

Attention Deficit Hyperactivity Disorder: Module 2

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The information in this training module was taken from an online article by the *National Institute of Mental Health*. (<http://www.nimh.nih.gov/health/publications/adhd/complete-publication.shtml>)

Objectives:

- Caregiver will be able to identify theories of possible causes of ADHD
- Caregiver will be able to list other disorders that sometimes accompany ADHD.

What Causes ADHD?

One of the first questions a parent will have is “Why? What went wrong?” “Did I do something to cause this?” There is little compelling evidence at this time that ADHD can arise purely from social factors or child-rearing methods. Most substantiated causes appear to fall in the realm of neurobiology and genetics. This is not to say that environmental factors may not influence the severity of the disorder, and especially the degree of impairment and suffering the child may experience, but that such factors do not seem to give rise to the condition by themselves.

The parents’ focus should be on looking forward and finding the best possible way to help their child. Scientists are studying causes in an effort to identify better ways to treat, and perhaps someday, to prevent ADHD. They are finding more and more evidence that ADHD does not stem from the home environment, but from biological causes. Knowing this can remove a huge burden of guilt from parents who might blame themselves for their child’s behavior.

Over the last few decades, scientists have come up with possible theories about what causes ADHD. Some of these theories have led to dead ends, some to exciting new avenues of investigation.

Environmental Agents

Studies have shown a possible correlation between the use of cigarettes and alcohol during pregnancy and risk for ADHD in the offspring of that pregnancy.

As a precaution, it is best during pregnancy to refrain from both cigarette and alcohol use.

Another environmental agent that may be associated with a higher risk of ADHD is high levels of lead in the bodies of young preschool children. Since lead is no longer allowed in paint and is usually found only in older buildings, exposure to toxic levels is not as prevalent as it once was. Children who live in old buildings in which lead still exists in the plumbing or in lead paint that has been painted over may be at risk.

Brain Injury

One early theory was that attention disorders were caused by brain injury. Some children who have suffered accidents leading to brain injury may show some signs of behavior similar to that of ADHD, but only a small percentage of children with ADHD have been found to have suffered a traumatic brain injury.

Food Additives and Sugar

It has been suggested that attention disorders are caused by refined sugar or food additives, or that symptoms of ADHD are exacerbated by sugar or food additives. In 1982, the National Institutes of Health held a scientific consensus conference to discuss this issue. It was found that diet restrictions helped about 5 percent of children with ADHD, mostly young children who had food allergies.³ A more recent study on the effect of sugar on children, using sugar one day and a sugar substitute on alternate days, without parents, staff, or children knowing which substance was being used, showed no significant effects of the sugar on behavior or learning.⁴

In another study, children whose mothers felt they were sugar-sensitive were given aspartame as a substitute for sugar. Half the mothers were told their children were given sugar, half that their children were given aspartame. The mothers who thought their children had received sugar rated them as more hyperactive than the other children and were more critical of their behavior.⁵

Genetics

Attention disorders often run in families, so there are likely to be genetic influences. Studies indicate that 25 percent of the close relatives in the families of ADHD children also have ADHD, whereas the rate is about 5 percent in the general population.⁶ Many studies of twins now show that a strong genetic influence exists in the disorder.⁷

Researchers continue to study the genetic contribution to ADHD and to identify the genes that cause a person to be susceptible to ADHD. Since its inception in 1999, the Attention-Deficit Hyperactivity Disorder Molecular Genetics Network

has served as a way for researchers to share findings regarding possible genetic influences on ADHD.⁸

Recent Studies on Causes of ADHD

Some knowledge of the structure of the brain is helpful in understanding the research scientists are doing in searching for a physical basis for attention deficit hyperactivity disorder. One part of the brain that scientists have focused on in their search is the *frontal lobes of the cerebrum*. The frontal lobes allow us to solve problems, plan ahead, understand the behavior of others, and restrain our impulses. The two frontal lobes, the right and the left, communicate with each other through the *corpus callosum*, (nerve fibers that connect the right and left frontal lobes).

The *basal ganglia* are the interconnected gray masses deep in the cerebral hemisphere that serve as the connection between the cerebrum and the *cerebellum* and, with the cerebellum, are responsible for motor coordination. The cerebellum is divided into three parts. The middle part is called the *vermis*.

All of these parts of the brain have been studied through the use of various methods for seeing into or imaging the brain. These methods include functional magnetic resonance imaging (fMRI) positron emission tomography (PET), and single photon emission computed tomography (SPECT). The main or central psychological deficits in those with ADHD have been linked through these studies. By 2002 the researchers in the NIMH Child Psychiatry Branch had studied 152 boys and girls with ADHD, matched with 139 age- and gender-matched controls without ADHD. The children were scanned at least twice, some as many as four times over a decade. As a group, the ADHD children showed 3-4 percent smaller brain volumes in all regions—the frontal lobes, temporal gray matter, caudate nucleus, and cerebellum.

This study also showed that the ADHD children who were on medication had a white matter volume that did not differ from that of controls. Those never-medicated patients had an abnormally small volume of white matter. The white matter consists of fibers that establish long-distance connections between brain regions. It normally thickens as a child grows older and the brain matures.⁹

Although this long-term study used MRI to scan the children's brains, the researchers stressed that MRI remains a research tool and cannot be used to diagnose ADHD in any given child. This is true for other neurological methods of evaluating the brain, such as PET and SPECT.

Test Questions:

1. Scientists are finding more and more evidence that ADHD does not stem from the home environment, but from biological causes.

True False

2. Studies have shown no possible correlation between the use of cigarettes and alcohol during pregnancy and risk for ADHD in the offspring of that pregnancy.

True False

3. Attention disorders often run in families, so there are likely to be genetic influences.

True False

4. The frontal lobes allow us to solve problems, and are the source of gross motor abilities.

True False

Disorders that Sometimes Accompany ADHD

Learning Disabilities

Many children with ADHD—approximately 20 to 30 percent—also have a specific learning disability (LD).¹⁰ In preschool years, these disabilities include difficulty in understanding certain sounds or words and/or difficulty in expressing oneself in words. In school age children, reading or spelling disabilities, writing disorders, and arithmetic disorders may appear. A type of reading disorder, *dyslexia*, is quite widespread. Reading disabilities affect up to 8 percent of elementary school children.

Tourette Syndrome

A very small proportion of people with ADHD have a neurological disorder called Tourette syndrome. People with Tourette syndrome have various nervous tics and repetitive mannerisms, such as eye blinks, facial twitches, or grimacing.

Others may clear their throats frequently, snort, sniff, or bark out words. These behaviors can be controlled with medication. While very few children have this syndrome, many of the cases of Tourette syndrome have associated ADHD. In such cases, both disorders often require treatment that may include medications.

Oppositional Defiant Disorder

As many as one-third to one-half of all children with ADHD—mostly boys—have another condition, known as oppositional defiant disorder (ODD). These children are often defiant, stubborn, non-compliant, have outbursts of temper, or become belligerent. They argue with adults and refuse to obey.

Conduct Disorder

About 20 to 40 percent of ADHD children may eventually develop conduct disorder (CD), a more serious pattern of antisocial behavior. These children frequently lie or steal, fight with or bully others, and are at a real risk of getting into trouble at school or with the police. They violate the basic rights of other people, are aggressive toward people and/or animals, destroy property, break into people's homes, commit thefts, carry or use weapons, or engage in vandalism. These children or teens are at greater risk for substance use experimentation, and later dependence and abuse. They need immediate help.

Anxiety and Depression

Some children with ADHD often have co-occurring anxiety or depression. If the anxiety or depression is recognized and treated, the child will be better able to handle the problems that accompany ADHD. Conversely, effective treatment of ADHD can have a positive impact on anxiety as the child is better able to master academic tasks.

Bipolar Disorder

There are no accurate statistics on how many children with ADHD also have bipolar disorder. Differentiating between ADHD and bipolar disorder in childhood can be difficult. In its classic form, bipolar disorder is characterized by mood cycling between periods of intense highs and lows. But in children, bipolar disorder often seems to be a rather chronic mood dysregulation with a mixture of elation, depression, and irritability. Furthermore, there are some symptoms that can be present both in ADHD and bipolar disorder, such as a high level of energy and a reduced need for sleep. Of the symptoms differentiating children with ADHD from those with bipolar disorder, elated mood and grandiosity of the bipolar child are distinguishing characteristics.¹¹

Test Questions:

5. As many as one-third to one-half of all children with ADHD have another condition, known as oppositional defiant disorder

- a. these children have various nervous tics and repetitive mannerisms, such as eye blinks, facial twitches, or grimacing.
- b. these children often seems to be a rather chronic mood dysregulation with a mixture of elation, depression, and irritability.
- c. these children have difficulty in understanding certain sounds or words and/or difficulty in expressing oneself in words.
- d. these children are often defiant, stubborn, non-compliant, have outbursts of temper, or become belligerent.

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Name _____

Job Title _____

Location _____