

# Diet and Violence

*Published on May 2, 2011 by Emily Deans, M.D. in Evolutionary Psychiatry*

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What would you think if I told you that young people today likely committed violent, criminal acts in part due to poor nutrition. What if they continued those violent acts in prison as the poor nutrition continued? Reserve judgment for now. This is science—let's see what the data tells us. My theory is that our relatively nutrient-poor modern diets contribute to a great deal of modern psychopathology.

Researchers note that behavior issues have been linked to deficiencies in omega 3 fatty acids, and that low levels of magnesium and zinc are also associated with hyperactive behavior, impaired brain development, and cognitive dysfunction.



Over the past decade or so, several groups of researchers have done some decent work in this area, and (for once in the nutritional-type psychiatry literature) I can look at a randomized controlled trial of good size and design that was actually replicated.

The modern era of good studies begins with Oxford nutrition and criminology researcher, Bernard Gesch. Back in 2002, he published a (full free text) study entitled “Influence of supplementary vitamins, minerals, and essential fatty acids on the antisocial behavior of young adult prisoners.” In this study, 231 (young, male, adult, prisoner) volunteers agreed to receive a daily vitamin, mineral, and essential fatty acid supplementation or placebo. The average length of the supplementation was about 142 days, and a number of measures were taken before and during the active phase, including psychological testing, reports of violent acts, and reports of disciplinary action. Prisoners were randomized in part based on baseline disciplinary status and their progress in the “prison regime.”

Here are the active ingredients of the multimineral, multivitamin, one of which the prisoners in the active arm received daily. The prisoners also received a fatty acid supplement with 1260 mg linoleic acid (I know—we’ll talk about that later), 160 mg gamma linolenic acid, 80 mg EPA and 44 mg DHA. The placebo fatty acid pill was made from vegetable oil.

The results? The average number of “disciplinary incidents per 1000 person-days” dropped from 16 to 10.4 in the active group ( $p < 0.001$ ), which is a 35% reduction, whereas the placebo group only dropped by 6.7%. Especially violent incidents in the active group dropped by 37%, and in the placebo group only 10.1%. That’s a pretty impressive finding, really. Currently, Gesch is working on a study of 1000 prisoners in 3 different UK prisons for a 3 year trial, including blood chemistry analysis to see what the baseline levels of micronutrients are in the prisoners, and also more cognitive testing, designed to answer some questions the earlier study couldn’t answer.

However, luckily for us (as the newer Gesch results have yet to be published), a Dutch research team led by Zaalberg repeated the experiment (more or less) in “Effects of Nutritional Supplementation on Aggression, Rule-Breaking, and Psychopathology Among Young Adult Prisoners.” The researchers note that behavior issues have been linked to deficiencies in omega 3 fatty acids, and that low levels of magnesium and zinc are also associated with hyperactive behavior, impaired brain development, and cognitive dysfunction. Check out the quote from the study:

The mechanisms underlying potential associations between nutrition and behavior, however, are not yet clearly established. Although a clear comprehensive theory is lacking, several findings do offer some clues on the plausibility of dietary interventions. Epidemiological research, for instance, shows that major changes in dietary patterns over time have taken place, especially in industrialized world during the last century [Cordain et al., 2005; Crawford et al., 1999; Muskiet, 2005; Simopoulos, 1999]. These changes resulted in (micro)nutrient intakes that are significantly lower than in the ancient, Paleolithic diet. Indeed, some ecological studies show correlations between diet and behavioral outcomes [Christensen and Christensen, 1988; Hibbeln, 2001; Peet, 2004], including criminal behavior [Hibbeln, 2001]. A major limitation of epidemiological studies is, however, the impossibility of making

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## Diet and Violence *(Continued)*

causal inferences. For this reason, the findings mentioned above must be judged with caution and experimental confirmation is needed.

(I love these researchers already!) They did this trial specifically to see if they could replicate Gesch's work. Only they made some modifications in their supplement - specifically leaving out linoleic acid "because of its abundance in the Dutch diet", and using larger capsules that could include more bio-available forms of minerals, so there was more magnesium (300mg of Mg citrate vs 30mg (of ?) in the Gesch trial). They also halved the amount of vitamin D (from 400 IU to 200 IU) in the supplement (but did not specify why). They also increased doses of omega 3 fatty acids compared to Gesch, inline with newer research on the effects of omega 3s on the brain. No one supplemented with micro doses of lithium, despite some interesting data on low doses of lithium and behavior.

In all, 221 young male prisoners completed the study. Many dropped out, often due to transfer to another prison or being released. Of the completers, numbers of violent events in the active group dropped 34%, whereas incidents in the control group increased 14%. The overall number of incidents was lower (11 per 1000 person-days) in the Dutch prison compared to the UK one, but the percentage change was still significant. There were no significant differences in any of the cognitive, personality, and behavioral testing measures used, just the actual incidents. Which is interesting, because you can't figure out, from this data, why the incidents decreased. If you could say - oh, look, impulsivity and attentional measures improved, then you could say that's why the behavior is better. But they didn't improve. Which means maybe the cognitive measures aren't very good, or the effect was too subtle to catch. Well, I know a prison warden cares more about decreasing reported numbers of violent incidents in a prison compared than decreasing the psychologic testing measures of impulsivity.

One problem with this second study is that at the beginning, 51% of the prisoners guessed wrong as to whether they were receiving active vs. placebo pill. By the end, only 25% guessed wrong, suggesting the blind was somehow partially broken (perhaps by smell of the pills?). Violent incidents were measured by the prison staff, it is unknown whether the prisoners told the staff if they suspected active or placebo pills. So keep that in mind when interpreting the results.

Here is the Dutch researchers' conclusion:

To summarize, the prospect of influencing aggression and rule-breaking behavior with nutrients in moderate doses is important enough to warrant further research. This is particularly true as adequate supplementation may also have beneficial effects on mental health and cognitive functioning. This study, however, did not confirm this association, except for some marginal trends in this direction. Yet, as the found decrease in the outcome measure-reported incidents and rule-breaking-is in line with the earlier British prison study of

Gesch et al., we feel that further research on the association between dietary status and violent behavior is warranted.

What do I think? Well, we now have evidence from two decently-sized randomized controlled trials of adding a multivitamin/multimineral/essential fatty acid supplement to normal prison fare. The trials were done about 8 years apart and in different countries, yet came out with a similar conclusion. Actual violent/discipline-requiring incidents committed by the prisoners who took the supplements was reduced by about 1/3 compared to pre-supplement days, and in one study the placebo-taking prisoners had an increase in violent events, whereas the other study showed not much change in the placebo group.

My conclusion—practically speaking, I hope that prisoners in the US get a supplement. I don't care if it is the best pharmaceutical grade supplement on the planet, a month of supplementation can't be more costly than a couple of days in prison. And total number of days in prison and parole and solitary and all those situations are in part determined by prisoner behavior, I imagine. I'm guessing that prisoners receive the most horrendous, cheap, grain-and-soy and margarine foods imaginable. We have to "get tough on crime" after all. Our tax dollars at work.

Of course I am being far too sensible—from an article about the pioneering diet and violence researcher Gesch in Science in 2009: "Decades of studies by Schoenthaler and others have supported a connection between nutrition and violence, but for a variety of reasons—some scientific, others political—it hasn't yet translated into policy." (<http://www.ifbb.org.uk/files/Science-25-9-09.PDF>)

But let's step back from pragmatism for a moment. Here's the real issue with the science I pursue, at least in the eyes of the medical establishment (also from the Science article):

"This field has seen a lot of exaggerated claims and not enough solid placebo-controlled research," says Eugene Arnold, a psychiatrist and former director of the Nisonger Center at Ohio State University, Columbus. Studies have shown that "there clearly is a connection" between nutrients and behavioral disorders—for example, between nutrition and depression—but rigorous research has been the exception, he says. Most studies of the effects of nutrition on antisocial behavior are dismissed because of poor experimental design. And Arnold notes that misleading claims by the booming nutrient supplement industry have brought the taint of pseudoscience to those studying diet and behavior. "Even good scientists in this field have been treated as guilty by association," he says.

Gesch began working with young offenders in the 80s as a social worker. He would invite groups over for home-cooked meals, (the goal being that the atmosphere would help them open up and share their troubles) and Gesch noticed that after a while, the kids would be "transformed...becoming healthier and often abandoning the antisocial behaviors that had gotten them into trouble. He began to believe that shed-



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ding their scattershot diets of junk food was central to the behavioral shift, perhaps even more so than the family-like socializing.”

Finally he was able to obtain funding for his 2002 study, now replicated, and at the same time Gesch gathered data for a second paper on how food choices of prisoners affected actual daily intake of nutrients. He found (not surprisingly) that, when they got the chance, prisoners would buy food like peanuts, chips, candy and cookies from the prison store, which would add to their daily intake of omega-6 oils, trans fats, grains, and sugar. In addition, though the prison diets were designed by institutional dietitians, most had suboptimal amounts of vitamin D (even compared to the lowly 400 IU recommended for people with little sun) and selenium, and the vegetarian and Muslim menus often had some suboptimal B vitamins and total calories.

Just want to mention here Schoenthaler’s randomized controlled trial from 2000, of 80 six-twelve year old schoolchildren who had previously been disciplined at school in “working class” Hispanic neighborhoods of Phoenix—Schoenthaler notes that previous randomized controlled trials of supplementation of the RDA for prisoners resulted in a 40% decrease in number of violent acts—his results were a 47% decrease in violent acts among the supplemented kids compared to the placebo controls. I’d call that more replication. And a call for some serious multivitamin/multimineral/EFA supplementation action on a large scale in institutions such as prisons, especially where relatives are often not allowed to bring in outside food.

Of course, nutrition is only a part of the larger problem of violence and crime. But in institutions, it seems like a relatively 30-40% controllable part, if only common sense would prevail.

In the larger picture, yes, nutrition affects the brain. We need to be eating nutrient-rich, wholesome, real food the vast majority of the time, and any government or economic intervention

that affects our food will also affect our brains and behavior. It behooves us all to consider carefully what we feed ourselves and our children. Personally, I trust the track record of evolution more than the USDA, a government agency designed to promote the consumption of American-produced grains. The stakes are high. My only advice is - do your reading before you pass judgment. ▲

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*The overarching theory she explores is that our bodies and brains do best in conditions for which they are evolved. She digs up scientific information and presents it in that context. She feels that by studying evolutionary medicine, we come closer to the answers for optimal conditions for health and vitality. The dietary basics of evolutionary medicine are simple: don’t eat very much fructose, omega-6 rich industrial vegetable oils, grains (such as wheat, rye, barley, spelt, quinoa, oats, corn, etc.), or processed “fake” food in general. Eat as much local, farmstand, grassfed, pastured, wild-caught as you care for. That’s vegetables, meat, fish, nuts, eggs, and fruits. In her opinion, if you have no serious medical conditions, it’s perfectly healthy to have high-fat dairy, safe starches such as white rice or potatoes, red wine, and dark chocolate in moderation. Also, get plenty of sleep and play.*

## Related Links

- Fighting Crime with Nutrition (<http://www.psychologytoday.com/articles/200305/fighting-crime-nutrition>)
- Nature’s Bounty: The Way We Were (<http://www.psychologytoday.com/articles/201006/natures-bounty-the-way-we-were>)
- Nutrition and Depression: Nutrition, Neuronal Protection, Omega 3 Fatty Acids, Vitamin D and Depression, Part 3 (<http://www.psychologytoday.com/blog/health-matters/201011/nutrition-and-depression-nutrition-neuronal-protection-omega-3-fatty-acid>)
- The Sugar-Coated Truth (<http://www.psychologytoday.com/articles/200411/the-sugar-coated-truth>)
- Eating without a net (<http://www.psychologytoday.com/blog/nourish/201005/eating-without-net>)