

## Omega-3, Concentration and Hyperactivity

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### Abstract (Summary)

When these problems start to have an adverse impact on school performance and behaviour, the child may be diagnosed with attention deficit hyperactivity disorder (ADHD). Research has established that omega3 fatty acids are crucial for healthy infant brain development, and researchers are also finding that omega-3 deficiencies might be related to a range of mental health problems including depression, bipolar disorder, schizophrenia, dementia, dyslexia and ADHD.

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Full Text (1404 words)

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### [Headnote]

Learning and behaviour problems associated with attention deficit hyperactivity disorder can cause a great deal of distress for children, their parents and teachers. Natalie Sinn examines whether fish oil might provide some relief.

Many people either have, or know someone with, a child who has difficulty sitting still, controlling impulses or concentrating at school. When these problems start to have an adverse impact on school performance and behaviour, the child may be diagnosed with attention deficit hyperactivity disorder (ADHD). The number of children diagnosed with ADHD has been increasing dramatically in America, Europe and Australia, with the Australian Bureau of Statistics placing 7% of girls and 19% of boys aged 6-12 in this category.

ADHD is more common in boys, and the major symptoms are hyperactivity, impulsivity and inattention. These symptoms often overlap with other problems including learning disabilities (e.g. dyslexia), depression, anxiety and oppositional or antisocial behaviour, and can be associated with poor academic achievement, low self-esteem and problems with self-discipline. When someone in the family has ADHD, very often there will also be other mental health problems within the same family like developmental disorders (e.g. dyslexia, autism or Asperger's syndrome), depression and schizophrenia.

There is evidence that children with ADHD have slower brain wave activity in specific areas of their brain, particularly the frontal lobes (behind the forehead), which are responsible for controlling attention. Studies have found that when children normally concentrate on something like reading, their brainwave patterns will become faster. However, when children with ADHD try to concentrate their brainwave patterns slow down. This would make it very difficult for them to keep their attention focused.

Therefore many treatments for ADHD are aimed at addressing symptoms at a biological level. However, there has been a great deal of concern over increasing prescriptions of stimulant medications for these children. Many people have opted for a nutritional approach, and there is some evidence that eliminating food additives and specific foods from the diet, or nutritional supplementation with zinc, might help.

A recent study conducted in South Australia has found that fish oil, containing omega-3 fatty acids, may also help to alleviate these symptoms.

## Omega-3 Fatty Acids for Concentration and Behaviour

How can omega-3 fatty acids help with concentration and behaviour? Most of us are aware of the importance of good nutrition for physical health, but not as many of us think about how food might affect our brain. However, it may make sense if we consider that the brain, just like the heart, liver, kidneys or lungs, is an organ. Furthermore, the brain influences our learning, moods and behaviour. Therefore if our brain doesn't receive the right nutrients, this is likely to impact on the way we think, feel and behave.

In fact, our brain has very high requirements for energy and nutrients from food, and one of the very important nutrients is omega-3 fatty acids. Over half of our brain is fat, and although the body normally has a 10:1 ratio of omega-6:omega-3 fatty acids, the long-chain omega-3 fatty acid DHA is the most concentrated polyunsaturated fat in our brain. Therefore it is thought that long-chain omega-3 fatty acids have very important structural and functional roles in the brain, including the maintenance of cell membrane fluidity and the transmission of neural chemical signals.

DHA is highly concentrated in the brain, and eicosapentaenoic acid (EPA) - another omega-3 fatty acid found in fish - is also believed to play important roles in brain function. Omega-6 fatty acids dihomo- $\gamma$ -linoleic acid (DGLA) and arachidonic acid (AA) also have important roles in the brain.

Research has established that omega-3 fatty acids are crucial for healthy infant brain development, and researchers are also finding that omega-3 deficiencies might be related to a range of mental health problems including depression, bipolar disorder, schizophrenia, dementia, dyslexia and ADHD.

## Our Research

A small number of research trials have shown that omega-3 fatty acids in fish oil might help to reduce the symptoms of ADHD, although there have been inconsistent results. A large study conducted in South Australia with 145 children confirmed that omega-3 may help with these symptoms. Children aged 7-12 years were given either placebo oil or fish oil for 15 weeks, and then all children were given the fish oil for a further 15 weeks. They were given cognitive psychological assessments before, during and after the 30 weeks, and parents filled in questionnaires at each of these times. The trial was double-blind, so the children, parents and researchers didn't know which groups were taking the real fish oil or placebo oil capsules.

After 15 weeks of taking the capsules, children in the fish oil groups showed significant improvements compared with the placebo group for parent ratings of their hyperactivity, impulsivity and inattention. When the placebo group then switched to the fish oil supplement for 15 weeks they showed the same improvements, and the children who had been taking the active fish oil for 30 weeks continued to improve.

The cognitive assessments showed improvements in children's ability to switch and control their attention, and in their vocabulary. This may be an indirect benefit from increased

concentration span resulting in longer reading time. Anecdotally, one parent reported that her son was reading for up to an hour at a time, whereas beforehand he was unable to concentrate on reading for longer than 5 minutes.

## The Results

The results from this research are very promising. It should be noted that it can take up to 8-12 weeks to start seeing improvements from the fish oil, and that not all children showed the same benefits. Up to half the children in our study showed notable improvements over 30 weeks of supplementation.

Further research needs to be done to determine which children are most likely to benefit and which ratio of EPA and DHA is most effective. We also need to look more closely at specific effects of fish oil on cognition and learning.

There have been no reports of adverse side-effects from taking the fish oil in studies to date, although omega-3 fatty acids do have a blood-thinning effect (hence their benefit for blood circulation and cardiovascular health). Therefore caution is advised when taking aspirin (which also has a blood-thinning effect) and in people with haemophilia. Recently published guidelines have recommended an upper limit of 3 g of fish oil per day in children and adults.

The fish oil supplement that was used for our study contained a 4:1 ratio of fish oil to evening primrose oil (containing omega-6 fatty acids), with active ingredients EPA (93 mg), DHA (29 mg), GLA (10 mg) and vitamin E (1.8 mg). Children took six capsules per day, providing a daily dose of 2.4 g fish oil and 0.6 g evening primrose oil. It is important to note that although this combination of polyunsaturated fatty acids has shown positive results with ADHD-related symptoms, it is not yet clear how important the addition of the evening primrose oil or the high EPA:DHA ratio is.

It is also important to recognise that the symptoms associated with ADHD are complex, and could be impacted by a variety of biological, nutritional and environmental influences. Therefore parents who have concerns about their child's learning or behaviour are advised to consult with their physician.

### [Sidebar]

#### What Are Omega-3 Fatty Acids?

Omega-3 and omega-6 fatty acids are polyunsaturated fats. Unlike saturated fats, which are used for energy and can be harmful (and fattening) if we eat too much of them, polyunsaturated fats are chemically active fats that are important structural components of every cell membrane in our body. A large body of research has shown that omega-3 fats are very important for cardiovascular health, and can therefore help to maintain a healthy heart. However, our bodies can't make these polyunsaturated fats, and diets in Western societies have become increasingly deficient in omega-3.

Vegetable sources of omega-3 include dark leafy vegetables, nuts and seeds. These can be converted to long-chain omega-3 fatty acids in the body, which are particularly important. However, many people have difficulty making these conversions. For these people the long-chain omega-3 fatty acids can be obtained directly from oily deep sea fish like tuna, mackerel, pilchards and sardines, or marine algae.

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