



DOMINO EFFECT

BY MARY STONE
PHOTOGRAPHS BY ARLEEN THALER

When we think of the word “hunger,” we automatically think of the physical feeling of being hungry, something most of us can cure with a walk to the fridge. But for many, it’s not so simple. And now science is telling us that this hunger may be at the very root of many of Rochester’s problems—from low graduation rates to high rates of violent crimes.



Endoenshia McLilly, 8, is a student at Rochester Prep Elementary. Her mother, Michelle Warden, brings Endoenshia to the Blessed Sacrament Church Supper Program on Monroe Avenue to help fill in the nutritional gaps in their household and instill a sense of community.

We know poor nutrition leads to diabetes, to obesity, to heart disease, but what about behavioral problems? Research shows that attitude problems in children and teenagers may originate, in no small part, from poor nutrition. Attitude and motivation, aggression and violence in some cases are directly tied to nutritional deficiencies common in what are termed “food insecure” (households that don’t have access to affordable nutritious food).

Research shows that over time, these deficiencies can reduce people’s ability to control how they deal with conflict and stress. Deficiencies can also limit brain development and, in turn, children’s ability to learn.

“Poor nutrition can be a behavioral health issue, particularly in children where its effects are most keenly felt,” explains Jeffrey Eisenberg M.D., a pediatrician at Fairport Pediatrics. For infants, inadequate nutrition can stunt growth and motor development, he says. Babies fail to thrive.

“Intelligence is adversely affected, as evidenced by a decrease in concentration, memory, and cognitive skills,” Eisenberg says. “Subsequently, there is an increased incidence of behavioral and psychological issues, such as anxiety and depression, learning disorders, and hyperactivity. These children may not socialize effectively.”

Of course, poor nutrition is not an isolated problem. It often converges with high stress, poor sleep, environmental toxins, crowding in the home, limited interaction with caregivers, and other conditions. But combined with the biological and behavioral effects of poor nutrition, these layers create a perpetually uneven playing ground for children and the adults they one day will become.

Perhaps one of the most misunderstood consequences of poor nutrition is the brain’s inability to self-regulate in the absence of certain micronutrients. Omega-3s, mainly found in fish, for example, are considered vital to brain development in children. A deficiency in this essential fatty acid has been shown to have long-term effects in adults that lead to antisocial and aggressive behavioral problems.

British psychologist Adrian Raine, a professor in the department of criminology at University of Pennsylvania’s School of Arts and Sciences, found that supplementing children’s diets with Omega-3 over a period of 6 months was shown to greatly decrease depression and anxiety in addition to negative behavior such as picking fights or lying.

Even six months after supplementation stopped, parents continued to report better behavior from their children.

A deficiency in Omega-3s, Raine and his fellow researchers found, can also disrupt emotion-regulating parts of the brain that can translate to violent outbursts and impulsive decision-making often associated with crime. Raine’s team looks at biological interventions such as various supplementation and other forms of enrichment to limit these dangers in growing children.

Known for his book “The Anatomy of Violence: The Biological Roots of Crime,” Raine is also recognized as the first person to conduct brain imaging scans on murderers. He went on to study the brains of other violent criminals and found that there were biological factors beyond the genetic, social, and environmental influences typically blamed for aggressive behavior. Raine says that of course, there’s more to antisocial,

violent behavior than just nutrition, but nutrition does appear to be a long-overlooked link. Biology is not destiny, he urges people to understand. The biological disposition to antisocial and aggressive behavior, he points out, can sometimes be adjusted through nutrition.

Iron deficiency can also affect behavior. Some research shows it is a contributing cause in attention deficit hyperactivity disorder. A 2008 study at the Hôpital Robert Debré in Paris, France, examined the effects of iron supplementation in children with ADHD. In the study, 23 non-anemic children between the ages of 5 and 8 were given either iron or a placebo for 12 weeks. Those who were supplemented with iron (80 mg a day) reported an improvement in their ADHD symptoms.

Hunger also affects behavior when blood glucose levels are low. One of four studies at the University of Kentucky College of Arts and Sciences, published in 2011, showed participants who consumed a glucose drink versus a placebo behaved less aggressively. Self-control consumes a lot of glucose in the brain, the researchers noted, suggesting that low glucose and poor glucose metabolism are linked to aggression and violence.

When we are hungry, many of us feel cranky or angry, but when hunger is chronic, persistent nutritional deficiencies can reduce and divert bodily resources enough to keep people fixed in a reactive state. Dietary changes have been shown to radically change behavior.

Diet changes implemented in some juvenile correctional facilities were shown to result in an almost 50 percent drop in violence and antisocial behavior after implementing nutrient-rich menus in line with World Health Organization guidelines. To test this on school-age children, ages 6 to 12, a 2000 study at California State University’s department of sociology and criminal justice administered a vitamin and mineral supplement to students over a period and then compared levels of aggression before and after supplementation using official school disciplinary records.

For four months, students in the study were given low-dose vitamin-mineral tablets versus a placebo. Of those who took the active tablet, there were lower rates of antisocial behavior across a series of indicators, including threats and fighting, vandalism, disrespect, disorderly conduct, defiance, refusal to work, and endangering others. The study concluded that poor nutrition leads to low concentrations of water-soluble vitamins in the blood, which can impair brain function, and contribute to violent or aggressive behavior.

Some doctors, however, say the link between nutrition and aggression is obscured behind a complex web of cause and effect.

A student at Edison Tech High School, Keisean Johnson, 15, and his mother, Nordea Johnson (Michelle Warden’s sister), have been going to Blessed Sacrament Church Supper Program for almost 3 years. The experience has taught Keisean to give back: He is Endoenshia’s cousin and often helps her with homework. For Nordea and Michelle, the program gives them the chance to eat together as a family.

“It is extremely difficult to tease out food insecurity and poverty from the social-emotional health impact of adverse childhood experiences,” says Stephen Cook M.D., a pediatrician at Strong Memorial Hospital’s general pediatric practice. “If these kids also have micronutrient deficiencies, it would be very difficult to measure how much behavior issues are related to the social and emotional environment they grow up in, their genetic predisposition and then try to assess if there could be some contribution from nutrition.”

Other local pediatricians say the link between nutrition and behavior, while hard to measure, is undeniable.

“The effects on behavior related to the intake of Omega-3s and water-soluble vitamins, having low levels of Omega-3, zinc, carnitine, iron, and vitamin B-12 are directly related with the ability to pay attention in class and learn,” explains Margot Weinberg M.D., of Pediatric Integrative Medicine in Pittsford. “Many children who are diagnosed with attention deficit disorder have low levels of these nutrients,” she says. “Studies show that the presence of ideal gut bacteria also is associated with a decrease in depression and anxiety.”

At Austin State University, a 2012 survey of 10 studies linking hunger to reduced self-control showed that higher levels of hunger were linked to passivity, perceptions of task difficulty, thoughts of death, racial



prejudice, and an inability to successfully halt aggressive thoughts and impulses. Hunger, the survey postulated, could be at the root of violence in war-torn countries around the world.

Of course, poor nutrition is not the only factor affecting childhood development in impoverished neighborhoods. For example, stress, due to the consistently high cortisol the body releases when subjected to stress, has been shown to reduce the amount of total gray matter in developing brains by 10 percent or more. Gray matter includes parts of the brain responsible for self-control, but also hearing, memory, emotions, and speech.

The biological effects of hunger stretch further still and often surface in the form of obesity. It's called the obesity-hunger paradox. A New York Times story five years ago referred to it as the Bronx paradox, since the Bronx was considered one of the country's obesity capitals, but also where the most severe hunger-related health problems were originating. It turns out obesity is most common in food-insecure homes.

"Children are born through cycles of deprivation. They have a lot of stress in their lives and are way more likely to be exposed to obesity in getting unhealthy foods. So while they're hungry, and they're skipping meals, the food that they're getting is calorie-dense and nutritionally void," says Julia Tedesco, Foodlink's co-executive director and chief development officer.

A diet based on processed foods creates biochemical disruptions, Eisenberg says. High amounts of sugar also affect health. Eisenberg wrote extensively about those effects in his book "Suckered," which examines the effects of what he calls Americans' addiction to sugar.

"As we consume increasing amounts of added sugar and processed carbohydrates, our insulin levels increase accordingly and a cascade of negative biochemical pathways ensue," Eisenberg says. Too much sugar, he adds, can trigger inflammatory and autoimmune disease, an increase in free radicals, and overall oxidative stress. Eventually, the immune system is altered, leading to a higher proportion of illness and infection.

"I'll sit on panels with renowned pediatricians and different people I'm in total awe of, and they'll be talking about the emotional and social well-being of children, and then it's my turn to talk about food," Tedesco says. "Sometimes it seems silly to talk about bags of peanut butter and tuna fish, but I really deeply believe that we cannot address the major issues that are facing our city: poverty, low graduation rates, low school attendance rates, major health issues, chronic obesity among children in our city (40 percent of our kids are obese). You can't talk about health care education or any of that if we don't talk about food first."

"In poorer neighborhoods the effects are particularly pronounced as cheaper, more energy-dense foods are chosen," Eisenberg says. "Since supermarkets and farmer's markets are noticeably absent in these areas, fast-food restaurants and mini-marts are frequently the only reservoir of food available. A study in 2009 showed that drinking one soda a day cut the life expectancy of that individual by 4.7 years, similar to the effects of cigarette smoking."

In Rochester, the problem of hunger is at the center of the city's worst problems, Foodlink's Tedesco explains.

In the city of Rochester food is central to creating sustainable pathways out of poverty, Tedesco explains. "We live in one of the richest agricultural regions in the nation. It's amazing that kids here are hungry."

There are opportunities though, she says. Foodlink is trying to facilitate some of them by addressing the logistical barriers separating city families from the local agricultural industry. By doing that, she says, Foodlink is investing in the local economy.

"And we know that there are tons of jobs to be had in the food industry," Tedesco says. "So by training people and teaching them about food it gives them an opportunity to get gainful employment. We believe that food is a powerful anti-poverty tool in a broader sense."

Foodlink tries to get healthier foods to people through multiple initiatives. It's not about just getting kids and parents fed, but getting them nutrient-rich food, educating them about why it's important, and teaching them how to prepare it, while improving accessibility. As a food bank, Foodlink supplies food to 500 local food pantries, soup kitchens, shelters and other agencies. For children specifically, Foodlink offers a backpack program for the weekends when kids can't get their meals at school. It's a safety net program, Tedesco says, to help Foodlink accomplish its aim to let no child go to bed hungry.

Many kids hoard food during the week, she says, and then show up at school on Monday ravenous because their supplies ran out. To identify the kids at highest risk, Foodlink works with 75 schools throughout Greater Rochester. Every Friday, food is discreetly deposited into their backpacks. The bags weigh no more than seven to eight pounds and are filled with protein and dairy sources, including peanut butter, tuna, and milk.

But longer-term results require education. To that end, Foodlink tries to change eating habits by teaching families about healthy food. One six-week course, "Cooking Matters," shows participants how to buy ingredients and prepare them. Offered at various locations throughout Rochester, the program is in its fifth year and growing. This year, enrollment rose from 389 last year to more than 1,000 in 2015, with classes usually booked months in advance.

Forty classes, led by 90 volunteers, are planned for this fiscal year.



The Northwest Neighborhood Outreach Center is one Cooking Matters location. NNOC offers meal programs but also a work experience program and ID restoration service for clients looking for copies of official documents, such as birth certificates.

Diane Argauer, NNOC's executive director, says that in combination with other Foodlink programs, Cooking Matters has the potential to make a shift for families out of their routine, in terms of what they eat but also how they relate to each other.

The mother from a family of four came to a few of the parent classes for Cooking Matters and attended another Foodlink program entitled "Just Say Yes to Fruits and Vegetables," Argauer says. (JSY, which includes cooking demonstrations and workshops, is designed to help people eligible for Supplemental Nutrition Assistance Program make healthier food choices.)

But it wasn't until the mother began attending the family Cooking Matters classes with her husband and children that Argauer started to see a change.

"The father started working out at the Y, where they have a sliding scale based on income. The mother dropped 20 pounds. Interesting thing is that they appeared to be a much more cohesive family unit," Argauer says. "It used to be the father would go off by himself and do his own thing. The wife may or may not have had kids. But then we would see the four of them together, not just one parent and the kids. It was interesting. Whether or not it was the experience of sharing that together that brought them closer, I don't know. It's possible."

To Argauer, families need overlapping programs such as those Foodlink offers. "The mother would participate periodically, but over time the reinforcement brought her family in. To change a mindset, you need

reinforcement." Good nutrition also is needed, she adds. "It seems kind of hokey, but you need good nutrition to move people beyond their mindset."

To help shift people's behavior, Argauer says she wishes there were more incentives for parents to buy fruits and vegetables.

"I wonder if, this is a little bit outside the box, but I'd like to see people rewarded for buying nutritious food with their food stamps as opposed to the non-nutritious foods," Argauer says. People could get double the value on their food stamps if they were to choose fruits and vegetables instead of processed food, she suggests.

Eisenberg thinks taxing sugary and processed items would help people make the switch to healthier foods. The revenue from taxes could be used to fund education and nutritional assistance, he says.

"WIC or SNAP needs to substitute more fruits and vegetables and farmers need to be subsidized to grow these crops more on par with corn crops," Eisenberg says. "We need to stop advertising fast food, sugary drinks, and candy to our children, and we have to make it less available in schools and in stores."

Tedesco, of Foodlink, says not a lot has changed with Rochester's hunger problem over the years. The one consolation now is that there seems to be a more collaborative effort in Rochester to address child hunger and obesity, but that work has yet to change the status quo.

"In the city I don't think it's a positive thing that (poverty) hasn't increased because what it really shows is that people have been living in chronic poverty for such a long time, it's hard to get worse than they are," Tedesco says. "The statistics are that half the children in the city of Rochester are living in poverty. We haven't seen it get worse, and we haven't seen it get a whole lot better, which is why we have moved to these other programs. We want to move the needle."