

Diets lacking omega-3s lead to anxiety, hyperactivity in teens

Diets lacking [omega-3](#) fatty acids - found in foods like wild fish, eggs, and grass-fed livestock - can have worsened effects over consecutive generations, especially affecting teens, according to a University of Pittsburgh study.

Published in *Biological Psychiatry*, the Pitt team found that in a rodent model second-generation deficiencies of omega-3s caused elevated states of [anxiety](#) and hyperactivity in adolescents and affected the teens' memory and cognition.

"We have always assumed that [stress](#) at this age is the main environmental insult that contributes to developing these conditions in at-risk individuals but this study indicates that [nutrition](#) is a big factor, too," said Bita Moghaddam, lead author of the paper and professor of [neuroscience](#) in the Kenneth P. Dietrich School of Arts and Sciences. "We found that this dietary deficiency can compromise the behavioral health of adolescents, not only because their diet is deficient but because their parents' diet was deficient as well. This is of particular concern because adolescence is a very vulnerable time for developing psychiatric disorders including [schizophrenia](#) and [addiction](#)."

Performing experiments in rats in Moghaddam's laboratory, the research team examined a "second generation" of omega-3-deficient diets, mimicking present-day adolescents. Parents of many of today's teens were born in the 1960s and 1970s, a time period in which omega-3-deficient oils like corn and soy oil became prevalent, and farm animals moved from eating grass to grain. Since omega-3s are present in grass and algae, much of today's grain-fed cattle contain less of these essential fatty acids.

The Pitt team administered a set of behavioral tasks to study the learning and memory, decision making, anxiety, and hyperactivity of both adults and adolescents. Although subjects appeared to be in general good physical health, there were behavioral deficiencies in adolescents that were more pronounced in second-generation subjects with omega-3 deficiencies. Overall, these adolescents were more anxious and hyperactive, learned at a slower rate, and had impaired problem-solving abilities.

"Our study shows that, while the omega-3 deficiency influences the behavior of both adults and adolescents, the nature of this influence is different between the age groups," said Moghaddam. "We observed changes in areas of the brain responsible for decision making and habit formation."

The team is now exploring epigenetics as a potential cause. This is a process in which environmental events influence genetic information. Likewise, the team is exploring markers of [inflammation](#) in the brain since omega-3 deficiencies causes an increase of omega-6 fats, which are proinflammatory molecules in the brain and other tissues.

"It's remarkable that a relatively common dietary change can have generational effects," said Moghaddam. "It indicates that our diet does not merely affect us in the short-term but also can affect our offspring."