Attachment disorder see Reactive attachment disorder of infancy or early childhood

Attention deficit hyperactivity disorder (ADHD)

Definition

Attention deficit hyperactivity disorder (ADHD) is a chronic developmental disorder characterized by attention problems, including distractibility, hyperactivity, impulsive behaviors, and the inability to remain focused on tasks or activities. Among its acronyms are AD/HD and ADD. Diagnosed in childhood, the disorder can continue into adulthood.

Demographics

ADHD is a psychiatric disorder that is generally diagnosed in children before the age of 7 years, although...
its symptoms can continue into adulthood. The Centers for Disease Control and Prevention (CDC) states that about 9.5% of children from 4 to 17 years of age have been diagnosed in the United States with ADHD. The disorder is more common in boys (13.2%) than in girls (5.6%). In addition, approximately 4.7% of American adults have ADHD.

In the United States, from 2007 through 2008, the average rate of ADHD varied geographically from a low of 5.6% in Nevada, in the western part of the United States, to a high of 15.6% in the east-central state of North Carolina. The CDC also reported that the diagnosis rate of ADHD increased by an average of 3% per year from 1997 to 2006, and from 2003 to 2007, the annual rate was 5.6%.

Worldwide, 3%–5% of children are afflicted with ADHD, with rates ranging from less than 1% in the United Kingdom (which has strict standards for diagnosis) to 12% in some countries within South America. Up to 50% of those diagnosed in childhood continue to have symptoms into adulthood.

**Description**

ADHD, also called hyperkinetic disorder (HKD) outside of the United States, is the most commonly diagnosed neurological disorder in children. It is frequently diagnosed by the age of seven years; however, it can be diagnosed as early as two years. Although childhood ADHD has been studied extensively, less information is available on adult ADHD. Studies on adults have produced a wide range of conflicting results. One reason for the wide range of findings is that the hyperactive component of the disorder often becomes less noticeable as individuals mature and develop more self-control.

Three types of ADHD are recognized by the American Psychiatric Association and outlined in the *Diagnostic and Statistical Manual of Mental Disorders*, fourth edition, text revised (DSM-IV-TR). These are:

- predominately hyperactive type, characterized by excessive physical activity (e.g., constant fidgeting, inability to stay seated, inability to engage in quiet play) and impulsive behaviors (e.g., interrupting, difficulty waiting in line)
- predominately inattentive type, characterized by inability to pay close attention to detail, stay on task, and organize tasks; sometimes referred to as attention deficit disorder (ADD)
- combined hyperactive and inattentive type, characterized by an inappropriately high activity level with a high level of distractibility

**Causes and symptoms**

**Causes**

Although the exact causes of ADHD are not known, it is clear that specific parts of the brain are involved, including the frontal cortex, parietal lobe, and possibly the cerebellum. Functional magnetic resonance imaging (fMRI) studies comparing the brains of children with ADHD and those without the disorder show that children with ADHD have weaker brain activation of the frontal area when responding to tasks that require inhibition. Researchers believe that this is related to an imbalance in certain neurotransmitters (the chemicals in the brain that carry messages between nerve cells), specifically deficits in the neurotransmitters dopamine and norepinephrine. Drugs used to treat ADHD make dopamine and/or norepinephrine more available in the brain.

ADHD also appears to have a hereditary component. Children with a parent or sibling with ADHD are two to eight times more likely to develop the disorder. Scientists have suggested at least 20 genes that may make a person more vulnerable to ADHD or contribute to the disorder in some way. As of 2011, these genes were being studied to learn more about whether they contribute to ADHD, and, if so, to what degree.

The condition is also more likely in children whose mothers smoke tobacco products, use drugs, or have been exposed to toxins. Pregnant women who smoke tobacco products are at increased risk to giving birth to a child with ADHD. Alcohol or drug use during pregnancy may also contribute to increased risk for ADHD. Children who are exposed to toxins are more likely to acquire developmental and behavioral problems associated with ADHD when compared to children who have never been exposed to toxins. One such toxin that has been scientifically shown to produce ADHD-like symptoms is the element lead (symbol Pb), which is sometimes found in paint from old homes and buildings.

A widely publicized study conducted by Benjamin F. Feingold (1899–1982) in the early 1970s suggested that allergies to certain foods and food additives caused the characteristic hyperactivity of children with ADHD. Although some children may have adverse reactions to certain foods that can affect their behavior (for example, a rash might temporarily cause a child to be distracted from other tasks), carefully controlled follow-up studies have uncovered no link between food allergies and ADHD. Some researchers believe that artificial coloring and food preservatives may contribute to hyperactive behavior as seen in ADHD, but no link has been proven. A popularly held misconception about food and ADHD is that the consumption of sugar causes hyperactive behavior. Studies have shown no link between sugar
intake and ADHD. It is important to note, however, that a nutritionally balanced diet is important for normal development in all children.

**Symptoms**

Children with ADHD have short attention spans, becoming easily distracted or frustrated with tasks. Although they may be quite intelligent, their lack of focus frequently results in poor grades and difficulties in school. Children with ADHD act impulsively, taking action first and thinking later. They are constantly moving, running, climbing, squirming, and fidgeting, but they often have trouble with motor skills and, as a result, may be clumsy and awkward. Their clumsiness may extend to the social arena, where they are sometimes shunned due to their impulsive and intrusive behavior. Because of these symptoms, ADHD children are often troubled by low self-esteem and may have poor relationships.

**Diagnosis**

There is not a single test for ADHD. Psychiatrists and other mental health professionals use the criteria listed in the *DSM-IV-TR* as a guideline for determining the presence of the disorder. A diagnosis of ADHD requires the presence of at least six of the following symptoms of inattention or six or more symptoms of hyperactivity and impulsivity combined. These symptoms must occur before the age of seven years, be present in at least two different environments (e.g., home and school) for at least six months, and not be attributable to any other developmental or mental health disorder.

Signs of inattention include:

- fails to pay close attention to detail or makes careless mistakes in schoolwork or other activities
- has difficulty sustaining attention in tasks or activities
- does not appear to listen when spoken to
- does not follow through on instructions and does not finish tasks
- has difficulty organizing tasks and activities
- avoids or dislikes tasks that require sustained mental effort (e.g., homework)
- loses things necessary for tasks (e.g., books, tools)
- is easily distracted
- is forgetful in daily activities

Signs of hyperactivity and impulsivity include:

- fidgets with hands or feet or squirms in seat
- does not remain seated or is restless when expected to sit
- runs or climbs excessively when inappropriate (in adolescents and adults, feelings of restlessness)
- has difficulty playing quietly
- blurts out answers before the question has been completed
- has difficulty waiting (e.g., to take turns, to stand in line)
- interrupts and/or intrudes on others

Additional hyperactivity/impulsivity criteria proposed for the fifth edition of the *DSM (DSM-5, 2013)* include:

- acts without thinking, such as starting tasks without reading instructions or speaking without considering the consequences
- is impatient and acts restless when waiting for others
- is uncomfortable doing things slowly, often rushing to complete tasks
- finds it difficult to resist temptations or opportunities, even when they involve risk

**Examination**

The first step in determining if a child has ADHD is to consult with a pediatrician. The pediatrician can make an initial evaluation of the child’s developmental maturity compared to other children in his or her age group. The physician also can perform a comprehensive physical examination to rule out any organic causes of ADHD symptoms, such as an overactive thyroid, vision problems, or hearing problems.

If an organic problem is not found, a **psychologist**, psychiatrist, neurologist, neuropsychologist, or learning specialist typically is consulted to perform a comprehensive ADHD assessment. A complete medical, family, social, psychiatric, and educational history is compiled from existing medical and school records and from interviews with parents and teachers. Interviews may also be conducted with the child, depending on his or her age. Along with these interviews, several clinical inventories may also be used, such as the Conners Rating Scales (Teacher’s Questionnaire and Parent’s Questionnaire), Child Behavior Checklist (CBCL), and the Barkley Home Situation Questionnaire. These inventories provide valuable information on the child’s behavior in different settings and situations. In addition, the Wender Utah Rating Scale has been adapted for use in diagnosing ADHD in adults. Continuous Performance Tests, which involve tasks performed on a computer, may support a diagnosis of attention-deficit type ADHD but by themselves are not diagnostic.

As many as 50% to 60% of people diagnosed with ADHD also meet the diagnostic criteria for another major psychiatric disorder such as anxiety disorders, depression, antisocial personality disorder, oppositional defiant disorder, bipolar disorder, substance...
abuse disorder, or conduct disorder. These individuals also have a high likelihood of having a learning disorder. Children with ADHD also sometimes have Tourette syndrome, which is a neurological disorder characterized by vocal tics or compulsive muscle spasms. A complete and comprehensive psychiatric assessment is critical to differentiate ADHD from other mood and behavioral disorders.

In the United States, public schools are required by federal law to offer free ADHD assessment upon request. A pediatrician also can provide a referral to a psychologist or pediatric psychiatrist for ADHD assessment. Parents should check with their insurance plans to see if these services are covered.

### Treatment

The CDC reported that in 2007, 2.7 million children from the age of 4 to 17 years were on medication to treat ADHD. It also stated that of all the children diagnosed with ADHD, 66.3% were on medication. Concerning age, the CDC found that children from 11 to 17 years of age were more likely to take medication than children aged 4 to 10 years. In addition, boys were 2.8 times more likely to take medication than girls. Treatment does not cure ADHD but has been found to help with its symptoms.

Therapy that addresses both psychological and social issues (called psychosocial therapy), usually combined with medications, is the treatment approach of choice to alleviate ADHD symptoms, and in younger children, therapy is preferred over medication. The combination of therapy and medication has proven to be the most effective treatment approach to ADHD. Most children who go through therapy for ADHD develop into normal functioning adults.

### Drugs

Stimulant drugs, also known as psychostimulants, are considered the most effective medication for treating ADHD. These drugs generally increase the availability of neurotransmitters in the brain, which tends to reduce such symptoms as inattention, impulsivity, and hyperactivity. Drug therapy must be highly individualized with the benefits balanced against the risk of undesirable side effects. Dextroamphetamine (Dexedrine, Dextrostat), dextroamphetamine/amphetamine mixture (Adderall), methylenphenidate (Concerta, Daytrana, Ritalin, Metadate), and dexmethylphenidate (Focalin) are common stimulant drug treatments. These drugs are available in both immediate release and extended release forms.

The use of the stimulant drug pemoline (Cylert) to treat ADHD was stopped in 2005 when the U.S. Food and Drug Administration (FDA) ruled that the risk of liver damage outweighed the benefits of this drug.

Stimulant drugs may have adverse side effects in some children. These side effects include loss of appetite, insomnia, mood disturbance, headache, and gastrointestinal distress. Tics may also appear and should be monitored carefully. Psychotic reactions are among the more severe side effects. There is some evidence that long-term use of stimulant medication may interfere with physical growth and weight gain. Some experts feel that these effects are ameliorated by taking medication breaks (or “drug holidays”) over school vacations or weekends. Increasingly, there is concern about long-term use of stimulant medications and their use of in very young children; their use is not recommended in children under age six unless absolutely necessary.

In the past, children who did not respond well to stimulant therapy were often given tricyclic antidepressants such as desipramine (Norpramin, Pertofane) and imipramine (Tofranil). These drugs are now rarely used,
as they have a much higher risk of causing serious side effects, including cardiac arrhythmia (irregular heartbeat that can be life threatening).

Nonstimulant drugs are now the preferred choice for treating ADHD when stimulant drugs are found to be ineffective or when adverse side effects occur. Atomoxetine (Strattera) is a nonstimulant norepinephrine reuptake inhibitor. Its effect is to make norepinephrine remain in the brain longer, thus increasing the amount of norepinephrine available.

Other medications used to treat ADHD include some antidepressants (when stimulants or nonstimulants do not work or when a mood disorder is present in addition to ADHD). These include buproprion (Wellbutrin) and venlafaxine (Effexor), both atypical, nontricyclic antidepressants. Clonidine (Catapres) and guanfacine (Intuniv, Tenex), both systemic antihypertensive (blood pressure lowering) medications, also have been used to control aggression and hyperactivity in some ADHD children. They may also reduce symptoms such as tics or insomnia. However, these drugs can have serious side effects if taken with methylphenidate (Ritalin).

Generally, a child’s response to medication will change with age and maturation, so ADHD symptoms should be monitored and prescriptions adjusted accordingly.

**Therapies**

It is important that drug treatment be carefully monitored and not be used exclusively in the management of ADHD. **Behavior modification** is often used in conjunction with drug therapy. Behavior modification uses a reward system to reinforce good behavior and task completion and can be implemented both in the classroom and at home. A tangible reward such as a sticker may be given to the child every time he or she completes a task or behaves in an acceptable manner. A chart system may be used to display the stickers and visually illustrate the child’s progress. When a certain number of stickers are collected, the child may trade them in for a bigger reward such as a trip to the zoo or a day at the beach. The reward system stays in place until the good behavior becomes ingrained and is sustained without reward.

A variation of this technique, **cognitive-behavioral therapy,** works to decrease impulsive behavior by getting the child to recognize the connection between thoughts and behavior. Behavior is changed by altering negative thinking patterns.

Individual **psychotherapy** may help children with ADHD build self-esteem, give them a place to discuss their worries and anxieties, and help them gain insight into their behavior and feelings. **Family therapy** also may be beneficial in helping family members develop coping skills and in working through feelings of guilt or anger that the parents may be experiencing. Parenting skills training also helps parents to develop methods to better understand and deal with their children.

**Social skills training** can help children learn more appropriate behaviors while interacting with others. Many **support groups** are available around the country that help to provide a much needed network of information, education, and other types of support for children and their families.

**Alternative treatment**

A number of alternative treatments exist for ADHD. Although there is a lack of controlled studies to prove their efficacy, proponents report that they are successful in controlling symptoms in some ADHD patients. Nevertheless, none of these treatments meets the standards of safety and effectiveness required by conventional medicine. Some of the more popular alternative treatments are:

- **EEG (electroencephalograph) biofeedback.** By measuring brainwave activity and teaching the ADHD patient which type of brainwave is associated with attention, EEG biofeedback attempts to train patients to generate the desired brainwave activity.
- **Dietary therapy.** Based in part on the Feingold food allergy diet, dietary therapy focuses on a nutritional plan that is high in protein and complex carbohydrates and free of white sugar and salicylate-containing foods such as strawberries, tomatoes, and grapes. Zinc supplementation has shown positive results in alleviating symptoms of hyperactivity, impulsiveness, and social interaction problems, though additional research is needed.

- **Herbal therapy.** Herbal therapy uses a variety of natural remedies to address the symptoms of ADHD, such as ginkgo (Ginkgo biloba) for memory and mental sharpness and chamomile (Matricaria recutita) extract for calming. The safety of herbal remedies has not been demonstrated in controlled studies. For example, it is known that ginkgo may affect blood coagulation, but controlled studies have not yet evaluated the risk of the effect.

- **Homeopathic medicine.** The theory of homeopathic medicine is to treat the whole person at a core level. Constitutional homeopathic care requires consulting with a well-trained homeopath who has experience working with ADD and ADHD individuals.
Prognosis

Approximately 70% to 80% of ADHD patients treated with stimulant medication experience significant relief from symptoms, at least in the short term. Some children with ADHD seem to “outgrow” symptoms of the disorder in adolescence or early adulthood, whereas others retain some or all of their symptoms as adults. Some children diagnosed with ADHD also develop a conduct disorder. As many as 25% of adolescents with both ADHD and a conduct disorder go on to develop antisocial personality disorder and the criminal behavior, substance abuse, and high rate of suicide attempts that frequently accompany this psychiatric disorder.

Untreated, ADHD negatively affects a child’s social and educational performance and can seriously damage his or her sense of self-esteem. Children with ADHD may have impaired relationships with their peers and be looked upon as social outcasts. They may be perceived as slow learners or troublemakers in the classroom. Siblings and even parents may develop resentful feelings toward the child.

Each child should have an individual educational plan (IEP) that outlines modifications to the regular mode of instruction that will facilitate the child’s academic performance. Teachers must consider the needs of the child when giving instructions, making sure that they are well paced. They must also understand the origins of impulsive behavior—that the child is not deliberately trying to ruin a lesson or activity by acting unruly. Teachers should teach in a structured way, be comfortable with the remedial services the child may need, and be able to maintain good lines of communication with the parent.

Specialists should devise a series of compensatory strategies that will enable the child to cope with his or her attention deficit or hyperactivity. These strategies might include simple things like creating checklists of things to do before handing in assignments (name on top, check spelling, etc.), putting a clock on the child’s desk to help structure time for activities, or covering the pictures on a page until the child has read the words so that he/she is not distracted.

Special assistance may not be limited to educational settings. Families frequently need help in coping with the demands and challenges of ADHD. The symptoms of inattention, shifting activities every five minutes, difficulty completing homework and household tasks, losing things, interrupting, not listening, rule breaking, constant talking, boredom, and irritability can take a toll on any family.

Parents may not understand how attention lapses or impulsivity affect daily functioning, and they might not be trained in the kind of techniques that help children with ADHD manage their behavior. Siblings may be resentful of what the child seems to “get away with” or the inordinate amount of attention he or she receives. The child with ADHD may be resentful of a younger sibling who is more accomplished at school or never seems to get in any trouble. Family interaction patterns may set up vicious cycles that become destructive and difficult to break.

Support groups for families are increasingly available through school districts and health care providers. Community colleges frequently offer courses in discipline and behavior management. Counseling services are available to complement any types of pharmacological treatment being used. There are a number of popular books available, which are informative and helpful.
There is no way to prevent attention deficit hyperactivity disorder. However, it is always wise for pregnant mothers to avoid the use of alcohol, drugs, and tobacco products to avoid medical problems with children later in life.

**Resources**

**BOOKS**


**PERIODICALS**


**WEB SITES**


**ORGANIZATIONS**


Attention Deficit Disorder Association, PO Box 7557, Wilmington, DE, 19803-9997, (800) 939-1019, info@add.org, http://www.add.org.


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