high school.

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Do Children Outgrow ADHD?

Some children do mature in ways that cause their ADHD symptoms to diminish or disappear. For others, hyperactivity may abate but problems with impulsivity, inattention, and organization remain. Experts dispute the proportion of children for whom maturation is a cure, but most believe that one-third to one-half will continue to have ADHD symptoms as adults.[3] Hallowell and Ratey,[11] however, claim that only one-third of the ADHD population outgrow the disorder.

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ADHD is more a performance problem than a lack of knowledge and skills. Children with ADHD cannot apply what they know at the point of performance.

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Untreated adults who experience multiple symptoms are "most likely to engage in serious antisocial behavior and/or drug or alcohol abuse."[15] A long-term study has revealed that those who were diagnosed with ADHD as children are—compared to the general population—"disproportionately uneducated, underemployed and plagued by mental problems," and by their early 20's, are "twice as likely to have arrest records, five times as likely to have felony convictions and nine times as likely to have served time in prison."[37]

ADHD's characteristic behaviors can be assets if channeled positively. High energy levels, intensity about ideas and relationships, and affinity for stimulating environments can lead to successful careers as adult.[11,38] Individuals with ADHD may succeed as inventors, writers, artists, designers, or businessmen, or in stimulating but structured careers like fire safety, law enforcement, or the military. One psychiatrist claims that some of the "most prosperous entrepreneurs" have ADHD.[39] A long-term study revealed that almost 20 percent of the subjects with ADHD owned a small business, compared to only five percent of the control group without ADHD.[37]

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Implications for Schools

Based on his theory that ADHD is a disorder of response inhibition, Barkley[22] raises several issues important to decision-makers concerning identification, evaluation, and treatment of ADHD in classroom settings:

- ADHD is best identified by direct, long-term observation of the child in situations demanding sustained effort, inhibition, organization, and self-regulation. School procedures for identifying students with ADHD should allow time to gather adequate information, and should include teacher and parent behavior ratings as well as classroom observations by a professional.
- ADHD is more a performance

problem than a lack of knowledge and skills. Children with ADHD cannot apply what they know at the point of performance.[10] Schools cannot teach, and students cannot learn, how not to have ADHD. Instead, schools must provide modifications and accommodations that help children cope with the disability to improve their performance.

- ADHD is not likely to be detected on traditional academic, intellectual, or psychometric tests, since they are not designed to measure response inhibition and the capacity for self-regulation. Schools need to recognize the profound impairment created by disinhibition in order to understand school failure and choose effective accommodations and modifications.
- ADHD will appear as a discrepancy between intelligence and daily classroom performance, especially the ability to self-regulate behavior. Since certain grading and discipline policies assume the ability to self-regulate behavior, they may be inappropriate for children with ADHD, unless modifications and accommodations are in place to help the child meet expectations. Schools can help teachers and students address problem areas through well designed Individualized Education Programs (IEPs) and alternative discipline plans.
- To be effective, treatments for ADHD must be in place where and when behavior occurs. Strategies must prompt desired behaviors, provide immediate feedback and consequences, and be extended over time to maintain desired results. Thus, interventions should be proactive, focusing on prevention of negative behaviors and outcomes as well as providing an appropriate response to behaviors that have already occurred.

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In Conclusion

Many children with ADHD do overcome their disabilities and avoid negative outcomes. Correct diagnosis; early, effective intervention; and parental support are some predictors of long-term success.[37] To help policymakers and practitioners choose policies and practices that help children with ADHD meet education goals and achieve learning standards, the next issue of *Policy Briefs* will review the research on school-based interventions and accommodations.

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DIAGNOSTIC CRITERIA FOR ATTENTION-DEFICIT/HYPERACTIVITY DISORDER (DSM-IV)

A. Either (1) or (2):

(1) six (or more) of the following symptoms of **inattention** have persisted for at least 6 months to a degree that is maladaptive and inconsistent with developmental level:

Inattention

(a) often fails to give close attention to details or makes careless mistakes in schoolwork, work, or other activities
(b) often has difficulty sustaining attention in tasks or play activities
(c) often does not seem to listen when spoken to directly
(d) often does not follow through on instructions and fails to finish schoolwork, chores, or duties in the workplace (not due to oppositional behavior or failure to understand instructions)
(e) often has difficulty organizing tasks and activities
(f) often avoids, dislikes, or is reluctant to engage in tasks that require sustained mental effort (such as schoolwork or homework)
(g) often loses things necessary for tasks or activities (e.g., toys, school assignments, pencils, books, or tools)
(h) is often easily distracted by extraneous stimuli
(i) is often forgetful in daily activities

(2) six (or more) of the following symptoms of **hyperactivity-impulsivity** have persisted for at least 6 months to a degree that is maladaptive and inconsistent with developmental level:

Hyperactivity

(a) often fidgets with hands or feet or squirms in seat
(b) often leaves seat in classroom or in other situations in which remaining seated is expected
(c) often runs about or climbs excessively in situations in which it is inappropriate (in adolescents or adults, may be limited to subjective feelings of restlessness)
(d) often has difficulty playing or engaging in leisure activities quietly
(e) is often "on the go" or often acts as if "driven by a motor"
(f) often talks excessively

Impulsivity

(g) often blurts out answers before questions have been completed
(h) often has difficulty awaiting turn
(I) often interrupts or intrudes on others (e.g., butts into conversations or games)

B. Some hyperactive-impulsive or inattentive symptoms that caused impairment were present before age 7 years.

C. Some impairment from the symptoms is present in two or more settings (e.g., at school [or work] and at home).

D. There must be clear evidence of clinically significant impairment in social, academic, or occupational functioning.

E. The symptoms do not occur exclusively during the source of a Pervasive Developmental Disorder, Schizophrenia, or other Psychotic Disorder and are not better accounted for by another mental disorder (e.g., Mood Disorder, Anxiety Disorder, Dissociative Disorder, or a Personality Disorder).

Types:

Attention-Deficit/Hyperactivity Disorder, Combined Type: if both Criteria A1 and A2 are met for the past 6 months

Attention-Deficit/Hyperactivity Disorder, Predominantly Inattentive Type: if Criterion A1 is met but Criterion A2 is not met for the past 6 months

Attention-Deficit/Hyperactivity Disorder, Predominantly Hyperactive-Impulsive Type: if Criterion A2 is met but Criterion A1 is not met for the past 6 months

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