

You Do What You Eat

Studies show what we already knew -- get rid of junk food and put kids on a veg diet, and their behavior problems go away.

By Marco Visscher

At first glance, there seems nothing special about the students at this high school in Appleton, Wisconsin. They appear calm, interact comfortably with one another, and are focused on their schoolwork. No apparent problems.

And yet a couple of years ago, there was a police officer patrolling the halls at this school for developmentally challenged students. Many of the students were troublemakers, there was a lot of fighting with teachers and some of the kids carried weapons.

School counsellor Greg Bretthauer remembers when he first came to Appleton Central Alternative High School back in 1997, for a job interview: "I found the students to be rude, obnoxious and ill-mannered." He had no desire to work with them, and turned down the job.

Several years later, Bretthauer took the job after seeing that the atmosphere at the school had changed profoundly. Today he describes the students as "calm and well-behaved" in a new video documentary, *Impact of Fresh, Healthy Foods on Learning and Behavior*. Fights and offensive behavior are extremely rare and the police officer is no longer needed. What happened?

A glance through the halls at Appleton Central Alternative provides the answer. The vending machines have been replaced by water coolers. The lunchroom took hamburgers and french fries off the menu, making room for fresh vegetables and fruits, whole-grain bread and a salad bar.

Is that all? Yes, that's all. Principal LuAnn Coenen is

still surprised when she speaks of the "astonishing" changes at the school since she decided to drastically alter the offering of food and drinks eight years ago: "I don't have the vandalism. I don't have the litter. I don't have the need for high security."

The Problems with 'Convenience Foods'

It is tempting to dismiss what happened at Appleton Central Alternative as the wild fantasies of health-food and vitamin-supplement fanatics. After all, scientists have never empirically investigated the changes at the school. Healthy nutrition -- especially the effects of vitamin and mineral supplements -- appears to divide people into opposing camps of fervent believers, who trust the anecdotes about diets changing people's lives, and equally fervent skeptics, who dismiss these stories as hogwash.

And yet it is not such a radical idea that food can affect the way our brains work -- and thus our behavior. The brain is an active machine: It only accounts for two percent of our body weight, but uses a whopping 20 percent of our energy. In order to generate that energy, we need a broad range of nutrients -- vitamins, minerals and unsaturated fatty acids -- that we get from nutritious meals. The question is: What are the consequences when we increasingly shovel junk food into our bodies?

It is irrefutably true that our eating habits have dramatically changed over the past 30-odd years. "Convenience food" has become a catch-all term that covers all sorts of frozen, microwaved and out-and-out junk foods. The ingredients of the average meal have been transported thousands of miles before landing on

our plates; it's not hard to believe that some of the vitamins were lost in the process.

We already know obesity can result if we eat too much junk food, but there may be greater consequences of unhealthy diets than extra weight around our middles. Do examples like the high school in Wisconsin point to a direct connection between nutrition and behavior? Is it simply coincidence that the increase in aggression, crime and social incivility in Western society has paralleled a spectacular change in our diet? Could there be a link between the two?

Stephen Schoenthaler, a criminal-justice professor at California State University in Stanislaus, has been

researching the relationship between food and behavior for more than 20 years. He has proven that reducing the sugar and fat intake in our daily diets leads to higher IQs and better grades in school.

When Schoenthaler supervised a change in meals served at 803 schools in low-income neighborhoods in New York City, the number of students passing final exams rose from 11 percent below the national average to five percent above.

He is best known for his work in youth detention centers. One of his studies showed that the number of violations of house rules fell by 37 percent when vending machines were removed and canned food in the cafeteria was replaced by fresh alternatives. He summarizes his findings this way: "Having a bad diet right now is a better predictor of future violence than past violent behavior."

But Schoenthaler's work is under fire. A committee from his own university has recommended suspending him for his allegedly improper research methods: Schoenthaler didn't always use a placebo as a control measure and his group of test subjects wasn't always chosen at random. This criticism doesn't refute Schoenthaler's research that nutrition has an effect on behavior. It means most of his studies simply lack the scientific soundness needed to earn the respect of his colleagues.

Recent research that -- even Schoenthaler's critics admit -- was conducted flawlessly, showed similar conclusions. Bernard Gesch, physiologist at the University of Oxford, decided to test the anecdotal clues in the most thorough study so far in this field. In a prison for men between the ages of 18 and 21 in England's Buckinghamshire, 231 volunteers were divided into two groups: One was given nutrition supplements along with their meals that contained our approximate daily needs for vitamins, minerals and fatty acids; the other group got placebos. Neither the prisoners, nor the guards, nor the researchers at the prison knew who took fake supplements and who got the real thing.

The researchers then tallied the number of times the participants violated prison rules, and compared it to the same data that had been collected in the months leading up to the nutrition study. The prisoners given supplements for four consecutive months committed an average of 26 percent fewer violations compared to the preceding period. Those given placebos showed no marked change in behaviour. For serious breaches of conduct, particularly the use of violence, the number of violations decreased 37 percent for the men given nutrition supplements, while the placebo group showed no change.

The experiment was carefully constructed, ruling out the possibility that ethnic, social, psychological or other variables could affect the outcome. Prisons are popular places to conduct studies for good reason: There is a strict routine; participants sleep and exercise the same number of hours every day and eat the same things at the same time.

Says John Copas, professor in statistical methodology at the University of Warwick: "This is the only trial I have ever been involved with from the social sciences which is designed properly and with a good analysis." As a randomized, double-blind, placebo-controlled study, Gesch emerges with convincing scientific proof that poor nutrition plays a role in triggering aggressive behavior.

Sugar's Not the Only Problem

Indeed, the study proves what every parent already knows. Serve soda and candy at a children's birthday party and you'll get loud, hyperactive behavior followed by tears and tantrums. It works like

after you eat sugar, which initially gives you a burst of fresh energy. But then your blood sugar falls, and you become lethargic and sleepy. In an attempt to prevent blood-sugar levels from falling too low, your body produces adrenalin, which makes you irritable and explosive.

But sugar can't be the only problem. After all, high blood-sugar levels mainly have a short-term effect on behavior, while the research of Schoenthaler and Gesch indicates changes over a longer period. They suggest it is much more important that you get the right amount of vitamins, minerals and unsaturated fatty acids because these substances directly influence the brain, and therefore behavior.

If these findings prove true -- and they do look convincing -- then we should be sounding an alarm about good nutrition. What are the long-term implications of the fact that the quality of our farmland has sharply declined in recent decades? The use of artificial fertilizer for years on end has diminished the levels of important minerals like magnesium, chromium and selenium, therefore present in much lower concentrations in our food.

The eating habits of children and young people also should be a cause for serious concern. Their diets now are rich in sugar, fats and carbohydrates, and poor in vegetables and fruit. Add to this an increasing lack of exercise among kids,

and the problem becomes even worse. The World Health Organization (WHO) talks of an epidemic of overweight among children. Obesity, the official name for serious weight problems, is said to absorb up to six percent of the total health budget -- a cautious estimate as all kinds of related diseases cannot be included in the exact calculation. Think of what this situation will look like when the current generation of overweight kids hits middle age.

The link between food and health is better understood by most people than the relationship between food and behavior, so health has become the driving force behind many public campaigns to combat overweight. A discussion has arisen in a number of countries about introducing a tax on junk food, the proceeds of which

ing. In Britain, Prime Minister Tony Blair announced in May he planned to spend an extra 280 million pounds (the equivalent of 420 million euros or \$500 million U.S.) on improving school lunches after the famous television chef Jamie Oliver began speaking out on the issue.

Yet with crime a major political issue almost everywhere, it's surprising more leaders have not embraced the idea of healthy eating as a recipe for safe streets and schools. After Gesch published his findings in 2002 in *The British Journal of Psychiatry*, the study was picked up by European and American media. The newspaper headlines were clear: "Healthy eating can cut crime"; "Eat right or become a criminal"; "Youth crime linked to consumption of junk food"; "Fighting crime one bite at a time." Then the media went deafeningly silent.

Perhaps that's because the relationship between nutrition and violence continues to be controversial in established professional circles. During their educations, doctors and psychologists are given scant training in nutrition, criminologists provided little awareness of biochemistry, and nutritionists offered no hands-on experience with lawbreakers or the mentally ill. As a result, the link between food and behaviour winds up in no-man's-land. Even researchers interested in the subject are discouraged -- not least of all because you can't get a patent on natural nutrients

like vitamins and minerals. Far more effort goes into pharmaceutical, rather than dietary, solutions.

The Netherlands currently is the only country where Gesch's research is being explored. Plans to test the findings about nutrition supplements and behaviour further are being set up in 14 prisons, with nearly 500 subjects. Ap Zaalberg, leading the project for the Dutch Ministry of Justice, remembers how he and his colleagues reacted when they first heard of Gesch's study. "Disbelief," he states resolutely. "This was surely not true. But when I looked into the issue more closely, I landed in a world of hard science."

Zaalberg knows diet is not the only factor that determines whether someone exhibits aggressive behavior. "Aggression is not only determined by nutrition," he states. "Background and drug use, for example, also play a role. Yet I increasingly see the introduction of vitamins and minerals as a very rational approach."

"Most criminal-justice systems assume that criminal behaviour is entirely a matter of free will," Gesch says. "But how exactly can you exercise free will without involving your brain? How exactly can the brain function without an adequate nutrient supply? Nutrition in fact could be a major player and, for sure, we have seriously underestimated its importance. I think nutrition may actually be one of the most straightforward factors to change antisocial behaviour. And we know that it's not only highly effective, it's also cheap and humane."

Cheap it is. Natural Justice, the British charity institution chaired by Gesch, which is researching "the origins of anti-social and criminal behaviour," estimates it would cost 3.5 million pounds (5.3 million euros or 6.4 million U.S. dollars) to provide supplements to all the prisoners in Great Britain. That is only a fraction of the current prison budget of 2 billion pounds (3 billion euros or 3.6 billion U.S. dollar).

Finding Safety Through the Stomach

It seems the link between nutrition and antisocial behaviour shows great promise as both political issue and human-interest story. How much longer will politicians concentrate on police and stricter surveillance as the answer to crime? When will they realize healthy food can help create a healthier society? After all, people would not only be more productive, but the cost of health care and of the criminal-justice system would decline. As is the case for a man's love, the way to safety may be through the stomach.

As Bernard Gesch notes, "Few scientists are not convinced that diet is fundamental for the development of the human brain. Is it plausible that in the last 50 years we could have made spectacular changes to the human diet without any implications for the brain? I don't think so. Now, evidence is mounting that putting poor fuel into the brain significantly affects social behaviour. We need to know more about the composition of the right nutrients. It could be the recipe for peace."

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