

# Soda and other sugary beverages are even worse for us than we thought

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Demonstrating the deadly effects of sugary drinks is important, says Christina Economos. “But the question is then, what do you do about it?” Credit: Christopher Harting

In public health circles, it's often called the low-hanging fruit. If people could just kick the sugar-sweetened beverage habit, it would make a

huge dent in the number of empty calories they consume. Sugary drinks often have no nutrients other than sugar, so it's a simple cut-it-out message that even kids can understand—no fussing with fiber grams or glycemic index rankings, no shopping for fruits and vegetables.

Public health officials have been banging the drum against [sugar-sweetened beverages](#) for years, and over the last decade, people seem to have started listening. Sales of soda, by far the biggest conduit of liquid sugar in the American diet, are declining. Sugared soda sales have dropped by more than a quarter since the late 1990s. A recent Gallup poll found 61 percent of Americans are actively trying to avoid soda, a big change from the 41 percent in 2002.

It is a [public health](#) success story, but in many ways the battle has just begun. According to a 2013 analysis in the *American Journal of Clinical Nutrition*, Americans still get about 150 calories per day from sodas, fruit beverages and sports and energy drinks—about a can's worth for everyone in the country. Other countries average even more. And certain pockets of the population drink far more than others.

We are still discovering just how high the stakes are. Friedman School researchers recently calculated that sugary drinks account for 184,000 deaths worldwide each year, by way of diabetes, [heart disease](#) and obesity-related cancers. But even if you are not obese, or even overweight, scientists are finding that sugary drinks can still do damage. All of which has made preventing people from developing the habit in the first place a priority for Tufts researchers.



Sugar Tallies: The photo above shows the sugar content for some typical bottled drinks, ranging in size from 11.5 to 20 fluid ounces. The sugar content for 8-ounce servings would be A. Lemon-lime soda: 6 tsp. B. Lemon tea: 4 tsp. C. Sparkling citrus beverage with natural pulp: 6 tsp. D. Sports drink: 3 tsp. E. Cola: 6 tsp. F. All-natural lemonade: 7 tsp. G. Sparkling grapefruit drink with fruit juice: 5 tsp. H. Citrus soft drink: 7 tsp. I. Root beer: 7 tsp. J. Fruit-flavored punch, sweetened with sugar and sucralose: 3 tsp. Credit: Christopher Harting

## Notorious S.S.B.

Nutritionists are usually reluctant to demonize a particular food, yet they are unabashedly ganging up on sugar-sweetened beverages. Which leads to the question: If [sweet drinks](#) are indeed "liquid candy," what makes them worse than peanut butter cups or gummy bears?

To start, there's volume. "We're not talking about a food people treat as a sometimes food," says Christina Economos, N96, the New Balance

Chair in Childhood Nutrition at the Friedman School. "We're talking about a liquid source of calories that people have embedded into their diet so that it's daily or multiple times a day."

According to a 2010 study by the National Cancer Institute, children ages 14 to 18 got four times more calories from soda and sports, fruit and energy drinks than they did from candy. It was the largest single source of calories in their diet.

Whether the sweetener is high-fructose corn syrup or old-fashioned cane sugar, a can of soda sends a rush of sugar to the blood. Repeated blood sugar spikes can lead to inflammation and insulin resistance. Studies have also shown that liquids may not satisfy hunger the way that solid foods do, making it easier to go overboard on daily calories.

"Sugar-sweetened beverages may be the perfect storm of harmful effects: a large dose of refined carbs, very rapid digestion and decreased ability to compensate for the extra calories," says Dariush Mozaffarian, dean of the Friedman School.

Observers liken this opposition to sugared beverages to the fight against big tobacco. And as with that battle, researchers first had to prove that the substance in question can make you sick. For a while, it was mostly a highly plausible theory. But over the last decade, says Gitanjali Singh, a research assistant professor at the Friedman School, many observational studies have shown a link between drinking sugary beverages and weight gain, which in turn is a major risk factor for diabetes and cardiovascular disease.

Then, in 2012, the *New England Journal of Medicine* published the results of a trio of controlled trials showing that cutting sugary drinks out of the diet helps people lose weight or at least gain less. "The evidence is all there," Singh says. "I wouldn't say that it is controversial anymore."

Researchers are uncovering other ways in which drinking sugar can harm your health. According to a recent study published in the *Journal of Hepatology*, a daily sugar-sweetened beverage habit may increase the risk of nonalcoholic fatty liver disease. Being overweight or obese is the biggest risk factor for this illness, which affects up to one in five adults and can silently lead to cirrhosis and liver failure.

The study, led by Jiantao Ma, M14, then a doctoral student at the Friedman School, looked at 2,634 white, middle-aged men and women, and found those who drank more than one sugary drink a day were 56 percent more likely to have the disease than those who drank none. The association held when they controlled for age, sex and body mass index (BMI).

"That means [that] irrespective of BMI, people who drink more sugary beverages have a higher chance of having [fatty liver disease](#)," says senior author Nicola McKeown, a scientist in the Nutritional Epidemiology Laboratory at the Jean Mayer USDA Human Nutrition Research Center on Aging at Tufts and an associate professor at the Friedman School.

## **It's More Than Just Fat**

Sweet drinks may also influence the fat you accumulate in other parts of your body. Another study by McKeown and Ma, published in 2014 in the *Journal of Nutrition*, looked at visceral fat, the kind that packs in around organs; scientists think it is metabolically more dangerous than subcutaneous fat, the kind just under the skin. In a study of 2,596 middle-aged adults, they found that people who drank at least one sugar-sweetened beverage a day had 10 percent more visceral fat than people who drank none.

There are signs that drinking sugar can mess with your health even without the interim step of weight gain. For a study published in the

journal *Obesity* in 2014, McKeown looked at people's cholesterol, triglycerides, insulin resistance, blood pressure and other biomarkers of heart disease risk and compared them to their sugar-sweetened beverage consumption. Adults who consumed one sugary drink daily were almost twice as likely to have metabolic red flags as those who drank none. And that wasn't just for people who are obese or overweight; the association held in normal-weight individuals, too.

On the surface, a daily can of soda may not seem to affect a growing kid who burns lots of calories on the track team. "How important is it to decrease my child's soda or fruit drink intake if they seem to be pretty healthy? It's hard for parents to know," says Maria Van Rompay, N06, N10, a research associate and instructor at the Friedman School.

Van Rompay found clues when she studied a diverse group of Boston-area schoolchildren for a study published in the *Journal of Nutrition*. The children who reported drinking the most sugar-sweetened beverages showed the highest levels of blood triglycerides, a risk factor for heart disease.

Over the course of a year, those children who reported they had cut back on their intake—by at least one can of soda per week—had the highest increase in their HDL levels, known as the "good" cholesterol. And this effect held true for children regardless of their weight.

## **Sugar-soaked Populations**

Sugar-sweetened beverage drinkers tend to be poorer and have less education than nondrinkers. They are also more likely to be minorities. And while the national numbers point to an overall decrease in the amount of sugary drinks we down—which is encouraging—consumption of sugary drinks among many black and Mexican-American children is still high.

"They are consuming significantly more calories from sugar-sweetened beverages and juice than their white counterparts. So there is still a lot more work to do," says Economos. She expects a repeat of what happened when tobacco companies started losing their more affluent customers. "Some of the marketing and advertising will be shifted into lower-income communities, and the availability of those beverages will remain high and perhaps even increase in those settings," she says.

That makes developing interventions that speak to those communities a priority, says Van Rompay. "Certain groups already have a lot of health risk factors; if they are ones who are continually consuming sugar-sweetened beverages, then additional focus needs to be placed on helping get the message out," she says.

Sweet beverage sales may be declining in the United States, but the problem is a global one, with some countries experiencing more dire health consequences. An analysis by Friedman School researchers published in the June 2015 issue of the journal *Circulation* estimated that worldwide, sugar-sweetened beverages are responsible for 133,000 deaths from diabetes, 45,000 deaths from cardiovascular disease and 6,450 deaths from cancer. More than three-fourths of the deaths occurred in low- and middle-income countries.

"The remarkably high rates of disease related to sugar-sweetened beverages in Latin America and the Caribbean were striking," says Mozaffarian, the senior author of the study. The reasons could be cultural, socioeconomic or both. Homemade sugar drinks, called "frescas," are popular in those countries, as are store-bought sodas.

Of the 20 most populous countries they looked at, Mexico had the highest death rate attributable to sugar-sweetened beverages, at 405 deaths per million. The United States was second, with 125 deaths per million.

The effect was most prominent among young people. "In the U.S., for example, about 10 percent of all obesity- and diabetes-related deaths under age 45 were attributed to sugar-sweetened beverage consumption," Mozaffarian says. "That's a remarkably high proportion."

The mortality study drew on the results of another analysis done by the same group, published in *PLOS ONE*, which found that worldwide, younger people drink much more sugar than older people. This brings up the question of what will happen when those young people get older. It could be that they will grow out of their penchant for sweet drinks, the way many tastes mature.

Or, "it could also be that the environment has changed over the past 40 to 60 years and that this is the norm now," says Singh, the lead author of the global studies. If young people keep drinking sugar as they age, it will only exacerbate the cost of obesity-associated health care and create economic losses from disability.

Singh says it is hard to predict whether soda consumption will decline worldwide as it has in the United States. It is possible that things could get worse before they get better. "If you look at lower- and middle-income countries, the food environments are changing very quickly. They have high levels of processed foods, and suddenly a lot more people can afford them. Those countries are very much a target of advertising and marketing."

All the more reason that public health efforts have to be refined so that they reach specific countries and even certain age groups within countries, Singh says. "We can't have a one-size-fits-all approach—we have to have direct and targeted policies."

## **While They're Young**

Demonstrating the deadly effects of sugary drinks is important, says Economos. "But the question is then, what do you do about it?"

As director and vice chair of ChildObesity180 at Tufts University, a research-based think tank working to turn around the obesity epidemic, Economos knows that people can change what they drink, especially if you get to them while they are young.

She saw the signs that this could work while leading the [Shape Up Somerville](#) project, where schools, restaurants, city officials and others teamed up to get children in that city to eat better and exercise more. When the researchers analyzed the data, they found the kids spent less time in front of screens and more time being active, but the most significant change they made to their diets was reducing their sugar-sweetened beverage intake by about a can a week.

Since then, ChildObesity180 has made reducing [sugary drinks](#) a cornerstone of several of its projects. Its Healthy Kids Out of School initiative has been working with volunteer-led programs, including the Boy Scouts, 4-H, Pop Warner and the YMCA, to spread nutrition education to the hundreds of thousands of children those groups work with. Of all the nutrition messages they could push, they started with "Choose water instead of sugar-sweetened beverages."

ChildObesity180 also worked with the Silver Diner, a family restaurant chain in Virginia and Maryland, to make changes to its children's menu. Among them: serving milk or 100 percent fruit juice with all entrees. Soda wasn't mentioned on the kids menu at all, though people could still order it. Before the change, more than a third of children ordered soda; two years later, less than a quarter of them did.

"That's pretty exciting, because if you implement a default option like that, and you've got millions of kids eating out, that's a big reduction in

sugar-sweetened beverages," Economos says.

Sugary drinks aren't solely to blame for the obesity epidemic. Will focusing on this one piece make that big a difference? After all, drinking sugar-sweetened beverages is associated with other unhealthy habits, including lack of exercise and poorer diet overall.

Economos has long advocated for a multifaceted approach to improving nutrition, and would hate for the no-soda message to reach kids in a vacuum. "We need to do a better job at comprehensive health education in the early years so they understand the larger context," she says.

That said, the message to stop drinking sugar is the kind of thing people can latch onto. "The rule of thumb with social marketing is 'keep it simple,'" she says. It could be just one of several clear-cut nutrition messages that seep into the public consciousness.

And that, to many health advocates, is why the sugary-drink habit is a low-hanging fruit, one that is ripe for plucking. "It won't be a magic bullet that's going to solve all diet-related problems," Mozaffarian says. "Yet this is a simple and straightforward first step."

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## **Drinks with Benefits**

Public health advocates are happy to see soda sales in decline. At the same time, they want to keep people from turning to sugary fruit drinks, lemonades, iced teas, sports drinks and energy drinks as substitutes. They are keeping a close eye on energy drink sales, which have been

climbing rapidly and are expected to reach \$10.8 billion in 2015, according to market researcher Mintel.

"Although they are a small percentage of calorie contribution [to the average diet], they are on the rise," says Tufts' Christina Economos.

What to drink instead? Milk contains natural sugars, but it also has many nutrients that are lacking in the average diet. You will get vitamins and minerals from 100 percent fruit juice, as well as plenty of natural sugar, which is why the Robert Wood Johnson Foundation recommends limiting 100 percent fruit juice to 4 to 8 ounces per day, depending on age.

Many nutrition experts would like to see people switching to seltzer or plain old water.

"When you think about what to substitute for those liquid calories, water is an obvious choice, but there is a lot of evidence showing that other beverages, such as coffee and tea, are beneficial," adds Nicola McKeown. Just go easy on the sugar packets.

**More information:** Jiantao Ma et al. Sugar-sweetened beverage, diet soda, and fatty liver disease in the Framingham Heart Study cohorts, *Journal of Hepatology* (2015). [DOI: 10.1016/j.jhep.2015.03.032](https://doi.org/10.1016/j.jhep.2015.03.032)

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