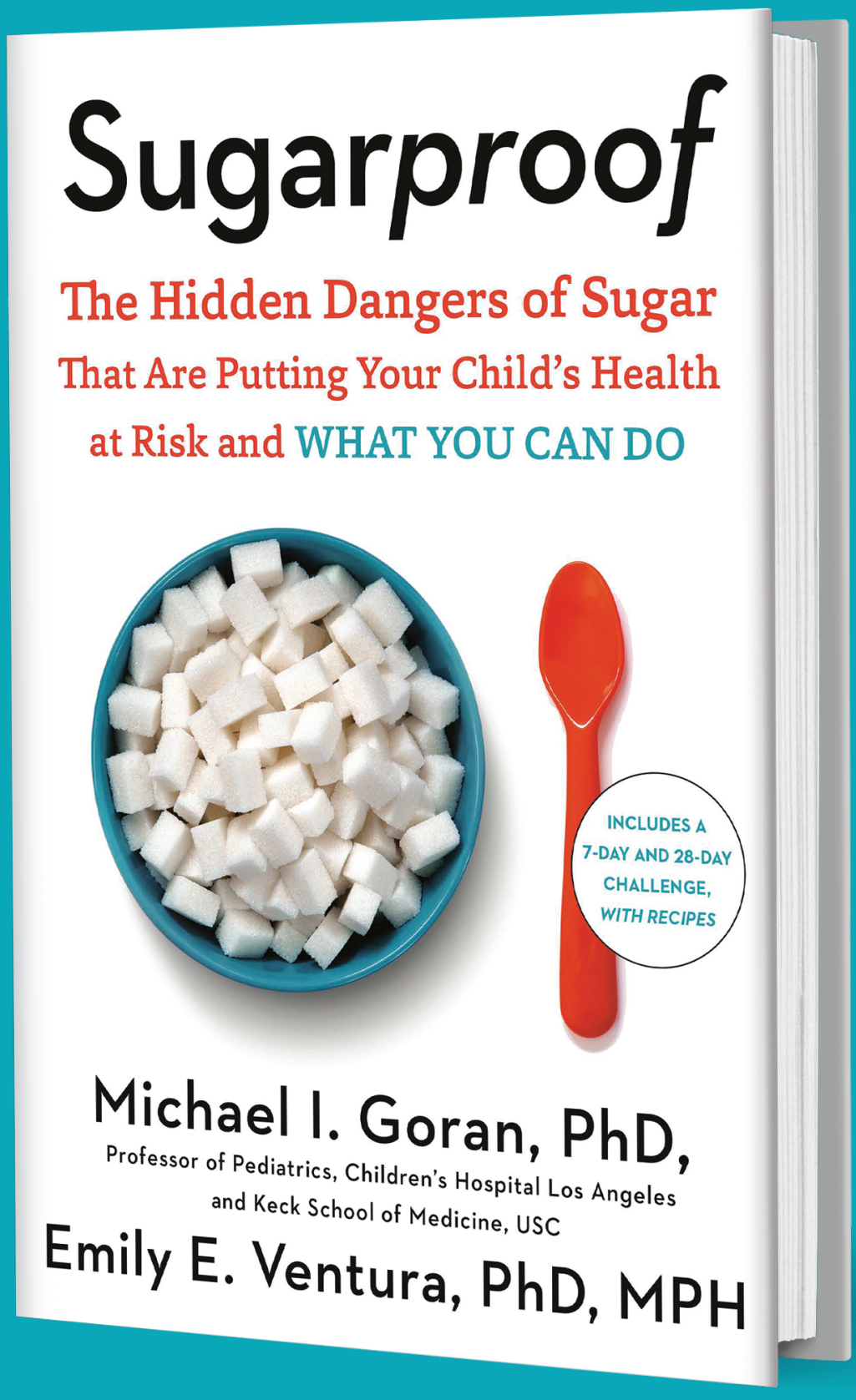
CHAPTER EXCERPT



AVERY

CHAPTER FOUR

Smarter without Sugar: Sugar's Effects on Learning, Memory, and the Growing Brain

If you could look at the brains of healthy adults who typically drink one or two sodas per day and compare them to the brains of people who drink less than one per day, you would see something astonishing. The brains of the group drinking sugary beverages would be smaller. To put it bluntly, new research shows that too much sugar shrinks your brain.

It's only recently that we have begun to understand the effects of sugar on the brain—on its size, volume, architecture, and ability to function. And it's only very recently that new research is shining a light onto the incredibly damaging effects that sugar can have on the growing brains of children and teens.

Too much sugar impairs children's abilities to excel at their tasks, whether it's building a tower of blocks at age two, writing an essay for a college application at age seventeen, or taking standardized tests in the classroom at any age. Kids who consume high amounts of sugar and sweeteners simply aren't as sharp as they could be. They have trouble concentrating. It's harder for them to

remember to bring their note- books home from school, or to recall things like the dates of the Vietnam War for a history test.

The effects of too much sugar don't stop with reduced academic achievement. Kids who consume too much sugar are less able to control their impulses, which can have serious consequences, especially for teenagers. Teens with a sugar habit tend to make poor decisions— and because this age group is already prone to taking risks, those poor decisions can have lasting consequences. Furthermore, an early sugar habit can reshape the brain permanently and put kids at risk for dis- orders later in life, including early cognitive decline and future risk of Alzheimer's disease.

This chapter will show you the research—my own as well as some of my colleagues, and other experts—that links too much sugar and sweeteners to problems ranging from mental focus to one of the most feared neurodegenerative disorders of our time. But it's not all bad news. When you know that sugar could be the reason a child is exhibiting difficult behavior or not performing up to his or her ability, you have the power to change the outcome.

Is Your Child Struggling in School?

A New Jersey–based mom named Elizabeth and her husband received an e-mail from their daughter's eighth grade science teacher that said, "I just wanted to touch base because I am a little concerned about Grace. The other day she was falling asleep in science class. This is not the first time that I noticed this happening."

The message was a huge surprise to Grace's parents. Science was second period, which started at 9:00 a.m. How could Grace, who was a bright, straight-A student, be so tired by then? Elizabeth and her husband felt that Grace's 9:30 p.m. bedtime was reasonable for a fourteen-year-old, but they figured she must not be getting enough sleep. So they told her that she needed to go to bed even earlier and that there would be a new rule of no phone use after 7:00 p.m. to reduce blue light exposure. Despite these efforts, Grace still struggled to stay awake mid- morning. Something just wasn't right, and her parents and her teacher couldn't seem to figure it out.

Flash-forward to later that year, when Elizabeth and her family participated in our 7-Day No-Added-Sugar Challenge. As part of this, Grace changed her breakfast routine. She would usually

have Honey Nut Cheerios (12 grams or 3 teaspoons added sugars per cup) with whole milk and a glass of a 100 percent juice blend of peach, mango, and orange (24 grams or 6 teaspoons of added sugars per cup). Plus, she would take her daily gummy multivitamin and a calcium plus vitamin D chew (3 grams or 3⁄4 teaspoon). That's almost 40 grams or 10 teaspoons of added sugars at breakfast alone, which is almost twice her daily maximum recommendation of 23 grams (5 3⁄4 teaspoons). That's not even including the second helping of cereal Grace would regularly serve herself because she still felt hungry after the first bowl.

During the 7-Day Challenge with zero added sugars, Grace instead had unsweetened oatmeal with raspberries, almond meal, and pecans for breakfast, and she skipped the juice and sugar-sweetened vitamins. Suddenly, Grace could easily stay awake in second period. That's when it all started to click: Grace was eating a sugar bomb of a breakfast at 7:30 a.m., and by 9:00 a.m., she was crashing. It was her morning food choices, not her bedtime routine, that was causing her drowsiness.

Grace's twelve-year-old sister, Tiffany, saw immediate benefits from a change in her breakfast as well. Her preferred breakfast on the 7-Day Challenge was scrambled eggs with cheddar cheese and toast, some- thing she could even make herself. Tiffany, who has ADHD, commented to her mom that on the days when she eats eggs for breakfast, she is better able to concentrate in class, and that she should be sure to have them on days when she has tests.

Elizabeth feels fortunate that they were able to put two and two together and that her daughters are doing well with their new breakfast routine. In addition to causing spikes and dips in energy levels, high amounts of sugar at breakfast disrupt a child's focus, concentration, and memory. In contrast, breakfasts without added sugars that are high in protein and better help stabilize blood sugar levels throughout the morning. We will have much more to say in later chapters that pro- vide strategies for a Sugarproof breakfast.

Focus and Concentration

It might come as a surprise, given everything we've just said about sugar, but the brain does need sugar to function. In fact, the brain's main fuel is the basic sugar glucose. But this doesn't

mean you need to eat straight sugar to give your brain the glucose it needs. In an ideal situation, the body gets this glucose from a variety of foods. The best source of glucose is that released from the slow, steady breakdown of complex carbohydrates, including whole grains, legumes, fruits, and vegetables. Glucose circulates in your blood and is what we know as blood sugar. It crosses the blood–brain barrier, and once in the brain, it fuels the neurons (brain cells) and helps them transmit and receive information. If you are healthy, your body does a good job of keeping your blood glucose levels within a certain range that keeps your brain functioning in a healthy zone. This is largely thanks to hormones like insulin that regulate your blood sugar.

Even still, your body and your brain are very sensitive to fluctuations in blood glucose. When you eat complex carbohydrates, your body breaks them down into glucose in a slow, regular manner. This helps keep your blood sugar levels steady. But when you eat or drink something with simple carbohydrates that are more easily broken down to glucose (like white rice, corncakes, pancakes, or cookies) or that contain a lot of plain sugar (like a glass of orange juice or a can of soda), your blood sugar spikes. At first, this is likely to boost your brain function. Research shows that right after you drink a sugary beverage, you are better able to complete tasks that involve processing information, resolving conflict, and recalling words. But because your body has received too much sugar all at once, it goes into overdrive and like we described in Chapter 3, you likely board the sugar roller coaster. In response to the sugar load, it overcompensates with a big surge of insulin. This flood of insulin can cause an extreme drop in your blood sugar. You already know that as your blood sugar drops, so do your energy levels. But your mental performance can drop, too.

This is what was happening to Grace mid-morning. Her breakfast caused a mid-morning crash and a dip in her brain functioning. That's why it was hard for her to focus when her teacher started to go over the periodic table or explain what happens to atoms in a chemical reaction. Grace was more than smart enough to grasp the concepts in class, and she was even interested in the material, but she was working with a handicap caused by her breakfast.

Sugar, Academic Performance, and Learning Ability

Jen had $10. She spent $4.50. How much money does she have left?

This is a typical math question asked on standardized tests. It's clear and straightforward—and when kids consume too much sugar, it's less likely that they will answer it correctly.

In one of the largest and most comprehensive studies on the effects of too much sugar on academic performance, Australian researchers looked at the diets of 4,245 children ages eight to fifteen years, along with their scores on standardized, multiple-choice academic tests. The study team found that regular consumption of sugary beverages was associated with lower test scores in grammar, reading, writing, and math. As the kids consumed an increasing number of sugary beverages, their test scores got progressively worse in all four subjects. In contrast, eating vegetables at the evening meal was associated with better test scores in spelling and writing—a finding that gives parents everywhere another reason to make sure their kids eat their broccoli or green beans.

Other studies have shown that kids tend to have poorer academic performance when they have habits like eating junk food that is high in sugar, skipping breakfast, or having a sweet breakfast with processed carbohydrates and sugars, which quickly raise blood sugar. Kids with these dietary habits just don't have the steady glucose levels they need for optimum brain function. The next time your children sit down to complete a task, like coloring in a worksheet or practicing the piano, watch to see if they begin with a burst of energy that sputters out, or if they work in a steady, continuous manner. Then think back to what they ate in the hours beforehand, and you may begin to notice a pat- tern. Sugar changes the way children approach their tasks—and how well they finish them.

New research also shows that the effects of sugar on learning ability in children can have very early roots. A recent study followed 1,234 pregnant mothers in Boston through pregnancy and tested learning ability in their children in early childhood (around three years of age) and mid-childhood (around eight years of age). The results were striking; they showed lower test scores for standardized tests in children whose mothers consumed more sugar and sugary beverages during pregnancy. This was also the case for diet sodas; the more the expectant mothers drank

during pregnancy, the poorer their children scored on tests that assessed their learning ability. In fact, this was the strongest finding from the study. This study also examined dietary pat- terns in the children and showed that the more sugar-sweetened beverages the children drank during early childhood, the lower they scored on verbal skills tests. While there are a number of reasons that sugar as well as alternative sweeteners could influence kids' performance on these types of tests, one important reason has to do with how sugar can impair memory..

Less Sugar, Better Memory

He studies math really hard at night, but when he takes a test the next day, it's like he's forgot- ten everything he learned.

I tell my sixteen-year-old that it's her responsibility to pack her own lunch in the morning, but she keeps forgetting. She does her home- work, but just can't remember to take it to school, or to hand it in to the teacher. She can't even remember where she parks her car when she goes shopping! Is this normal? ?

Kids can be scatterbrained, and to some degree this behavior re- ally is normal. But if your child is chronically forgetful, it's time to take a look at how much sugar they're getting. Sugar can cause amnesia- like effects, especially in the teenaged brain. In a study led by my col- league Dr. Scott Kanoski at USC, the goal was to understand whether sugar damages spatial memory, and whether the effects vary with age. In this study, rats were taught visual cues to recognize differ- ent shapes and colors. Then they were put in a maze with a harsh environment of bright lights and loud noise, which the rats did not like. In order to exit the maze, the rats had to learn and remember the visual cues that guided them to an escape hole. Imagine that you're trying to find your car in a busy and noisy mall parking lot or trying to make your way out of a chaotic high school that has many different wings and hallways, and you'll have a sense of what the rats were being asked to do.

The rats were fed their usual diet and bottle of water, but in addition, they were given either a) another bottle of water, b) a sucrose solution (table sugar), or c) a high-fructose corn syrup (HFCS) solution. The two different sugar solutions were made to mimic the concentration of a

typical sugary beverage for human consumption. The rats that were given either of the sugar solutions had impaired spatial memory. They forgot their cues. They got lost more easily and couldn't escape as quickly. They finished their task more slowly than the others. Sound like any teenagers you know?

That's not all. Kanoski and his team analyzed how these sugary drinks affected the rats according to their ages, comparing adolescent rats to adult rats. It was only the adolescent rats whose memory performance was a affected by consuming the sugar. Adult rats were exposed to the same sugar solutions, and they drank just as much, but there was no effect on how they performed in the tests. This damaging effect of sugar on the brain was unique to adolescent rats and not found in adults—probably because during adolescence, the brain is still developing and is more vulnerable to the damaging effects of too much sugar. When Kanoski and his team looked at the adolescent rats' brains, they found that rats drinking the sugar solutions, especially the HFCS, had in inflammation in a key area of the brain called the hippocampus, which is important for memory. (People who have had damage to the hippo- campus suffer from amnesia.) Giving teens too much sugar causes a hit to their brains at a critical time. What's more, this damage can be permanent. In a follow-up study, Kanoski's team went on to show that the damage to the adolescent brains lasted into adulthood, even if the rats stopped consuming sugar. Excess sugars, even if only consumed temporarily during the adolescent period, wired the brain to have permanent effects on memory.

To add insult to injury, the hippocampus also plays a role in regulating appetite. We've already talked about some of the ways sugar's effect on your blood glucose levels can make you hungry, but its effects on the hippocampus can lead to appetite problems as well. The hippocampus fields the signals that the body sends the brain to remind it of what it has eaten and tell it when it is full. When you are eating and start to feel satisfied, your gut sends messages to your brain to tell it that you have had enough. But when you eat too much sugar, those signaling pathways are obstructed, leading you to eat more. And likely to eat more sugar, given how addictive it is. It's another vicious cycle.

Sugar, memory, and appetite disruption all work together. In one large study, researchers

gave students a questionnaire about their diets that asked them to recall how often, over the past year, they had consumed twenty-four common food and drink items, all of which are high in either saturated fat or refined sugar, or both (ground red meat, cooked red meat, fried chicken, salami, sausage, bacon, butter, eggs, pizza, cheese, French fries, potato chips, pancakes, pastries, cookies, cakes, ice cream, chocolate, lollipops, soft drinks, sports drinks, full-fat milk, fruit juice, white bread). In addition, two further questions assessed the frequency of added sugar usage (in cereal, tea, coffee, etc.) and frequency of eating restaurant-prepared food. The researchers then gave the students tests to assess their long-term memory. During the tests, the students listened to an audio recording of two stories and then were asked to type their recollection of the stories immediately, and then again after twenty to thirty minutes. The students who reported eating more fat and refined sugar were less likely to remember all the details that they originally recalled about the story when asked to recount it the second time. This impairment of long-term memory could help ex- plain why some young people do poorly on tests, even when they've studied hard in the days before.

This study continued with a smaller group of students who were matched into same-gender pairs. Each pair included one student who was a high-fat and -sugar consumer and another who was a low consumer of fat and sugar, all based on their responses to the dietary questionnaire described above. None of the students was overweight. The students who had diets higher in fat and sugar fared worse on the memory tests, were less able to accurately recall what they had eaten, and also reported feeling less full than their matched pairs. This study shows that a high-sugar diet not only can affect long-term memory but also can affect eating behaviors in a way that may promote future weight gain. Considering that all of the participants in the study were of normal weight, the negative effects of having too much sugar on the brain can occur even when children are not obese, or before obesity begins to develop.

Inflammation: The Double Whammy

Now here comes a double whammy: If a person does become over- weight, the extra body fat itself contributes to an inflammatory state of its own. Many people don't realize that fat is an

active organ, much like your liver or your heart. It isn't just a passive blob of energy stores, but instead secretes hormones that communicate to the rest of the body, including molecules that cause inflammation. And that inflammation can also create memory problems.

A study conducted with overweight and obese children showed that kids with visceral adiposity, or fat around their internal organs, scored lower on tests of relational memory, or the ability to associate items. For example, the kids were asked to study pictures that showed particular animals in specific habitats. Later they were asked to recall which animals they had seen in which habitats. The researchers hypothesize

that inflammation is the reason the kids with visceral fat had trouble remembering which habitat went with each animal.

When you think of inflammation, you might think of just one part of your body becoming inflamed, like the immediate area around a bite, scrape, or sprain. But inflammation can easily become systemic, or spread throughout the body, even in kids. When you have inflammation in one area, like in the case of the kids with the visceral fat, your body sends out what are called inflammatory markers to other parts of the body, including the brain. When these inflammatory factors cross the blood–brain barrier, they can cause inflammation in the brain as well. Inflammation in the brain can then cause a variety of problems, including memory impairment and loss. Although inflammation is hard to assess in human brains, new imaging techniques are beginning to make this possible. A recent study, albeit in just eleven kids, used imaging to show greater inflammation in a region of the brain called the hypothalamus that was more pronounced with increasing obesity. This is all the more relevant since the hypothalamus is the region of the brain that plays an important role in helping regulate food intake.

In summary, these impairments in memory from too much sugar can occur in normal-weight children and teens. But if a child does be- come overweight, the hits to his or her memory are likely to be even more pronounced because more inflammation is likely to occur in the brain.

What's the Gut Got to Do with It?

The gut (or intestines) is now actually being referred to as a "second brain." And rightly so.

As a BBC News article explained, "There are over 100 million brain cells in your gut, as many as there are in the head of a cat." When you eat, the microorganisms that live naturally in your gut respond to what you have fed them and can produce what are called neuroactive molecules, or compounds that can send signals to your brain and regulate things like your appetite and even your mood. But sugar disrupts the balance of healthy bacteria that live in your gut by feeding the unhealthy bacteria and causing them to overpopulate. Artificial sweeteners have also been shown to disrupt gut bacteria. When your mix of gut bacteria is out of balance, the messaging between your gut and your brain is thrown off, which can lead to things like overeating and anxiety. Furthermore, we now know that eating or drinking too much sugar can weaken the lining of the gut, which can then allow toxins to pass through into the body's circulation and eventually make their way to organs like the brain, where they can affect memory, mood, and behavior.

Though we are still working to understand all of the details about the gut–brain connection, we do already know that you can promote healthy brain development in your kids and keep their memories sharp by giving them foods and drinks that foster healthy bacteria in their guts. These include high-fiber "prebiotic" foods like fruits, vegetables, legumes, and whole grains, as well as fermented "probiotic foods" like yogurt and miso.

The Crucial Skill for Success—and How Sugar Disrupts It

Does your middle schooler do her homework right after school, or does she watch YouTube for hours and then panic about her unfinished assignments?

Does your sixteen-year-old wake up late for predawn swim practice, skip the pool—and then complain that everyone else is "naturally" faster than he is?

Parents everywhere know the pain of teaching children delayed gratification, the ability to postpone a small, immediate pleasure in anticipation of a greater reward later on. It's a di cult skill but a crucial one. Young children who learn to delay gratification do better on their SATs and are described by their parents as more competent when they are teens. Studies have even shown that preschoolers who exhibit this important skill are less likely to be overweight as adults or to use drugs. They also tend to have a higher level of educational achievement, are better able to

cope with stress, and have a higher sense of self-worth.

Delayed gratification is made possible through the brain's reward system, located in the prefrontal cortex. Part of the brain's reward system is the prefrontal cortex, the area of the brain that is responsible for planning and making decisions. The teenage years are especially important for the maturation of the prefrontal cortex, and adolescence is an important window for solidifying the kinds of traits that you as a parent want to encourage, such as impulse control and the ability to make smart decisions. But biology does not make this task easy. As part of normal adolescent development, teens have increased activity in the areas of the prefrontal cortex that use dopamine, a neurotransmitter that leads us to seek rewards. This is why teens are naturally more prone to thrill-seeking behaviors and acting on impulse, and are also more likely to report feeling bored. Their need for excitement is just simply higher. If you add sugar into this equation, everything intensifies. Sugar itself stimulates the re- lease of dopamine and opioids, which can fuel these pathways and lead to an addictive cycle of more thrill seeking and sugar consumption as well to maintain high dopamine levels. In other words, sugar and the teenage brain together make a recipe for drama, and not the good kind.

While overdoing it on any type of sugar has harmful effects on teens, fructose has a number of its own special dangers, including its effects on the brain. A colleague at USC, Dr. Katie Page, led a study about sugar and brain activity that involved twenty-four young adults between the ages of sixteen and twenty-five. Participants were given either a glucose-based or fructose-based beverage on separate days. Each time the participants finished their drinks, the research team showed the young adults pictures of foods such as candy, cookies, pizza, and ham- burgers. At the same time, they measured the participants' brain activity with an fMRI scan, which is a special magnetic resonance imaging (MRI) scan of the brain that looks at how different regions respond to certain tasks or stimulations. After drinking the fructose-based drink, the participants' brains showed greater reactivity in response to the food pictures than after they drank the glucose-based drink. When the participants drank fructose and then saw the junk foods, their brains lit up like Christmas trees. They saw those junky foods and wanted them, fiercely, after drinking the fructose-based beverage but not the glucose- based beverage. This study highlights

what we've seen again and again: All sugar in excess is bad for kids, but fructose in particular has more damaging effects on their bodies and minds.

After the food-cue test, the researchers also gave the participants a decision-making task to complete. In this task, the participants were offered a series of choices between immediate food rewards or delayed monetary rewards based on the market value of the food items, such as cookies or pizza. The immediate food rewards included items that the participants had rated as "very attractive" on a pre-screening questionnaire. The youth were told that these foods had to be consumed right away rather than taken home. The other option was to receive a Visa gift card that would be delivered later, in an amount based on the value of the products. The results of this part of the experiment were similar to the first: After participants had the fructose drink, they were more likely to select an immediate food reward than the delayed monetary reward.

Choosing junk food now over a monetary reward later is a mild version of what poor impulse control and the inability to delay gratification look like. In real life, these traits are what lead teens to blow o studying for their finals, or skateboard down a steep hill without a helmet, or accept a dare to steal something from a convenience store, or try drugs. These studies tell us that by giving kids less sugar, and especially less fructose, we can promote the healthy development of their reward centers, and ultimately help them to make better decisions.

Longer-Term Effects: Can You Start Now to Protect Your Child from Cognitive decline, dementia, and Alzheimer's?

"Kids are so lucky. They can eat anything and not worry about the consequences."

Parents often use statements like the one above to justify giving their children sweet treats on a regular basis. (These parents may not realize quite how much sugar is sneaking into their kids' diets.) There's a general sense that kids get a free pass to eat whatever they want, and that only adults have to worry about the consequences of what they eat. But this "pass" doesn't exist, and it never did.

We now know that what you eat and how high your blood sugar levels are over the long term

can predict your brain health during aging. A recently published study followed a group of 5,189 adults over a ten-year period and found that higher blood sugar levels were associated with cognitive decline, which refers to impairments in thinking, memory, and language. This included people who were not technically diabetic but still had elevated blood sugar levels, likely related to a diet that is high in sugar and simple carbohydrates. Research also shows that having a high-carbohydrate diet is directly linked to the development of cognitive impairment and dementia.

High blood sugar over the long term has been shown to damage an enzyme in the brain called macrophage migration inhibitory factor (MIF). This damage to MIF inhibits the ability of the brain to make glial cells. Glial cells are highly abundant in the brain. They help protect and insulate neurons and thus maintain healthy brain function. This recent discovery was made by scientists in England who analyzed the brains of people with and without Alzheimer's. They found that in the early stages of Alzheimer's, the enzyme MIF is damaged from the brain being exposed to too much sugar over time. As study author Omar Kassaar from the University of Bath in the UK explained, "Excess sugar is well known to be bad for us when it comes to diabetes and obesity, but this potential link with Alzheimer's disease is yet another reason that we should be controlling our sugar intake in our diets." That this condition develops silently over time is extremely frightening, and though we can't know exactly when the damage begins to occur, it could easily be in childhood. There's strong reason to believe that the effects of high circulating glucose in general can begin in childhood and add up over a lifetime. Alzheimer's disease is one of the most feared disorders of our time. Why not, given what we know about the harmful effects of sugar on the brain, do everything you can do protect your children now?

There is also new evidence to suggest that drinking sugar-sweetened beverages is related to signs of preclinical Alzheimer's, or the early signs that show that it is developing. The disease is characterized by plaques and tangles in the brain, nerve cell loss, tissue death, and brain shrinkage, all of which impair brain function. This analysis produced the scans that were mentioned at the beginning of this chapter, the ones showing that people who consume one to two sugary beverages a day have lower total brain volume than those who consume less than one sugary beverage a day. They also found that the higher sugar consumers scored worse on tests of episodic

memory, or their unique memory of a specific event, such as what you had for dinner last night or ability to recall details of a story someone just told you twenty minutes ago. People who drank fruit juice every day experienced a similar effect, with lower total brain volume, hippocampal volume, and poorer epi- sodic memory. This is yet another reason not to give your child sugary beverages, including juice, on a regular basis.

There are a few reasons that sugar, and especially fructose, can contribute to these serious, long-term brain issues. One has to do with brain plasticity, or the ability of the synapses (connections) in the brain to grow and change. Rats that are given a high-fructose diet for six weeks develop a variety of problems related to brain function and ability to learn. That's because fructose reduces the plasticity of their brains. When the brain loses plasticity, it ages faster and experiences declines in functioning. These changes disrupted the rats' ability to learn and also impaired their long-term memory. Other studies have shown that a high sugar diet reduces the production and functioning of brain-derived neurotrophic factor (BDNF), which is essential for long-term memory. This protein is found in several areas of the brain. It helps support the synapses and assists them in growing and changing. Reductions in BDNF have been linked to the development of dementia and Alzheimer's, as well as other conditions, including depression and schizophrenia.

At this point, you probably won't be surprised to hear us say that it's not just regular sugar that can cause long-term damage to the brain, it's low-calorie sweeteners as well. Another study showed that drinking one or more diet sodas per day is associated with a greater risk of stroke and dementia, including Alzheimer's disease. Why? Some of the most popular diet drinks, including Diet Coke, are sweetened with aspartame, which has been shown to impair memory in mice. Research has also shown that the body breaks aspartame down into various components, including phenylalanine, aspartic acid, and methanol. Phenylalanine and aspartic acid can both pass through the blood–brain barrier and are known to be toxic to the brain and contribute to memory reduction. Also, methanol can be converted by the body into formaldehyde, which can be carcinogenic and damage cellular function throughout the body. It has also been found that

exposure to the sweetener AceK in mice causes abnormalities in the synapses of brain cells, resulting in impairment of memory and disruption in learning ability. A study of this sort would not be safe to conduct in humans, but these results are enough to convince us that giving AceK, or any other artificial sweeteners, to children just isn't worth the risk. Sweeteners like aspartame and AceK are found in a wide range of products such as diet beverages, baked goods, jams, yogurts, candy, and chewing gum. Also look out for them in some other healthcare products such as PediaSure nutrition drinks (marketed specifically for children and healthy growth), throat lozenges, toothpaste, vitamins, and supplements.

All this research points in one direction: If you want to help protect your children's brains from a devastating disorder later in life, begin now by reducing their sugar and sweetener intake.

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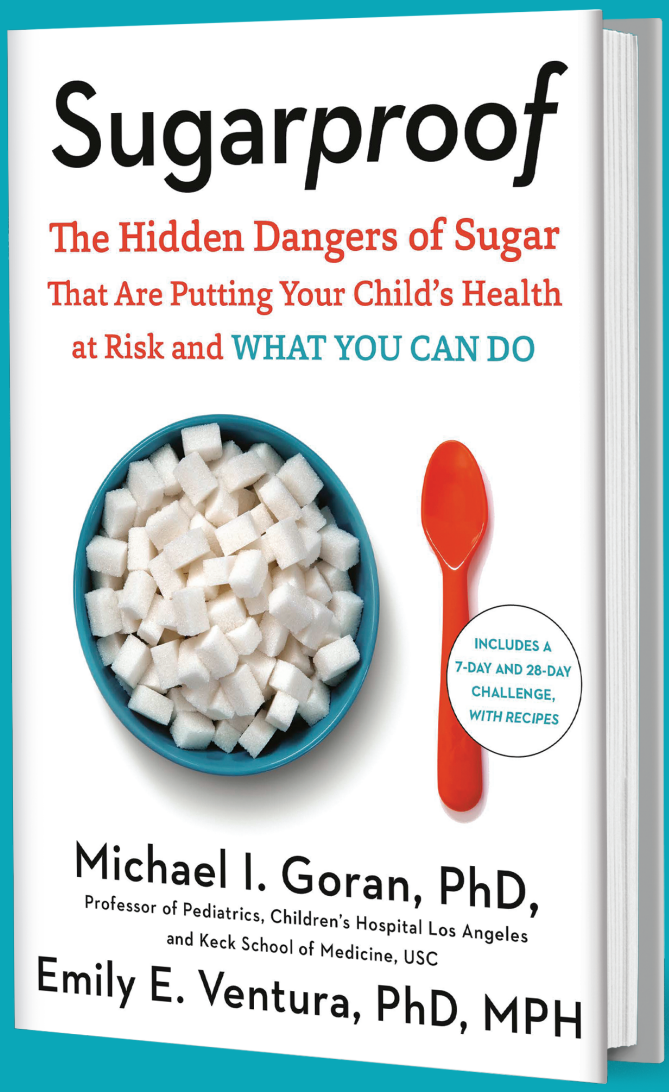

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