section

1.1

Understanding Attention-Deficit/ Hyperactivity Disorder

As mentioned in this book's introduction as well, many people continue to use the two distinct terms of ADD (Attention-Deficit Disorder) and ADHD (Attention-Deficit/Hyperactivity Disorder). Some use the two terms interchangeably, and others specifically use ADD when referring to those who do not have the symptoms of hyperactivity. However, the most current and official term or acronym is ADHD (with or without the slash). This is the umbrella term or acronym under which all three types of the disorder are included:

* The *predominantly inattentive* type of ADHD (those without hyperactivity)
* The *predominantly hyperactive/impulsive* type of ADHD (those without a significant number of the inattentive symptoms)
* The *combined type* (the most common type of ADHD—those with a significant amount of symptoms in all three core areas—inattention, impulsivity, and hyperactivity)

In the first edition of this book (1993) I had used ADD/ADHD, and it remains as such in the title of this new edition. However, throughout the remainder of this text I choose to use the most current terminology of ADHD; and this will include all three types of attention-deficit disorders.

Definitions and Descriptions of ADHD

There are several descriptions or definitions of ADHD based on the most widely held belief of the scientific community at this time. The following are some of those provided by leading researchers and specialists in the field:

* ADHD is a neurobiological behavioral disorder characterized by chronic and developmentally inappropriate degrees of inattention, impulsivity, and, in some cases, hyperactivity (CHADD, 2001c).
* ADHD is a brain-based disorder that arises out of differences in the central nervous system (CNS)—both in structural and neurochemical areas.
* ADHD is a dimensional disorder of human behaviors that all people exhibit at times to certain degrees. Those with ADHD display the symptoms to a significant degree that is maladaptive and developmentally inappropriate compared to others that age.
* ADHD is a developmental disorder of self-control, consisting of problems with attention span, impulse control, and activity level (Barkley, 2000b).
* ADHD is a chronic physiological disorder that interferes with a person's capacity to

regulate and inhibit behavior and sustain attention to tasks in developmentally appropriate ways.

* ADHD is a neurobiological behavioral disorder causing a high degree of variability and inconsistency in performance, output, and production.
* ADHD refers to a family of related chronic neurobiological disorders that interfere with an individual's capacity to regulate activity level (hyperactivity), inhibit behavior (impulsivity), and attend to tasks (inattention) in developmentally appropriate ways (National Institute of Mental Health, 2000; National Resource Center on AD/HD, 2003a).
* Attention-deficit/hyperactivity disorder (ADHD) is the most common neurobehavioral disorder of childhood. ADHD is also among the most prevalent chronic health conditions affecting school-aged children (American Academy of Pediatrics, 2000).
* ADHD is a neurobehavioral disorder characterized by differences in brain structure and function that affect behavior, thoughts, and emotions (CHADD, 2001c).
* ADHD is characterized by a constellation of problems with inattention, hyperactivity, and impulsivity. These problems are developmentally inappropriate and cause difficulty in daily life (Goldstein, 1999).

Behavioral Characteristics of ADHD

The fourth edition of the *Diagnostic and Statistical Manual* (DSM-IV), published by the American Psychiatric Association [APA] in 1994, is the source of the official criteria for diagnosing attention-deficit/hyperactivity disorder. The DSM-IV and more recently the DSM-IV-TR (text revised) lists nine specific symptoms under the category of inattention and nine specific symptoms under the hyperactive/impulsive category. Part of the diagnostic criteria is that the child or teen *often displays at least six of the nine* symptoms of either the inattentive or the hyperactive/impulsive categories. The lists below contain those symptoms or behaviors found in the DSM-IV (1994) and DSM-IV-TR (2000). Below are the symptoms specifically listed in the DSM *(which are indicated in italics),* as well as additional common and related behaviors (Rief, 2003).

The Predominantly Inattentive Type of ADHD

This type of ADHD (what many still call ADD), refers to those with a significant number of inattentive symptoms that occur frequently. They may have some, but not a significant number of the hyperactive/impulsive symptoms. Since they do not exhibit the disruptive behaviors that get our attention, it is easy to overlook these students and misinterpret their behaviors and symptoms (for example, as "not trying" or "being lazy").

It is common to display any of the following behaviors at times, in different situations, to a certain degree. Those who truly have an attention-deficit disorder have a history of showing many of these characteristics—far above the "normal" range developmentally—causing impairment in their functioning (at school, home, social situations, work). The nature of these inattentive symptoms tends to heavily impact academic performance and achievement. Those written in italics are the behaviors that are listed in the DSM-IV and DSM-IV-TR.

Characteristics and Symptoms of Inattention (That Occur Often)

* *Easily distracted by extraneous stimuli* (sights, sounds, movement in the environment)
* *Does not seem to listen when spoken to directly*
* Difficulty remembering and following directions
* *Difficulty sustaining attention in tasks and play activities*

* Difficulty sustaining level of alertness to tasks that are tedious, perceived as boring, or not of one's choosing
* *Forgetful in daily activities*
* *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)*
* Tunes out—may appear "spacey"
* Daydreams (thoughts are elsewhere)
* Appears confused
* Easily overwhelmed
* Difficulty initiating or getting started on tasks
* Does not complete work, resulting in many incomplete assignments
* *Avoids, dislikes, or is reluctant to engage in tasks requiring sustained mental effort (such as schoolwork or homework)*
* Difficulty working independently—needs high degree of refocusing attention to task
* Gets bored easily
* Sluggish or lethargic (may fall asleep easily in class)
* *Fails to pay attention to details and makes many careless mistakes* (with math computation, spelling, written mechanics—capitalization, punctuation)
* Poor study skills
* Inconsistent performance—one day is able to perform a task, the next day cannot; the student is "consistently inconsistent"
* *Loses things necessary for tasks or activities (toys, school assignments, pencils, books, or tools)*
* Disorganized—misplaces or loses belongings; desks, backpacks, lockers, and rooms may be total disaster areas

* *Difficulty organizing tasks and activities* (planning, scheduling, preparing)
* Little or no awareness of time—often underestimates length of time a task will require to complete
* Procrastinates
* Displays weak executive functions as described below in this section

Academic Difficulties Related to Inattention

Reading:

* Loses his or her place when reading
* Cannot stay focused on what he or she is reading (especially if text is difficult, lengthy, boring, not choice reading material), resulting in missing words, details, and spotty comprehension
* Forgets what he or she is reading (limited recall) and needs to reread frequently

Writing:

* Difficulty planning and organizing for the writing assignment
* Off topic as result of losing train of thought
* Minimal written output and production
* Slow speed of output/production—taking two or three times longer to execute on paper what is typical for the average child/teen that age or grade
* Poor spelling, use of capitalization/punctuation, and other mechanics, ability to edit written work (as a result of inattention to these boring details)

Math:

* Numerous computational errors because of inattention to operational signs (+,–,×, ÷), decimal points, and so forth
* Poor problem solving due to inability to sustain the focus to complete all steps of the problem with accuracy

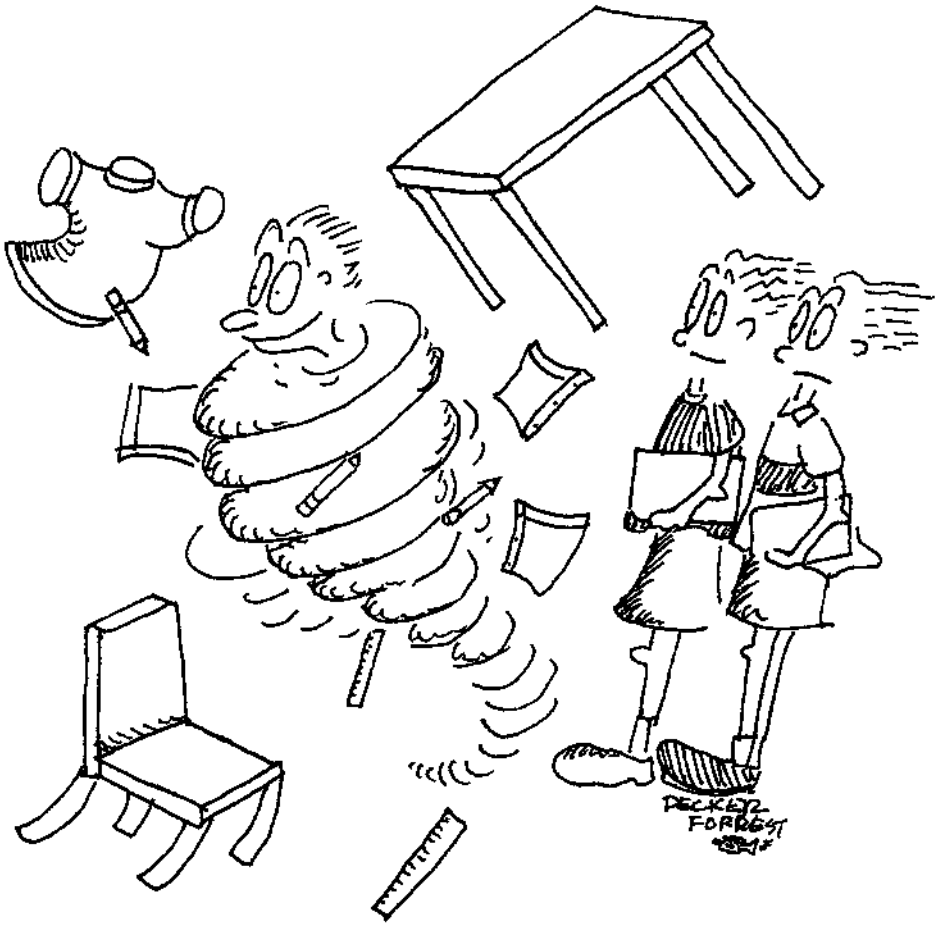
The Predominantly Hyperactive-Impulsive Type of ADHD

Those individuals with this type of ADHD have a significant number of hyperactive/impulsive symptoms; they may have some, but not a significant number of inattentive symptoms. Children and teens with ADHD may exhibit many of the following characteristics (not all of them).

Even though each of these behaviors is normal in children at different ages to a certain degree, in those with ADHD, the behaviors *far exceed* that which is normal developmentally (in frequency, level, and intensity). Again, those written in italics are the behaviors that are listed in the DSM-IV and DSM-IV-TR.

Characteristics and Symptoms of Hyperactivity (That Occur Often)

* *"On the go" or acts as if "driven by a motor"*
* *Leaves seat in classroom or in other situations in which remaining seated is expected*
* Cannot sit still (jumping up and out of chair, falling out of chair, sitting on knees or standing by desk)
* Highly energetic—almost nonstop motion
* *Runs about or climbs excessively in situations in which it is inappropriate (in adolescents or adults, may be limited to subjective feelings of restlessness)*
* A high degree of unnecessary movement (pacing, tapping feet, drumming fingers)
* Restlessness
* Seems to need something in hands. Finds/reaches for nearby objects to play with and/or put in mouth
* *Fidgets with hands or feet or squirms in seat*
* Roams around the classroom—is not where he or she is supposed to be
* *Difficulty playing or engaging in leisure activities quietly*
* Intrudes in other people's space; difficulty staying within own boundaries
* Difficulty "settling down" or calming self



Characteristics and Symptoms of Impulsivity (That Occur Often)

* Much difficulty in situations requiring having to wait patiently
* *Talks excessively*
* Difficulty with raising hand and waiting to be called on
* *Interrupts or intrudes on others (butts into conversations or games)*
* *Blurts out answers before questions have been completed*
* *Has difficulty waiting for his or her turn in games and activities*
* Cannot keep hands/feet to self
* Cannot wait or delay gratification—wants things NOW
* Knows the rules and consequences, but repeatedly makes the same errors/infractions of rules
* Gets in trouble because he or she cannot "stop and think" before acting (responds first/thinks later)
* Difficulty standing in lines
* Makes inappropriate or odd noises
* Does not think or worry about consequences, so tends to be fearless or gravitate to "high risk" behavior
* Engages in physically dangerous activities without considering the consequences (jumping from heights, riding bike into street without looking); hence, a high frequency of injuries
* Accident prone—breaks things
* Difficulty inhibiting what he or she says, making tactless comments—says whatever pops into head and talks back to authority figures
* Begins tasks without waiting for directions (before listening to the full direction or taking the time to read written directions)
* Hurries through tasks (particularly boring ones) to get finished—making numerous careless errors
* Gets easily bored and impatient
* Does not take time to correct/edit work
* Disrupts, bothers others
* Constantly drawn to something more interesting or stimulating in the environment
* Hits when upset or grabs things away from others (not inhibiting responses or thinking of consequences)

Other Common Characteristics in Children and Teens with ADHD

* A high degree of emotionality (temper outbursts, quick to anger, get upset, irritable, moody)
* Easily frustrated
* Overly reactive
* Difficulty with transitions and changes in routine/activity
* Displays aggressive behavior
* Difficult to discipline
* Cannot work for long-term goals or payoffs
* Low self-esteem

* Poor handwriting, fine motor skills, written expression, and output
* Overly sensitive to sounds, textures, or touch (tactile defensive)
* Motivational difficulties
* Receives a lot of negative attention/interaction from peers and adults
* Learning, school performance difficulties—not achieving or performing to level that is expected (given his or her apparent ability)
* Language and communication problems (sticking to topic, verbal fluency)

Criteria for a Diagnosis of ADHD

It is not just the existence of symptoms that indicate ADHD. It must be proven that there is a history of those symptoms having been evident since before age seven and lasting for a while (at least the past six months). In addition, those symptoms must be (a) more severe than in other children that same age; (b) evident in at least two settings (for example, school and home); and (c) causing impairment in the child's functioning (academically, socially).

Remember that each individual with ADHD is unique in the combination, amount, and degree of symptoms he or she exhibits, as well as that person's own set of strengths, talents, interests, personality traits, and so forth.

Positive Traits and Characteristics Common in Many Children, Teens, and Adults with ADHD

Parents and teachers must recognize, appreciate, and nurture the many talents and positive qualities our children possess. To develop their self-esteem and enable them to become resilient, successful adults, we must help our children to value their areas of competency and strengths. The following are some common positive characteristics and traits that many of those with ADHD possess (Rief, 2003):

* Highly energetic
* Verbal
* Spontaneous
* Creative and inventive
* Artistic
* Persistent/tenacious
* Innovative
* Imaginative
* Warmhearted
* Compassionate/caring
* Accepting and forgiving
* Inquisitive
* Resilient
* Makes and creates fun
* Knows how to enjoy the present
* Empathetic
* Sensitive to needs of others
* Resourceful
* Gregarious
* Not boring
* Enthusiastic
* Intelligent/bright
* Humorous
* Outgoing
* Ready for action
* Willing to take a risk and try new things
* Good at improvising
* Enterprising
* Sees different aspects of a situation
* Able to find novel solutions
* Charismatic
* Observant
* Negotiator
* Full of ideas and spunk
* Can think on their feet
* Intuitive
* Good in crisis situations
* Passionate

Girls with Attention-Deficit Disorders

Many girls with ADHD have gone undiagnosed (or misdiagnosed) for years because they frequently do not have the typical hyperactive symptoms seen in boys that signal a problem

and draw attention. In the past few years, much more attention has been given to girls with the disorder. Girls who do have the combined symptoms of ADHD are very recognizable because their behavior is so significantly out of norm for other girls. But on the whole, most girls have the predominantly inattentive type of the disorder and are often labeled or written off as being "space cadets," "ditzy," or "scattered" (Rief, 2003).

Much of what we are now aware of and beginning to understand about females with ADHD comes from the work of Dr. Kathleen Nadeau, Dr. Patricia Quinn, Dr. Ellen Littman, Sari Solden, and others who have strongly advocated on the behalf of this population. The scientific community has now been looking at gender issues in ADHD. Studies have recently begun to reveal the significance of gender differences and issues and will undoubtedly result in changes and improvements in the diagnosis and treatment for girls and women with this disorder.

According to Dr. Nadeau, Dr. Quinn, and Dr. Littman (1999), girls with ADHD:

* Have more internal and often less external (observable) symptoms
* Have greater likelihood of anxiety and depression
* Experience a lot of academic difficulties, peer rejection, and self-esteem issues
* Are more likely to be hyperverbal than hyperactive

In addition:

* Symptoms in girls tend to increase rather than decrease at puberty, with hormones having a great impact.
* PMS worsens ADHD symptoms by adding to disorganization and emotionality.
* Another reason girls are likely underdiagnosed is because the current diagnostic criteria require evidence of symptom onset before seven years of age; but in girls symptoms are likely to emerge later.
* Girls tend to try very hard to please teachers and parents. They often work exceptionally hard (compulsively so) to achieve academic success.
* Impulsivity in girls can lead to binge eating, engaging in high-risk/high-stimulation activities (smoking, drinking, drugs, sexual promiscuity, unprotected sex) (Nadeau, Littman, & Quinn, 1999).

Dr. Janet Giler (2001) also points out that female social rules place a greater value on cooperation, listening, caretaking, and relationship-maintaining activities, compromising girls with ADHD whose symptoms interfere with these social norms.

ADHD and the "Executive Functions"

When discussing difficulties associated with ADHD, many of them center on the ability to employ the "executive functions" of the brain. The following are some definitions/descriptions of what is referred to as "executive functioning."

Executive Functions Are

* The management functions ("overseers") of the brain
* The covert, self-directed actions individuals use to help maintain control of themselves and accomplish goal-directed behavior
* The range of central control processes in the brain that activate, organize, focus, integrate, and manage other brain functions—enabling us to perform both routine and creative work (Brown, 2000; National Resource Center on AD/HD, 2003b)
* Brain functions that have to do with self-regulation of behavior

Many specialists and researchers believe Dr. Russell Barkley's theory (2000a, May) that the deficit in inhibition (the core of ADHD) impairs the development of these executive

functions. Apparently, in children with ADHD, the executive functions (at least some of them) are developmentally delayed compared to other children of the same age. The individual with ADHD, therefore, does not fully utilize his or her "executive functions" for self-management.

Executive Function Components

It has not as yet been determined exactly what constitutes the executive functions of the brain. However, some of those functions are believed to involve:

* Working memory (holding information in your head long enough to act on it)
* Organization of thoughts, time, and space
* Planning and prioritizing
* Arousal and activation
* Sustaining alertness and effort
* Self-regulation
* Emotional self-control
* Internalization of speech/language (using your inner speech to guide your behavior)
* Inhibiting verbal and nonverbal responding
* Quick retrieval and analysis of information
* Developing and following through on a plan of action
* Strategy monitoring and revising, which involves making decisions based on task analyses, planning, reflection, and goal-directed problem solving (Brown, 2000; Dendy & Ziegler, 2002)

It is important to realize that executive function weaknesses cause academic challenges (mild to severe) for most students with ADHD, irrespective of how intelligent, gifted, and capable they may be. Consequently, most children and teens with attention-deficit disorders will need some supportive strategies and/or accommodations to compensate for their deficit in executive functioning (whether they are part of a written plan or not).

ADHD "Look Alikes"

Not everyone who displays symptoms of ADHD has an attention-deficit disorder. There are a number of other conditions and factors (medical, psychological, learning, psychiatric, emotional, social, environmental) that can cause inattentive, hyperactive, and impulsive behaviors. The following can cause some of the symptoms that may look like or mimic ADHD:

* Learning disabilities
* Sensory impairments (hearing, vision, motor problems)
* Mood disorders (depression, dysthymia)
* Substance use and abuse (of alcohol and drugs)
* Oppositional defiant disorder (ODD)
* Conduct disorder (CD)
* Allergies
* Post-traumatic stress disorder (PTSD)
* Anxiety disorder
* Obsessive-compulsive disorder (OCD)
* Sleep disorders
* Bipolar disorder (manic/depressive)
* Thyroid problems
* Rare genetic disorders (for example, Fragile X syndrome)
* Seizure disorders
* Lead poisoning
* Hypoglycemia
* Anemia
* Fetal alcohol syndrome/fetal alcohol effects
* Chronic illness
* Language disorders
* Tourette's syndrome (Tourette's disorder)
* Pervasive developmental disorder
* Autism
* Asperger's syndrome
* Developmental delays
* Sensory integration dysfunction
* Low intellectual ability
* Very high intellectual ability
* Severe emotional disturbance
* Side effects of medications being taken (for example, anti-seizure medication, asthma medication)

Emotional and environmental factors that have nothing to do with ADHD can also cause a child or teen to be distracted, unable to concentrate, and have acting-out or aggressive behaviors. For example, if the child/teen is experiencing or witnessing physical/sexual abuse/violence or family stresses such as divorce and custody battles; a victim of bullying/peer pressure and other peer/social issues; or has a chaotic, unpredictable, unstable, and/or neglectful home life with inappropriate expectations placed on the child.

Inattention and disruptive classroom behaviors can be school-related (again without having anything to do with ADHD). Students may display those behaviors if they are in a school environment that has a pervasive negative climate, poor instruction and low academic expectations, nonstimulating and unmotivating curriculum, ineffective classroom management, and so forth.

ADHD and Co-Existing (or Associated) Disorders

Besides a condition that looks like ADHD, it is very possible that *in addition* to ADHD the child has some other co-existing conditions or disorders. ADHD may be only *part* of the diagnostic picture. It is important to be aware that there is a high rate of "co-morbidity" with ADHD, which means there are at least two co-occurring conditions. Studies show that approximately two-thirds of children with ADHD have (or will develop) at least one other co-existing condition (MTA Cooperative Group, 1999; Pierce, 2003). This, of course, makes treatment, intervention, and management more complicated.

Making an accurate and complete differential diagnosis requires a skilled, knowledgeable professional who is aware of conditions that produce symptoms similar to ADHD and who can identify and address other conditions or disorders that may co-exist.

The prevalence reported of individuals with ADHD who have additional co-existing disorders varies among sources. The following range is agreed on by most researchers (American Academy of Pediatrics, 2000; CHADD, 2001a):

Co-Existing Disorders in Those Diagnosed with ADHD

* Oppositional defiant disorder (ODD)—from 30 to 65 percent
* Anxiety disorder—from 20 to 35 percent of children and 25 to 40 percent of adults
* Conduct disorder (CD)—from 10 to 25 percent of children, 25 to 50 percent of adolescents, and 20 to 25 percent of adults
* Bipolar (manic/depressive illness)—from 1 to 20 percent
* Depression—from 10 to 30 percent in children and 10 to 47 percent in adolescents and adults
* Tics/Tourette's syndrome—about 7 percent of those with ADHD have tics or Tourette's syndrome, but 60 percent of Tourette's syndrome patients also have ADHD
* Learning disabilities—from 12 to 60 percent, with most estimating between one-third and one-half of children with ADHD having a co-existing learning disability
* Sleep problems—more than 50 percent of ADHD children need more time to fall asleep; nearly 40 percent may have problems with frequent night waking; and more than half have trouble waking in the morning
* Secondary behavioral complications—up to 65 percent of children with ADHD may display secondary behavioral complications such as noncompliance, argumentativeness, temper outbursts, lying, blaming others, being easily angered, and so forth

Keep the following points in mind:

* Most children with ADHD have some kind of school-related problems (achievement, performance, social).
* A high percentage of children with ADHD have co-existing learning disabilities. The multidisciplinary school team should always

evaluate students when there are signs of any learning problems.

* It is believed that having ADHD predisposes that person to these above-mentioned disorders. Therefore, the diagnostic process should include screening for possible comorbidities through interview, questionnaires, and rating scales that may indicate or alert the diagnostician to symptoms of other co-existing disorders.

ADHD falls under the category of disruptive behavior disorder in the *Diagnostic and Statistical Manual of Mental Disorders* (4th ed.) (APA, 1994) and most current version, DSM-IV-TR (APA, 2000). Also in this category are the commonly co-occurring disorders of oppositional defiant disorder (ODD) and conduct disorder (CD). Children with ADHD are at a much higher risk than the average child of developing a more serious disruptive behavior disorder. It is important that we recognize the risk and implement early interventions.

The diagnosis of *oppositional defiant disorder* (ODD) requires a pattern of negative, hostile, and defiant behavior that has been evident for a while; occurs more frequently than is typical in individuals of comparable age and developmental level; and causes significant impairment. The child/teen with ODD often loses his or her temper, argues and actively defies adult requests or rules, deliberately annoys people, and blames others for his or her own mistakes or misbehavior. These children and teens also tend to be touchy or easily annoyed by others, angry and resentful, and spiteful or vindictive.

Conduct disorder (CD) is the most serious form of disruptive behavior disorders in children and teens, and involves a pattern of delinquent behavior. Some of the characteristics include aggression to people and animals, deliberate destruction of property, deceitfulness or theft, and serious violations of rules.

Parents, educators, and medical/mental-healthcare providers should be alert to signs of other disorders and issues that may exist or emerge (often in the adolescent years), especially when current strategies and treatments being used with the ADHD child/teen are no longer working effectively. This warrants further diagnostic assessment.

Formula ONE for Disaster
take ONE impulsive child
add ONE forbidden object
multiply by ONE minute
to equal
ONE predictable trip to the emergency room. . . .

Karen Easter ©1995

Statistics and Risk Factors

ADHD is associated with a number of risk factors. Compared to their peers of the same age, youth with ADHD (those untreated for their disorder) experience:

* More serious accidents, hospitalizations, and significantly higher medical costs than those children without ADHD (Centers for Disease Control and Prevention, 2003)
* More school failure and dropout
* More delinquency and altercations with the law
* More engagement in antisocial activities
* More teen pregnancy and sexually transmitted diseases
* Earlier experimentation and higher use of alcohol, tobacco, and illicit drugs
* More trouble socially and emotionally
* More rejection, ridicule, and punishment
* More underachievement, and underperformance at school/work (Barkley, Cook, Dulcan, et al., 2002; Barkley, 2000b)

Without early identification and appropriate treatment, ADHD can have serious consequences that include school failure and drop out, depression, conduct disorder, failed relationships,

underachievement in the workplace, and substance abuse (CHADD, 2003b). Yet despite the serious consequences, studies indicate that less than half of those with the disorder are receiving treatment (Barkley, Cook, Dulcan, et al., 2002)

Prevalence of ADHD

* Approximately 3 to 5 percent of school-aged children have ADHD, according to much of the literature over the past several years, including the Surgeon General's Mental Health Report (1999, 2001).
* Current estimates, according to the American Academy of Pediatrics, indicate that as high as 4 to 12 percent of all school-aged children may be affected (American Academy of Pediatrics and National Initiative for Children's Healthcare Quality, 2002).
* Nearly 7 percent of elementary-aged children in the United States have been diagnosed with ADHD, according to the first nationwide survey conducted by the Centers for Disease Control and Prevention reported in May 2002. And ADHD is estimated to affect between 3 and 7 percent of school-aged children, according to the American Psychiatric Association (2000).
* ADHD affects approximately 2 to 4 percent of the adult population (Murphy & Barkley, 1996).
* ADHD is a lifelong disorder. Most children with ADHD (up to 80 percent) continue to have substantial symptoms into adolescence, and as many as 67 percent continue to exhibit symptoms into adulthood (CHADD, 2003a).

More risks associated with ADHD:

* Almost 35 percent of children with ADHD quit school before completion (Barkley, 2000b).
* Up to 58 percent have failed at least one grade in school, and at least three times as many teens with ADHD as those without ADHD have failed a grade, been suspended, or been expelled from school (Barkley, 2000b).
* For at least half of children with ADHD, social relationships are seriously impaired (Barkley, 2000b).
* Within their first two years of independent driving, adolescents with a diagnosis of ADHD have nearly four times as many auto accidents and three times as many citations for speeding as young drivers without ADHD (Barkley, Murphy, & Kwasni, 1996).
* ADHD is diagnosed at least three times more frequently in boys than girls; although it is believed (and research is showing) that *many* more girls actually have ADHD. In fact, the actual number may be nearly equal (CHADD, 2003b).

What Is Currently Known About ADHD

There are degrees of ADHD ranging from mild to severe; types of ADHD with a variety of characteristics; and no one has all of the symptoms or displays the disorder in the exact same way. Symptoms vary in every child, and even within each child with ADHD the symptoms may look different from day to day.

ADHD is not new. It has been around, recognized by clinical science, and documented in the literature since 1902 (having been renamed several times). Some of the previous names for the disorder were "minimal brain damage," "minimal brain dysfunction," "hyperactive child syndrome," and ADD with or without "hyperactivity."

We know that ADHD is *not* a myth. It is *not* a result of poor parenting or lack of caring, effort, and discipline. ADHD is *not* laziness, willful behavior, or a character flaw. There is no "quick fix" or "cure" for ADHD.

Many children/teens with ADHD "slip through the cracks" without being identified and without receiving the intervention and treatment they need. This is particularly true of ethnic minorities and girls.

ADHD exists across all populations, regardless of race or ethnicity. There are racial and ethnic disparities in access to healthcare services. As such, ethnic minorities with ADHD are often underserved and do not receive adequate help and treatment (Satcher, 2001).

Children and teens with ADHD do much better when they are provided with activities that are interesting, novel, and motivating. Generally, the majority of students with ADHD can learn well in general education classrooms when teachers employ proper management, effective instructional strategies, and assistive supports/interventions.

Fortunately, we know a great deal about:

* Which behavior management techniques and strategies are effective in the home and school for children with ADHD
* The classroom interventions, accommodations, and teaching strategies that are most helpful for students with ADHD
* Specific "parenting strategies" that are most effective with children who have ADHD
* Treatments that have been proven effective in reducing the symptoms and improving functioning of children/teens with ADHD
* Many additional strategies that are helpful for individuals with ADHD, such as organization and time management, stress reduction/relaxation

We also know:

* ADHD can be managed best by a multimodal treatment and a team approach.
* It takes a team effort of parents, school personnel, and health/mental healthcare professionals to be most effective in helping children with ADHD.
* No single intervention will be effective for treating/managing ADHD. It takes vigilance and ongoing treatment/intervention plans, as well as revision of plans and going "back to the drawing board" frequently.
* The teaching techniques and strategies that are necessary for the success of children with ADHD are good teaching practices and helpful to *all* students in the classroom.
* There is a lot of help out there, and resources are available for children, teens, and adults with ADHD, as well as those living with and working with individuals with ADHD.
* We are learning more and more each day due to the efforts of the many researchers and practitioners (educators, mental health professionals, physicians) committed to improving the lives of individuals with ADHD.

The extensive research into ADHD during the past several years has revealed a lot about the disorder. The following is a summary of the current evidence about ADHD, based on the research from metabolic, brain-imaging, and molecular genetic studies.

Differences in the Brain

Differences between those with ADHD and control groups have been identified using brain activity and imaging tests/scans (MRIs, SPECT, EEG, BEAMS, PET, and functional MRIs). Those brain differences include decreased activity level and lower metabolism levels in certain regions of the brain (mainly the frontal region and the basal ganglia); lower metabolism of glucose (the brain's energy source) in the frontal region; decreased blood flow to certain brain regions; and specific brain structures are smaller than in those unaffected by ADHD.

Note: *Imaging and other brain tests are NOT used in the diagnosis of ADHD. To date, a comprehensive history of the problem remains the best way to identify the disorder.*

There is very strong scientific evidence which supports that ADHD may be due to imbalances in various neurotransmitters or brain chemicals and/or reduced metabolic rates in certain regions of the brain. These chemicals are believed to travel across the synapses of the

brain, affecting the braking mechanism or inhibitory circuits of the brain. Dopamine pathways in the brain, which link the basal ganglia and frontal cortex, for example, appear to play a major role in ADHD (Castellanos, 1997).

Genetic Research

Much of the recent research involves molecular genetic studies. One type is whole-genome scanning studies that genotype DNA in entire families to look for patterns and differences. Other genetic research involves "candidate-gene" studies seeking specific forms of genes, which show up more often in children with ADHD compared to those unaffected by ADHD.

Researchers have found at least two candidate genes associated with ADHD. One of those genes, the dopamine transporter gene (DAT1), is involved in regulating the amount of dopamine available in the brain. Researchers have found differences between the structure of the DAT1 gene in families with ADHD and "normal" control families. There is belief that the DAT1 gene in some individuals with ADHD may be causing an "overactive dopamine pump"—sucking up dopamine too fast and not leaving it in the synapse long enough (Barkley, 1998).

A second gene was found (DRD4) that may be involved with ADHD. It apparently makes specific nerve cells less sensitive to dopamine. It is suspected that, because ADHD is a complex disorder with multiple traits, that multiple genes are involved and will be discovered in the future. Researchers believe that variations in dopamine receptors or transporters, or both, may result in underactivity of brain regions that are involved in attention and behavior, according to James Swanson and others (Fine, 2001).

Landmark MTA Study

There has also been significant research with regard to treatments for ADHD and their relative effectiveness. The longest and most thorough study of the effects of ADHD interventions was the Multimodal Treatment Study of Children with ADHD (MTA) by the National Institute of Mental Health. This study involved 579 children with ADHD ages seven to nine who were randomly assigned to one of four treatment groups, implemented over fourteen months. The groups were

* Medication alone (carefully managed and adjusted medication that was titrated for maximum benefit, with monthly office visits and phone contact with teachers)
* Behavioral therapy alone (very intensive training of parents and teachers on this approach, with an integrated program of specific psychosocial interventions and trained classroom paraprofessional)
* Combination of the above two treatments
* Routine care (treatment by physician in the community, which generally involved one or two office visits/year, no direct interaction with teachers, lower doses of medication prescribed) (MTA Steering Committee, 2003)

Researchers found that medication treatment alone and medication combined with behavior treatment worked significantly better than behavior treatment alone or community care alone at reducing the symptoms of ADHD. There was overwhelming evidence as to the effectiveness of well-managed use of stimulant medication in the treatment of ADHD. Stimulant medications have been proven to be very effective in improving the core symptoms of at least 70 to 80 percent of children and adults with ADHD (MTA Cooperative Group, 1999). Some estimates are even higher (up to 90 percent).

Combined treatments offered slightly greater benefits than medication management alone for symptom reduction as well as for other domains, such as peer relations, child-parent relations, and academic outcomes (MTA Steering Committee, 2003).

The MTA group continued to monitor (although not treat) all of the children and families and reevaluated the outcomes after twenty-four months. They generally found that the

outcomes for the combined and medication only groups were still superior to the other groups, but the relative superiority was reduced by 50 percent. Those children who had received the MTA medication alone approach were still better off than children who received the intensive behavior therapy alone. This was particularly true for ADHD symptoms and oppositional/aggressive symptoms based on ratings by teachers (who were not part of the initial treatment component of the study) as well as by parents. Based on this, they concluded that the benefits of intensive medication management for ADHD extended ten months beyond the intensive treatment phase, although the effects appeared to diminish over time (MTA Steering Committee, 2003).

The investigators also observed "mild growth suppression" in the medication and combined medication/behavioral treatment group. The MTA researchers noted that medication appears to incur some risks in terms of slowing growth and weight. Children treated with medication did grow more slowly (by one-third inch) in the second study year (MTA Steering Committee, 2003).

What May Be the Causes of ADHD

ADHD has been researched extensively in the United States and a number of other countries. There have been hundreds of well-designed and controlled scientific studies trying to determine the causes and most effective treatments for children, teens, and more recently, adults. To date, the causes of ADHD are not fully known or understood. However, based on the enormous amount of research, there is a lot of consensus in the scientific community about most *probable causes,* which include the following.

Heredity

This is the most likely common cause of ADHD, based on the evidence:

* Heredity accounts for about 80 percent of children with ADHD, according to leading researchers (Barkley, 1998).
* ADHD is known to run in families, as found by numerous studies (especially twin studies with identical and fraternal twins, adopted children, family studies) (Lombroso, Scahill, & State, 1998).
* It is believed that a genetic predisposition to the disorder is inherited. Children with ADHD will frequently have a parent, sibling, grandparent, or other close relative with ADHD or whose history indicates he or she had similar problems and symptoms during childhood.

Prenatal, During Birth, or Postnatal Trauma/Injury

It has been found that trauma to the developing fetus during pregnancy or birth, which may cause brain injury or abnormal brain development, can cause ADHD.

According to Jenson (2001), trauma might include:

* Fetal exposure to alcohol and/or cigarettes
* Exposure to high levels of lead
* Complications during pregnancy and birth, such as toxemia
* Brain injury from disease or trauma

Illnesses and Brain Injury

Researchers say that no more than 5 percent of those with ADHD are believed to acquire the disorder through illness or postnatal brain damage. However, ADHD may be caused by trauma or head injury to the frontal part of the brain. Also, certain medical conditions such as thyroid disorder and illnesses that affect the brain (for example, encephalitis) may be a contributing cause.

Diminished Activity and Lower Metabolism in Certain Brain Regions

It has been found that, as a group, those with ADHD have less brain activity (compared to the non-ADHD population) taking place in certain regions of the brain (the frontal lobe, its

connections to the basal ganglia, and their relationship to the cerebellum). These regions are known to be responsible for controlling activity level, impulsivity, and attention. Most neurological and neuro-imaging studies revealed that, as a group, those with ADHD have less blood flow, metabolism of glucose, electrical activity, and reactivity to stimulation in one or more of these brain regions (Barkley, Cook, Dulcan, et al., 2002).

Chemical Imbalance or Deficiency in Neurotransmitters

It is believed that those with ADHD have a deficiency, imbalance, or inefficiency in brain chemicals called neurotransmitters, affecting certain brain regions associated with ADHD. It is believed that stimulant medications affect the neurochemical signaling process of the dopamine and norepinephrine systems (the main ones thought to be involved in ADHD). It is believed that the medication works to increase the availability of these neurotransmitters—through facilitating their release and inhibiting their reuptake (CHADD, 2001b).

Research is indicating that increases in dopamine levels that are associated with the stimulant medication methylphenidate (MPH) produces two therapeutic changes: an increase in the signal-to-noise ratio in the brain and an increase in the saliency (significance) of a task to an individual, making the task more interesting, and thus improving attention.

According to Volkow, a leading mental health and drug addiction researcher, random firing of nerve cells in the brain is normal. It allows the brain cells to react more quickly when there is an actual stimulus. However, if there is too much random firing, real signals can get lost in the noise. Increases in dopamine, like those associated with oral MPH, enhance task-specific signaling in the brain and decrease random firing and background noise (Imperio, 2004; Volkow, 2003).

Slight Structural Brain Differences

There is evidence of some structural differences in certain brain regions believed responsible for ADHD. Scientists have found through neuroimaging studies that these specific brain regions are smaller and less asymmetrical than in individuals without ADHD (Barkley, 1998; Castellanos, 1997).

Follow-up studies of brain size in children with and without ADHD by renowned researcher Xavier Castellanos and his team of investigators found that the brain as a whole and cerebellum in particular were smaller in children with ADHD who had never taken medication. Although smaller, the ADHD brain followed a normal growth curve, indicating a normal growth process with a smaller base (Castellanos, 2003; Imperio, 2004). Their studies found that children with ADHD, both medicated and unmedicated, had less total gray matter (brain tissue containing nerve cells and blood vessels) than children without ADHD. Total white matter (brain tissue responsible for carrying information between nerve cells) was less in unmedicated children with ADHD. Medicated children with ADHD had the same volume of white matter as children without ADHD (Castellanos, 2003; Imperio, 2004).

Environmental Factors

It is also generally believed that factors in the environment (for example, the amount of structure versus chaos; the effective management techniques being used; the types of supports in place) affect the severity of the symptoms and behaviors displayed and the risk for developing more significant problems. However, these environmental factors are *not* found to be the *cause* of ADHD. Research has not supported many of the other suggested causes that are popular beliefs (diet, food additives, sugar).

Other environmental factors that may affect developing brains in very young children

are being studied. One such study by researchers at the Department of Pediatrics, University of Washington, published in *Pediatrics,* the research publication of the American Academy of Pediatrics (2004), concluded that early exposure to television was associated with subsequent attention problems. The authors observe that "environmental exposures, including types and degrees of stimulation, affect the number and the density of neuronal synapses." The authors emphasize, "We cannot draw inferences from these associations. It could be that attentional problems lead to television viewing rather than vice versa" (CHADD, 2004b; Christakis, Zimmerman, DiGiuseppe, & McCarty, 2004). Replication of the study and more research needs to be conducted.

ADHD in Minority Populations

There is a greater likelihood that children of minority populations (for example, African American, Hispanic/Latino) are underserved and undertreated for their medical and mental health disorders, with less access to comprehensive assessment and to appropriate treatment options. The Executive Summary on Mental Health: Culture, Race and Ethnicity from the Report of the Surgeon General (2001) shows that African American youths are overrepresented in arrests, detentions, incarcerations, classes for emotional disturbance, and the child welfare system. However, African Americans do not appear to receive needed treatment for ADHD or for other mental health disorders (Ellison, 2003).

The vast majority of research on ADHD has been conducted with samples of white boys between the ages of six and eleven years with middle-class backgrounds. We have very little information on how ADHD symptoms might be expressed as a function of cultural background, or how to best account for diversity when evaluating children for this disorder (DuPaul & Barrett, 2003).

In the few studies exploring medication rates across races, ethnic minority children are two to two and a half times less likely to be medicated for ADHD compared to white children (Safer & Malever, 2000; Safer & Zito, 2000).

There is evidence that African Americans may be more mistrusting of medical research and treatment than individuals from other ethnic groups (Taylor-Crawford, Richardson, & Madison-Boyd, 2003).

A panel of experts voiced concerns to the Congressional Black Caucus about misperceptions of ADHD in the African American community during a Capitol Hill briefing in March 2004 (sponsored by CHADD). The panel presented scientific evidence that African Americans with ADHD are often undertreated and discussed the devastating implications for minority communities when denied appropriate access to care (CHADD, 2004a).

Although diagnostic interviews and rating scales appear "objective," these measures are only as accurate as the perceptions of the person completing them. The amount of subjectivity involved in assessing ADHD symptoms becomes even more of a concern when evaluating children from minority backgrounds, especially given the potential for over-identification and misdiagnosis when cultural differences are not taken into account (DuPaul & Barrett, 2003).

In Latino families it is common that, following a diagnosis of ADHD, many extended family members will be consulted on this diagnosis and their opinions will have considerable weight. Education and counseling of parents about ADHD needs to include extended family members to facilitate support and involvement in treatment (Bauermeister & Reina, 2003).

Educators and clinicians must be culturally sensitive and aware of barriers to ADHD diagnosis and treatment and take efforts in working with parents to bridge some of those barriers (language/communication issues, mistrust, stigma, fear, financial resources, access to healthcare).

It is important for schools and clinical practices to do what they can to bridge language and cultural barriers and support families. It helps

to include in their team someone who is familiar with and who understands the family's culture (and language). Schools and clinicians should make every effort to provide materials/resources to families and contacts with whom parents can clearly and comfortably communicate, share concerns, and have their questions answered.

What Is Not Known About ADHD

There is still a great deal that we do not yet know about ADHD, including:

* How to prevent ADHD or specific symptoms that cause impairment in a person's functioning
* An easy, conclusive diagnosis for ADHD
* What may prove to be the best, most effective treatments and strategies for helping individuals with ADHD
* The causes (although there are more accepted theories supported by a growing body of scientific evidence)

Just in the past few years there has been a great deal of interest and focus on ADHD in adulthood. This has generated a lot of research, resulting in much more information and better treatment options for this population. ADHD in the early childhood years (prior to age six) is also an area that requires more research and understanding.

Gender issues and the differences between males and females with ADHD has gained considerable recognition, and consequently, has been the focus of various research studies in the past few years. Also, cultural variables and the effects of cultural factors on the diagnosis, treatment, and care of individuals with ADHD is another area that has only recently been a focus of research. These are very important topics that warrant much more research.

There is an overwhelming amount of evidence that ADHD is neurobiological in nature. Although much has been learned about this disorder over the past decade, there is still much to learn. Hopefully, with all of the research taking place about attention-deficit disorders, the scientific community will solve the puzzle of ADHD in the near future.

ADHD and the Impact on the Family

It is important to be aware of the challenges that exist in the home when one or more children (or a parent) have ADHD, as this disorder significantly impacts the entire family (Rief, 2003). Unfortunately, teachers are generally unaware or underestimate the struggles that families face. Typically, in homes of children with ADHD there is a much higher degree of stress than the average family has, along with depression or other pathology in one or more family members.

Note: *Remember, it is likely that more than one family member also has ADHD.*

Living with a child who has ADHD often takes a heavy toll on marriages. It is common for parents to be in different stages of a "grieving process" about having a child who struggles compared to other children, and whose differences may even be considered a disability. Parents frequently disagree about treatment, discipline, management, structure, and so forth. There are generally major issues surrounding the battle with homework as well as morning and evening routines (getting ready for school, bedtime).

Parents are also known to blame one another for the child's problems or to be highly critical of one another in their parenting or spousal roles. This causes a great deal of marital stress and a higher rate of divorce. Often it is the mother who must cope with the brunt of the issues throughout the day, which is physically and emotionally exhausting. In single parent homes it is even more challenging.

As any parent of a toddler knows, when your child needs constant supervision and monitoring, it is very time-consuming and interferes

with one's ability to get things done as planned (housework, chores).

Parents of children who have ADHD are constantly faced with needing to defend their parenting choices as well as their child. They must listen to "negative press" about this disorder and reject popular opinion in order to provide the child with necessary interventions and treatment. Parents must deal with criticism and "well-meaning advice" from grandparents, other relatives, friends, and acquaintances regarding how they should be disciplining and parenting their child. This causes a lot of parental self-doubt and adds to the stress they are already living with day in and day out.

Frequently, the family must deal with social issues, such as the exclusion of the child from out-of-school activities and so forth. It is painful when your child is not invited to birthday parties or has difficulty finding someone to play with and keeping friends. Siblings are often resentful or jealous of the central role their ADHD sibling plays in the family's schedule, routines, and activities, as well as the extra time and special treatment he or she receives. In addition, siblings are acutely aware of and feel hurt and embarrassed when their brother or sister has acquired a negative reputation in the neighborhood and school.

Parents of children with ADHD have a much higher degree of responsibility in working with the school and being proactive in the management of their son or daughter. Further, it is crucial that they fully educate themselves about ADHD in order to successfully advocate for their child's needs.

Keep the following points in mind:

In many cases, other family members who have ADHD were never diagnosed and have been struggling to cope with their own difficulties without proper treatment and support. That is why the clinicians who specialize in treating children with ADHD say it is so important to view treatment in the context of the family. Learning about the family (communication, disciplinary practices, and so forth) helps in designing a treatment plan that is most effective for the child.

It is very common that a parent will recognize for the first time what he or she has been suffering with over the years (undiagnosed ADHD) when a son or daughter is diagnosed with the disorder. This can be most helpful and result in a positive change in the family dynamics. Without question, families of children with ADHD need support and understanding. Fortunately, there are far more supports available now than there were a decade ago.