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NUTRITION

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Does Nutrition Play a Role in ADHD?

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There's no evidence that diet causes the behavioral disorder ADHD.



However, research suggests that for some people, dietary changes can help to improve symptoms.



But, a substantial amount of research has examined how nutrition affects ADHD.



This article is an overview of these findings, discussing foods, diets, and supplements involved.



Medically reviewed by [Atli Arnarson BSc, PhD](#) —
Written by Freydis Hjalmsdottir, MS on
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What is ADHD?

Attention deficit hyperactivity disorder (ADHD) is a neurodevelopmental disorder involving inattention, hyperactivity, and impulsiveness (1, 2).

It's one of the most common disorders children can have but also affects many adults (3, 4).

The exact cause of ADHD is unclear, but research shows that genetics play a major role. Other factors, such as environmental toxicity and poor nutrition during infancy, have also been implicated (5, 6, 7, 8).

ADHD is believed to originate from low levels of dopamine and noradrenaline in the region of the brain responsible for self-regulation (9, 10, 11).

When these functions are impaired, people struggle to complete tasks, perceive time, stay focused, and curb inappropriate behavior (12, 13, 14).

In turn, this affects their ability to work, do well in school, and maintain appropriate relationships, which can decrease quality of life (15, 16, 17, 18, 19).

ADHD is not considered to be a curable disorder, and treatment instead aims to reduce symptoms. Behavioral therapy and medication are mostly used (20, 21).

However, dietary changes may also help to manage symptoms (1, 22).

SUMMARY

ADHD is a complicated behavioral disorder. Common treatments include therapy and medication. Dietary changes may also be useful.

Nutrition and behavior

The science behind the effect of food on behavior is still quite new and controversial. However, certain foods do affect behavior.

For example, **caffeine** can increase alertness, **chocolate** can affect mood, and **alcohol** can change behavior (23).

Nutritional deficiencies can also affect behavior. One study concluded that taking a supplement of essential fatty acids, vitamins, and minerals led to a significant reduction in antisocial behavior, compared with a placebo (24).

Studies suggest vitamin and mineral supplements can also reduce antisocial behavior in children, and polyunsaturated fatty acids have been shown to decrease violent behavior (25, 26).

Since foods and supplements may influence behavior, it seems plausible that they could also affect ADHD symptoms, which are largely behavioral.

For this reason, a good amount of nutrition research has looked into the effects of foods and supplements on ADHD.

Mostly, two types of studies have been performed:

- **Supplement studies.** These focus on supplementing with one or several nutrients.
- **Elimination studies.** These focus on eliminating one or several ingredients from the diet.

SUMMARY

Studies indicate that certain foods and supplements do affect behavior. For these reasons, quite a few studies have looked into how nutrition affects ADHD symptoms, which are mostly behavioral.

Supplement studies: A research review

Many studies have shown that children with ADHD aren't eating a well-balanced diet and have [nutrient deficiencies](#) (27, 28, 29, 30).

This caused researchers to speculate that supplements might help improve symptoms.

Nutrition studies have looked into the effects of several supplements on ADHD symptoms, including:

- amino acids
- vitamins
- minerals
- omega-3 fatty acids

Amino acid supplements

Every cell in your body needs amino acids to function. Among other things, amino acids are used to make neurotransmitters, or signaling molecules in the brain.

In particular, the amino acids phenylalanine, tyrosine, and tryptophan are used to make the neurotransmitters dopamine, serotonin, and norepinephrine.

People with ADHD have been shown to have problems with these neurotransmitters, as well as low blood and urine levels of these amino acids (31, 32).

For this reason, a few studies have examined how amino acid supplements affect ADHD symptoms in children.

Tyrosine and s-adenosylmethionine supplements have provided mixed results, with some studies showing no effects and others showing modest benefits (33, 34, 35).

SUMMARY

Amino acid supplements for ADHD show some promise, but more studies need to be done. For now, the results are mixed.

Vitamin and mineral supplements

Iron and zinc deficiencies can cause mental impairment in all children, whether or not they have ADHD (36, 37, 38).

However, lower levels of zinc, magnesium, calcium, and phosphorous have repeatedly been reported in children with ADHD (39, 40, 41).

Several studies have looked into the effects of zinc supplements, and all of them reported improvements in symptoms (42, 43, 44).

Two other studies assessed the effects of iron supplements on children with ADHD. They also found improvements, but again, more research is needed (45, 46).

The effects of mega doses of vitamins B6, B5, B3, and C have also been examined, but no improvements to ADHD symptoms were reported (47, 48).

Nevertheless, a 2014 trial of a multivitamin and mineral supplement did find an effect. The adults taking the supplement showed improvement on ADHD rating scales after 8 weeks, compared with the placebo group (49, 50).

SUMMARY

The results from vitamin and mineral supplement studies have been mixed, but several show promise.

Omega-3 fatty acid supplements

Omega-3 fatty acids play important roles in the brain.

Children with ADHD generally have lower levels of omega-3 fatty acids than children who don't have ADHD (51, 52).

What's more, the lower their omega-3 levels, the more learning and behavioral problems the children with ADHD have (53).

Therefore, it's unsurprising that many studies have found omega-3 supplements to cause modest improvements to ADHD symptoms (54, 55, 56, 57, 58).

Omega-3 fatty acids appeared to help improve task completion and inattention. Additionally, they decreased aggression, restlessness, impulsiveness, and hyperactivity (59, 60, 61, 62, 63, 64, 65).

However, not all researchers are convinced. One analysis of studies, estimating ADHD

symptoms using the Connor's rating scale (CRS), concluded that there's poor evidence supporting the claim that omega-3 supplements improve ADHD symptoms in children (66 [🔗]).

SUMMARY

Numerous trials have found that omega-3 supplements can bring about modest improvements in ADHD symptoms, although the evidence is not entirely consistent.

Elimination studies: A research review

People with ADHD are more likely to have adverse reactions to food, causing speculation that eliminating problematic foods might help to improve symptoms (30 [🔗], 67 [🔗]).

Studies have examined the effects of eliminating many ingredients, including:

- food additives
- preservatives
- sweeteners
- allergenic foods

Eliminating salicylates and food additives

By accident, an allergist named Dr. Feingold discovered that food could affect behavior.

In the 1970s, he prescribed a diet to his patients that eliminated certain ingredients that produced a reaction for them.

The diet was free of salicylates, which are compounds found in many foods, medications, and food additives.

While on the diet, some of Feingold's patients noted an improvement in their behavioral problems.

Soon after, Feingold started recruiting children diagnosed with hyperactivity for dietary experiments. He claimed that 30–50% of them improved on the diet (68).

His work was celebrated by many parents, who formed the still-existent Feingold Association of the United States (69 [🔗]).

Although reviews concluded the Feingold diet was not an effective intervention for hyperactivity, it stimulated further research into the effects of food and additive elimination on ADHD (70 [🔗], 71 [🔗], 72 [🔗]).

Some medical professionals strongly advise against using salicylate elimination diets in the treatment of ADHD. The diet may cause nutritional deficiencies and promote food aversion among children (73 [🔗]).

SUMMARY

The Feingold diet pioneered elimination diet research for ADHD. Dr. Feingold claimed it improved symptoms in children with ADHD, although evidence is lacking.

Eliminating artificial colorants and preservatives

After the Feingold diet was no longer considered effective, researchers narrowed their focus to look at artificial food colors (AFCs) and preservatives.

This is because these substances seem to affect the behavior of children, regardless of whether or not they have ADHD (74, 75).

One study followed 800 children suspected of hyperactivity. Of the group, 75% of them improved while on an AFC-free diet, but relapsed once given AFCs again (76).

Another study found that hyperactivity was increased when 1,873 children consumed AFCs and sodium benzoate, which is a preservative (77).

Even though these studies indicate that AFCs can increase hyperactivity, many people claim the evidence is not strong enough (1, 54, 78, 79, 80, 81).

Nonetheless, the Food and Drug Administration (FDA) requires certain AFCs to be listed on food packages. The European Union (EU) additionally requires foods containing AFCs to have a [warning label](#) listing adverse effects to children's attention and behavior (82, 83, 84).

SUMMARY

AFCs may affect behavior in children, although some say the evidence is not strong enough. However, the FDA and the EU require food labels to list additives.

Eliminating sugar and artificial sweeteners

[Soft drinks](#) have been linked to increased hyperactivity, and low blood sugar is also common in those with ADHD (85, 86). (same link as below)

Furthermore, some observational studies have found [sugar intake](#) to be related to ADHD symptoms in children and adolescents (87).

However, one review looking into sugar and behavior found no effects. Two trials studying the artificial sweetener [aspartame](#) also found no effects (88, 89, 90).

Theoretically, it's more likely that sugar causes inattention, rather than hyperactivity, as blood sugar imbalances can cause attention levels to drop.

SUMMARY

Sugar and artificial sweeteners have not been shown to directly affect ADHD. However, they may have indirect effects.

The Few Foods Elimination Diet

The Few Foods Elimination Diet is a method that tests how people with ADHD respond to foods. Here's how it works:

- **Elimination.** This step involves following a very restricted diet of low-allergen foods that are unlikely to cause adverse effects. If symptoms get better, enter the next phase.
- **Reintroduction.** Foods suspected of causing adverse effects are reintroduced every 3–7 days. If symptoms return, the food is identified as “sensitizing.”
- **Treatment.** A personal dietary protocol is prescribed during this step. It avoids sensitizing foods as much as possible, in order to minimize symptoms.

Twelve different studies have tested this diet, each of which lasted 1–5 weeks and included 21–50 children.

Eleven of the studies found a statistically significant decrease in ADHD symptoms in 50–80% of the participants, while the other one found improvements in 24% of the children ([91](#), [92](#), [93](#), [94](#), [95](#), [96](#), [97](#), [98](#), [99](#), [100](#), [101](#), [102](#)).

Of the children who responded to the diet, most reacted to more than one food. While this reaction varied by individual, cow's milk and wheat were the most common offenders ([92](#), [94](#), [100](#)).

The reason why this diet works for some children and not others is unknown.

SUMMARY

The Few Foods Elimination Diet is a diagnostic tool to rule out problems with food. All studies have found a favorable effect in a subgroup of children, usually more than half.

The bottom line

Research on the effects of food on ADHD symptoms is far from conclusive.

Yet, the studies mentioned here suggest that diet can have powerful effects on behavior.

How we reviewed this article:

 **HISTORY**

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