

ATTENTION-DEFICIT/ HYPERACTIVITY DISORDER (ADHD)

An Information and
Action Handbook for School Nurses



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ADHD: CAUSE AND EFFECT

Young children are—by nature—active, impulsive, and easily distracted. In school, they often squirm in their seats, run in the halls, and forget their homework. Of course, some children are quieter and more sedentary than their peers, while others are louder and more exuberant. This is all part of the normal continuum. But when a child's behavior is at the extreme end of the continuum--marked by an excessively short attention span, excessively high activity level, excessively limited impulse control--it's reasonable to suspect ADHD.

A Basic Definition of ADHD

ADHD is a neurobehavioral disorder characterized by developmentally inappropriate inattention, hyperactivity, and impulsivity.¹ Exactly what does this mean? "Neuro-" means, of course, that the brain and nervous system are involved. "Behavioral" means that the child's actions are affected. "Developmentally inappropriate" means that the child's behavior is significantly different from that of most children in the same age group.

In a practical sense, saying that a child (or adult) has ADHD means that the person has trouble completing tasks, doesn't seem to listen to or remember instructions, may act impulsively, and may have difficulty interacting with others. Over the years, affected children have been called fidgety, impulsive, uncontrollable, or worse. They don't just misbehave; they demonstrate a persistent pattern of several abnormal behaviors, and the pattern differs from child to child.² Other common symptoms include low frustration tolerance, daydreaming, difficulties with organizing, and shifting activities frequently.³

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What Causes ADHD?

Could it be a brain injury? In the early 1900s, many people who survived an epidemic of encephalitis (brain inflammation) developed a persistent pattern of inattention, impulsivity, and hyperactivity. These abnormal behaviors also occurred in people who suffered head injuries or strokes that damaged the brain's prefrontal cortex, the region located just behind the forehead.⁴ Consequently, many physicians concluded that, even when no underlying illness or injury could be detected, hyperactive children with attention problems must also have had some form of brain injury, which they labeled "minimal brain dysfunction" or "minimal brain damage." These labels have now been abandoned.⁵

Don't blame the parents

Other healthcare professionals believed—also incorrectly—that ADHD was caused by bad parenting.⁴ Parents were at fault for not teaching the child how to behave, for not enforcing rules at home, for letting the child run wild. Today, it's well accepted that children with ADHD have a biologically determined predisposition to develop ADHD symptoms. However, parents' actions can indeed influence the frequency of some ADHD-related behaviors. For example, when parents use ineffective or inconsistent discipline, the child's conduct problems often increase. Conversely, parents who skillfully manage their child's behavior and provide a calm, orderly home environment can often help the child remain focused and attentive.⁵

Many medical professionals believed--incorrectly--that ADHD was caused by poor parenting.

Is it something they ate?

Some clinicians blamed ADHD symptoms on dietary factors--such as consumption of processed sugars, food colorings, food additives, preservatives, and artificial sweeteners. In the 1970s, many parents reported that the low-sugar, additive-free Feingold diet produced noticeable improvements in their children's ADHD symptoms. But carefully controlled clinical trials of this diet consistently failed to prove any benefits.⁵

Some people still refuse to abandon their belief in special diets, since certain allergy diets do help some children who have ADHD. However, there is no evidence that food allergies cause ADHD. Like pollen allergies and other allergic problems, food allergies can cause tension and fatigue, which--in turn--may worsen ADHD symptoms. Medication or a special diet can control the allergy and eliminate the exacerbation of ADHD symptoms, but it won't cure the ADHD.

Also, unless restricted diets are carefully planned, they may eliminate foods that a child needs for a balanced mix of vital nutrients.²

There is no evidence that food allergies cause ADHD.

Could vitamin deficiencies cause ADHD? Negative findings here, too. There is no evidence that a deficiency of any vitamin causes ADHD. Attempts to cure ADHD by administering high doses of certain vitamins or minerals may, in fact, do more harm than good.²

Neurobiology

Thanks to recent advances in medical science, we now understand that ADHD has many biological causes. New techniques for structural magnetic resonance imaging (MRI) of the brain have demonstrated that the total brain, the corpus

callosum, and the prefrontal cortex are smaller than normal in some people with ADHD.^{3,6} Other studies using positron emission tomography (PET) show that adults and teenagers with ADHD often have lower than normal brain activity in this prefrontal area. Several investigations also showed that blood flow to this part of the brain is decreased in children with ADHD.⁷

Administration of stimulant medications that are commonly used to treat children with ADHD temporarily increases blood flow and brain activity in this prefrontal area.^{4,8,8} So decreased size and decreased blood flow in the prefrontal area of the brain appear to be important causes of ADHD.

Brain chemistry

As you know, chemicals in the brain and nervous system, known as neurotransmitters, control the passage of impulses from nerve cell to nerve cell. This neurotransmission process regulates our behavior. Some brain chemistry studies suggest that people with ADHD may also have decreased levels of two neurotransmitters, dopamine and norepinephrine.^{4,9}

In animal experiments, administration of stimulant medications appears to increase brain levels of these neurotransmitters. Researchers believe a similar increase may occur in humans. If that is the case, abnormal levels of neurotransmitters may be an important factor in ADHD.⁴

Genetic factors

What causes all of these brain and neurotransmission abnormalities? New research in genetics shows that inheritance plays a strong role. In fact, ADHD is now among the most commonly recognized genetic-based disorders in psychiatry.³

Genetic investigations have identified two or more genes that are associated with decreased dopamine levels in ADHD.⁴ Other studies have shown that many children and adults with ADHD have a form of the gene called DRD4, which increases "novelty seeking behaviors" such as risk-taking, impulsiveness, and restlessness.^{4,10,11} Current studies are focusing on several other genes that also appear to be associated with ADHD.

As genes are transmitted from parents to their children, it's not surprising that ADHD very frequently runs in the family. It's common, for example, that when parents are informed about their child's ADHD behavior problems, the father or mother may say, "That's the same problem I have!" Studies of identical twins have found that if one twin has ADHD,

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there's an 80% to 90% chance that the other twin will have it, too.⁴ The likelihood that fraternal twins will both have ADHD is about 17%,³ which is still a significant association.

Environmental causes

In some children, ADHD seems to come out of nowhere; no one in the family has had similar symptoms. This situation suggests that an environmental cause, such as pregnancy complications or exposure to toxic substances, has affected the child's brain development and function.⁴ It's well known, for example, that drinking alcoholic beverages during pregnancy can cause developmental abnormalities in the brain's frontal areas. Research studies have shown that the quantity of alcohol a pregnant woman drinks is directly related to the probability that her child will exhibit hyperactivity and inattention at ages 4 to 7 years.⁴

Studies have also shown that the more cigarettes a mother smokes during pregnancy, the greater is the risk that her child will have ADHD.⁴

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Exposure to lead in early childhood may be another risk factor for ADHD, although this association seems less clear than that for nicotine and alcohol exposure during pregnancy. Even among children with high levels of exposure to lead, only about 1 in 3 showed increased impulsivity, hyperactivity, and other ADHD-related behaviors. But this is still a significant number of affected youngsters, especially in areas where there are high levels of lead in the soil or many older buildings with flaking lead-based paint on the walls.^{4,5}

Suspected--but unproven--causes of ADHD

Chronic medical problems that can't be cured often spark unscientific theories about hidden causes. ADHD is that kind of problem. Parents often feel frustrated because they don't know why their child has ADHD and what could have caused it. So it's not surprising that they're willing to accept plausible, though unsubstantiated, theories.

As a school nurse, you've probably heard parents blame their child's ADHD on childhood vaccinations, mercury in dental fillings--even their astrological sign. Recently, it's been suggested that ADHD might be precipitated by too much time spent watching TV, playing video games, or using the computer. Research studies have found no confirming evidence for any of these hypotheses.⁴

Still, parents, teachers, and the news media continue to suggest new theories. That's why it's important for you to explain that scientifically rigorous research is needed to

confirm any theory. You might tell the parents that barring scientific proof, there are several ways to judge whether a proposed theory or treatment has some validity:⁶

- It fits with current, proven scientific knowledge
- The treatment is claimed to be effective for a specific problem, not for a broad range of unrelated symptoms
- Possible adverse effects are acknowledged
- No claims are made that the scientific community is unwilling to accept this new idea

Despite your rational explanations, many people simply have no desire to be disabused of their beliefs. So save your breath! Instead, try to focus a parent's efforts on obtaining an accurate diagnosis and proper treatment for the child's problem.