David H. Freedman has been covering science, business and technology for 30 years. His most recent book, *Wrong*, explores the forces that lead scientists and other top experts to mislead us.

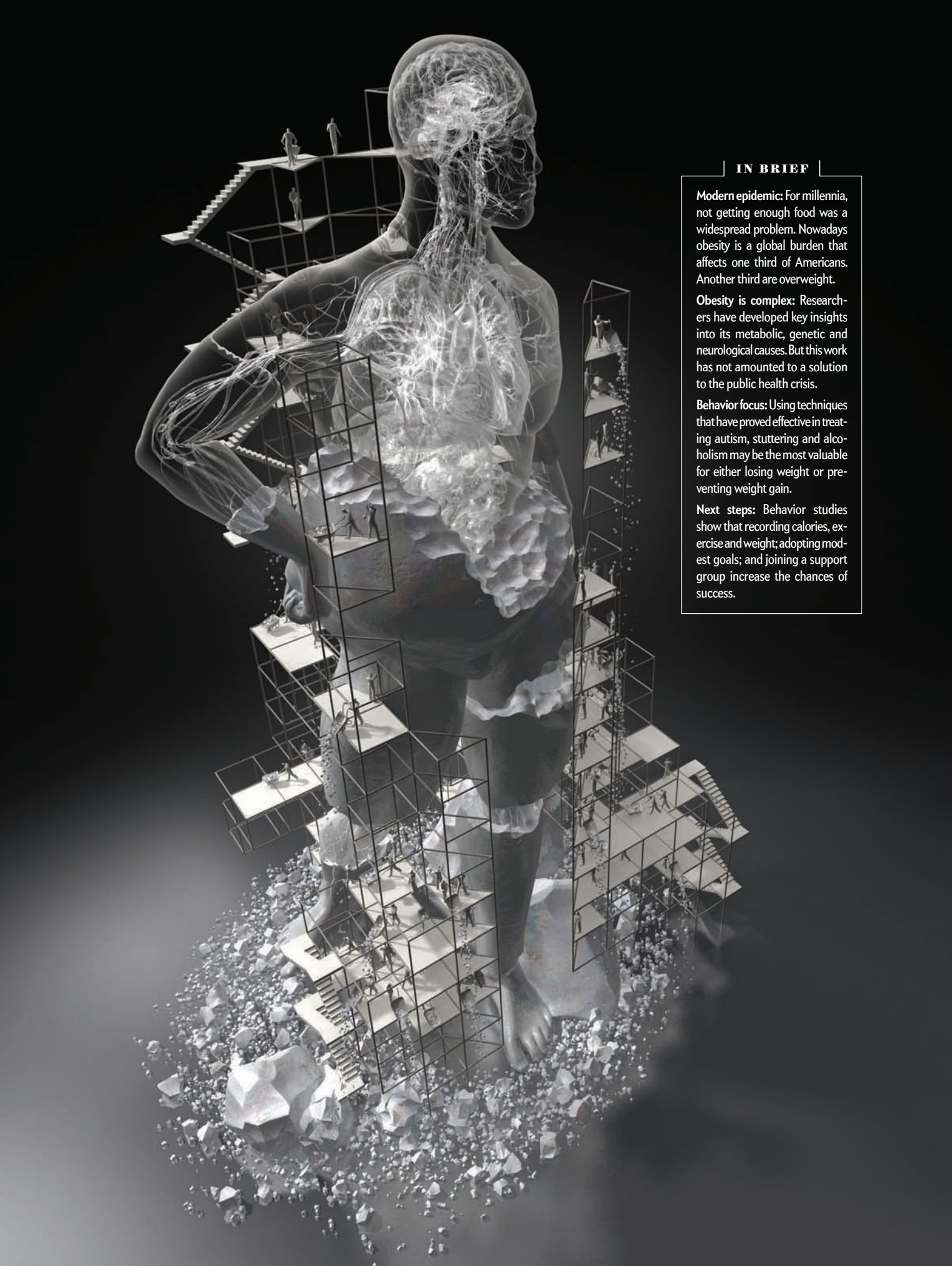
HEALTH

How to fix the obesity crisis

Although science has revealed a lot about metabolic processes that influence our weight, the key to success may lie elsewhere

By David H. Freedman

Illustration by Bryan Christie



IN BRIEF

Modern epidemic: For millennia, not getting enough food was a widespread problem. Nowadays obesity is a global burden that affects one third of Americans. Another third are overweight.

Obesity is complex: Researchers have developed key insights into its metabolic, genetic and neurological causes. But this work has not amounted to a solution to the public health crisis.

Behavior focus: Using techniques that have proved effective in treating autism, stuttering and alcoholism may be the most valuable for either losing weight or preventing weight gain.

Next steps: Behavior studies show that recording calories, exercise and weight; adopting modest goals; and joining a support group increase the chances of success.

OBESITY IS A NATIONAL HEALTH CRISIS—THAT MUCH we know. If current trends continue, it will soon surpass smoking in the U.S. as the biggest single factor in early death, reduced quality of life and added health care costs. A third of adults in the U.S. are obese, according to the Centers for Disease Control and Prevention, and another third are overweight, with Americans getting fatter every year. Obesity is responsible for more than 160,000 "excess" deaths a year, according to a study in the *Journal of the American Medical Association*. The average obese person costs society more than $7,000 a year in lost productivity and added medical treatment, say researchers at George Washington University. Lifetime added medical costs alone for a person 70 pounds or more overweight amount to as much as $30,000, depending on race and gender.

All this lends urgency to the question: Why are extra pounds so difficult to shed and keep off? It doesn't seem as though it should be so hard. The basic formula for weight loss is simple and widely known: consume fewer calories than you expend. And yet if it really were easy, obesity would not be the nation's number-one lifestyle-related health concern. For a species that evolved to consume energy-dense foods in an environment where famine was a constant threat, losing weight and staying trimmer in a modern world of plenty fueled by marketing messages and cheap empty calories is, in fact, terrifically difficult. Almost everybody who tries to diet seems to fail in the long run—a review in 2007 by the American Psychological Association of 31 diet studies found that as many as two thirds of dieters end up two years later weighing *more* than they did before their diet.

Science has trained its big guns on the problem. The National Institutes of Health has been spending nearly $800 million a year on studies to understand the metabolic, genetic and neurological foundations of obesity. In its proposed plan for obesity research funding in 2011, the NIH lists promising research avenues in this order: animal models highlighting protein functions in specific tissues; complex signaling pathways in the brain and between the brain and other organs; identification of obesity-related gene variants; and epigenetic mechanisms regulating metabolism.

This research has provided important insights into the ways proteins interact in our body to extract and distribute energy from food and produce and store fat; how our brains tell us we are hungry; why some of us seem to have been born more likely to be obese than others; and whether exposure to certain foods and toxic substances might modify and mitigate some of these factors. The work has also given pharmaceutical companies numerous potential targets for drug development. What the research has not done, unfortunately, is make a dent in solving the national epidemic.

Maybe someday biology will provide us with a pill that readjusts our metabolism so we burn more calories or resets our built-in cravings so we prefer broccoli to burgers. But until then, the best approach may simply be to build on reliable behavioral-psychology methods developed over 50 years and proved to work in hundreds of studies. These tried-and-true techniques, which are being refined with new research that should make them more effective with a wider range of individuals, are gaining new attention. As the NIH puts it in its proposed strategic plan for obesity research: "Research findings are yielding new and important insights about social and behavioral factors that influence diet, physical activity, and sedentary behavior."

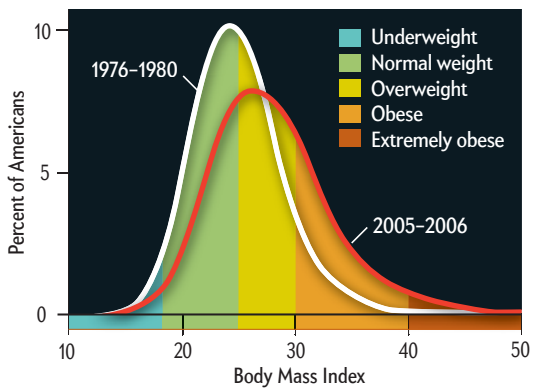
HOW WE GOT HERE

THE DESPERATION OF THE OBESE AND OVERWEIGHT is reflected in the steady stream of advice pouring daily from sources as disparate as peer-reviewed scientific journals, best-selling books, newspapers and blogs. Our appetite for any diet twist or gimmick that will take the pounds off quickly and for good seems to be

OBESITY EPIDEMIC

A Growing Problem

Increases in overweight and obesity in the U.S. (*left*), as measured by the body mass index (*right*), presage a growing burden of stroke, heart disease, type II diabetes, some types of cancer and other chronic health problems throughout the 21st century.



Getting bigger: Just over 34 percent of American adults are obese (*orange area under curve*)—up from 15 percent in the late 1970s. Thirty-three states have obesity rates over 25 percent (*not shown*).

Height (feet and inches)	Weight (pounds)													
	120	130	140	150	160	170	180	190	200	210	220	230	240	250
4'8"	27	29	31	34	36	38	40	43	45	47	49	52	54	56
4'10"	25	27	29	31	34	36	38	40	42	44	46	48	50	52
5'0"	25	25	27	29	31	33	35	37	39	41	43	45	47	49
5'2"	22	24	26	27	29	31	33	35	37	38	40	42	45	46
5'4"	21	22	24	26	28	29	31	33	34	36	38	40	41	43
5'6"	19	21	23	24	26	27	29	31	32	34	36	37	39	40
5'8"	18	20	21	23	24	26	27	29	30	32	34	35	37	38
5'10"	17	19	20	22	23	24	26	27	29	30	32	33	35	36
6'0"	16	18	19	20	22	23	24	26	27	29	30	31	33	34
6'2"	15	17	18	19	21	22	23	24	26	27	28	30	31	32
6'4"	15	16	17	18	20	21	22	23	24	26	27	28	29	30
6'6"	14	15	16	17	19	20	21	22	23	24	25	27	28	29

Body mass index is a ratio of height to weight, developed by 19th-century Belgian mathematician and proto-sociologist Adolphe Quetelet. Although BMI does not measure body fat, anyone (except very muscular athletes) with a number over 30 is considered obese.

SOURCES: CDC/NCHS, NATIONAL HEALTH AND NUTRITION EXAMINATION SURVEY (*BMI changes*); NATIONAL OBESITY EDUCATION INITIATIVE (*BMI chart*)

Graphics by Jen Christiansen

as insatiable as our appetite for the rich food that puts the pounds on. We, the public, love to believe in neat fixes, and the media oblige by playing up new scientific findings in headline after headline as if they are solutions.

It doesn't help that the scientific findings on which these headlines are based sometimes appear to conflict. For example, a study in September's *American Journal of Clinical Nutrition* found a link between increased dairy intake and weight loss, although a meta-analysis in the May 2008 *Nutrition Reviews* discovered no such link. A paper in the *Journal of Occupational and Environmental Medicine* in January 2010 postulated a connection between job stress and obesity, but in October a report in the journal *Obesity* concluded there was no such correlation. Part of the problem, too, is that obesity researchers are in some ways akin to the metaphorical blind men groping at different parts of the elephant, their individual study findings addressing only narrow pieces of a complex puzzle.

When the research is taken together, it is clear that the obesity fix cannot be boiled down to eating this or that food type or to taking any other simple action. Many factors contribute to the problem. It is partly environment—the eating habits of your friends, what food is most available in your home and your local stores, how much opportunity you have to move around at work. It is partly biology—there are genetic predispositions for storing fat, for having higher satiety thresholds, even for having more sensitive taste buds. It is partly economics—junk food has become much cheaper than fresh produce. And it is marketing, too—food companies have become masterful at playing on human social nature and our evolutionary "programming" to steer us toward unhealthy but profitable fare. That is why the narrow "eat this" kinds of solutions, like all simple solutions, fail.

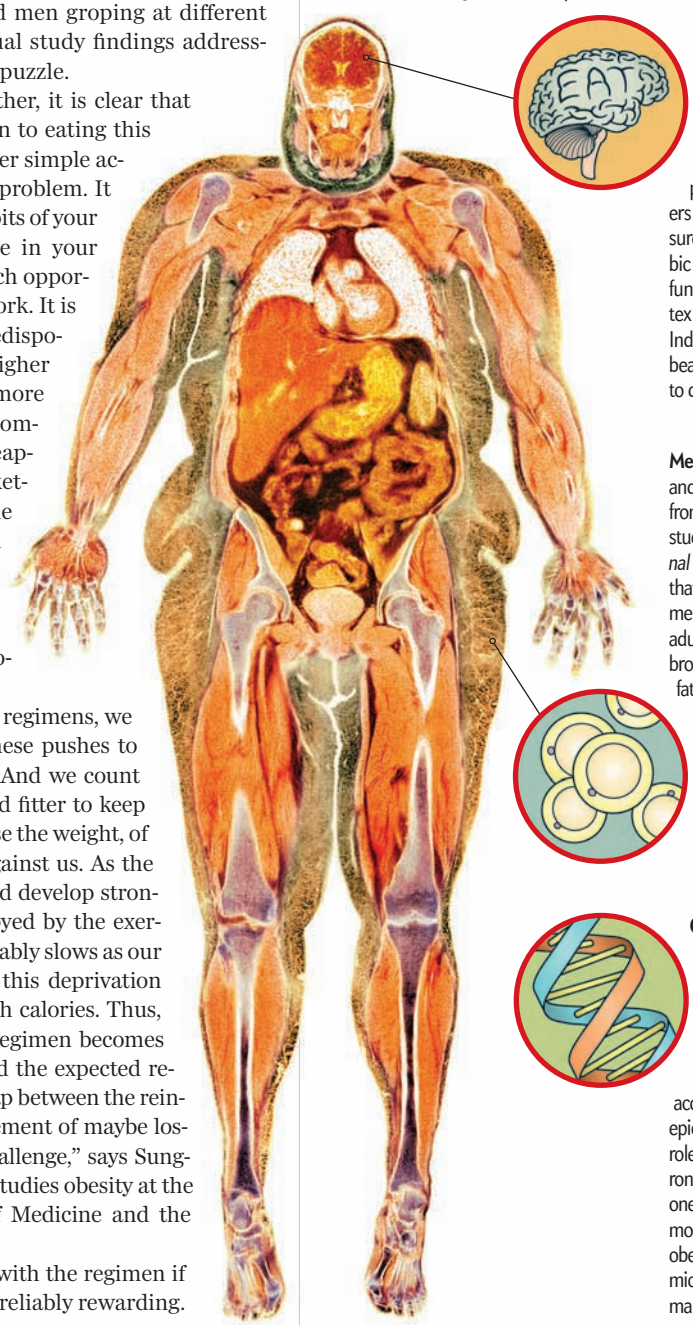
When we go on diets and exercise regimens, we rely on willpower to overcome all these pushes to overeat relative to our activity level. And we count on the reward of getting trimmer and fitter to keep us on the wagon. It *is* rewarding to lose the weight, of course. Unfortunately, time works against us. As the weight comes off, we get hungrier and develop stronger cravings and become more annoyed by the exercise. Meanwhile the weight loss inevitably slows as our metabolism tries to compensate for this deprivation by becoming more parsimonious with calories. Thus, the punishment for sticking to our regimen becomes increasingly severe and constant, and the expected reward recedes into the future. "That gap between the reinforcement of eating and the reinforcement of maybe losing weight months later is a huge challenge," says Sung-Woo Kahng, a neurobehaviorist who studies obesity at the Johns Hopkins University School of Medicine and the Kennedy Krieger Institute.

We would be more likely to stick with the regimen if it remained less punishing and more reliably rewarding. Is there a way to make that happen?

ADVANCES IN THE LAB

The Biology of Obesity

The National Institutes of Health has spent nearly $800 million a year on studies to understand the neurological, metabolic and genetic foundations of obesity. In the process, scientists have uncovered complex biochemical pathways and feedback loops that connect the brain and digestive system; a new appreciation for the regulatory functions of fat tissues; subtle hereditary changes that make some groups more prone to obesity than others; and the strong possibility that exposure to certain foods and toxic substances might modify and mitigate some of these factors. Given that it will likely take decades to understand the various causes of obesity, more surprises are no doubt in store.



Brain: Scientists have long known that the hypothalamus and brain stem help to regulate feelings of hunger and fullness. Over the past several years researchers have found that the pleasure-reward centers of the limbic system and the evaluating functions of the prefrontal cortex are also heavily involved. Indeed, chronic overeating bears biochemical similarities to drug addiction.

Metabolism: The ability to burn and store energy varies greatly from cell to cell. In 2009 three studies in the *New England Journal of Medicine* demonstrated that at least some women and men continue to benefit well into adulthood from small stores of brown fat, which, unlike white fat, is associated with being lean. Brown fat helps to generate heat and is apparently more closely related to muscle than to white fat, whose primary purpose is to store excess energy.

Genes: Researchers have confirmed variations in 20-odd genes that predispose people to gaining weight easily. But further investigation shows that the effects are modest at best and cannot account for the current obesity epidemic. Genes may still play a role, however, through the environment's influence on which ones get turned on or off. So far most such genetic switches for obesity have been identified in mice, although a few likely human candidates are known.

PHOTO RESEARCHERS, INC. (*MRI*)

Illustration by Peter and Maria Hoey

FROM BIOLOGY TO BRAIN

THE MOST SUCCESSFUL WAY to date to lose at least modest amounts of weight and keep it off with diet and exercise employs programs that focus on changing behavior. The behavioral approach, tested over decades, involves making many small, sustainable adjustments in eating and exercise habits that are prompted and encouraged by the people and the rest of the environment around us.

The research in support of behavioral weight-loss approaches extends back more than half a century to Harvard University psychologist B. F. Skinner's development of the science of behavioral analysis. The field is founded on the notion that scientists cannot really know what is going on inside a person's brain—after all, even functional MRIs, the state of the art for peering into the mind, are crude, highly interpretable proxies for cognition and emotion that reduce the detailed firing of billions of neurons in complex circuits to a few blobs of color. But researchers can objectively and reproducibly observe and measure physical behavior and the immediate environment in which the behavior occurs, allowing them to identify links between environment and behavior. That typically includes trying to spot events or situations that may be prompting or triggering certain behaviors and noting what may be rewarding and thus reinforcing of some behaviors or punishing and thus inhibiting of others.

Mass-market programs tend to fall short when it comes to enlisting a full range of behavioral techniques and customizing them to meet the varied needs of individuals.

The effectiveness of behavioral interventions has been extensively documented for a wide variety of disorders and problem behaviors. A 2009 meta-analysis in the *Journal of Clinical Child & Adolescent Psychology* concluded that "early intensive behavioral intervention should be an intervention of choice for children with autism." A systematic review sponsored by the U.S. Preventive Services Task Force found that even brief behavioral counseling interventions reduced the number of drinks taken by problem drinkers by 13 to 34 percent for as long as four years. Review studies have found similar behavioral-intervention successes in challenges as diverse as reducing stuttering, increasing athletic performance and improving employee productivity.

To combat obesity, behavioral analysts examine related environmental influences: Which external factors prompt people to overeat or to eat junk food, and which tend to encourage healthful eating? In what situations are the behaviors and comments of others affecting unhealthful eating? What seems to effectively reward eating healthfully over the long term? What reinforces being active? Behavior-focused studies of obesity and diets as early as the 1960s recognized some basic conditions that seemed correlated with a greater chance of losing weight and keeping it off: rigorously measuring and recording calories, exercise and weight; making modest, gradual changes rather than severe ones; eating balanced diets that go easy on fats and sugar rather than dropping major food groups; setting clear, modest goals; focusing on lifelong habits rather than short-term diets; and especially attending groups where dieters could receive encouragement to stick with their efforts and praise for having done so.

If these strategies today sound like well-worn, commonsense advice, it is because they have been popularized for nearly half a century by Weight Watchers. Founded in 1963 to provide support groups for dieters, Weight Watchers added other approaches and advice in keeping with the findings of behavioral studies and used to bill itself as a "behavior-modification" program. "Whatever the details are of how you lose weight, the magic in the sauce is always going to be changing behavior," says nutrition researcher and Weight Watchers chief science officer Karen Miller-Kovach. "Doing that is a learnable skill."

Studies back the behavioral approach to weight loss. A 2003 review commissioned by the U.S. Department of Health and Human Services found that "counseling and behavioral interventions showed small to moderate degrees of weight loss sustained over at least one year"—a year being an eon in the world of weight loss. An analysis of eight popular weight-loss programs published in 2005 in the *Annals of Internal Medicine* found Weight Watchers (at that time in its pre-2010 points-overhaul incarnation) to be the only effective program, enabling a 3 percent maintained body-weight loss for the two years of the study. Meanwhile a 2005 *JAMA* study found that Weight Watchers, along with the Zone diet (which, like Weight Watchers, recommends a balanced diet of protein, carbohydrates and fat), achieved the highest percentage (65 percent) of one-year diet adherence of several popular diets, noting that "adherence level rather than diet type was the key determinant of clinical benefits." A 2010 study in the *Journal of Pediatrics* found that after one year children receiving behavioral therapy maintained a body mass index that was 1.9 to 3.3 lower than children who did not. (BMI is a numerical height-weight relation in which 18.5 is held to be borderline underweight and 25 borderline overweight.) The *Pediatrics* report noted that "more limited evidence suggests that these improvements can be maintained over the 12 months after the end of treatments." A 2010 study in *Obesity* found that continuing members of Take Off Pounds Sensibly (TOPS), a national, nonprofit behaviorally focused weight-loss organization, maintained a weight loss of 5 to 7 percent of their body weight for the three years of the investigation. The U.K.'s Medical Research Council last year declared that its own long-term study had shown that programs based on behavioral principles are more likely to help people take and keep the weight off than other approaches. (The study was funded by Weight Watchers, but without its participation.)

But Weight Watchers and other mass-market programs tend to fall short when it comes to enlisting a full range of behavioral techniques and customizing them to meet the varied needs of individuals. They cannot routinely provide individual counseling, adapt their advice to specific challenges, assess environmental factors in a member's home, workplace or community, provide much outreach to members who do not come to meetings, or prevent their members from shooting for fast, dramatic, short-term weight loss or from restricting food groups. As a for-profit company, Weight Watchers sometimes even mildly panders to these self-defeating notions in its marketing. "Some people join us to drop 10 pounds for a high school reunion," says Weight Watchers's Miller-Kovach. "They achieve that goal, then stop coming."

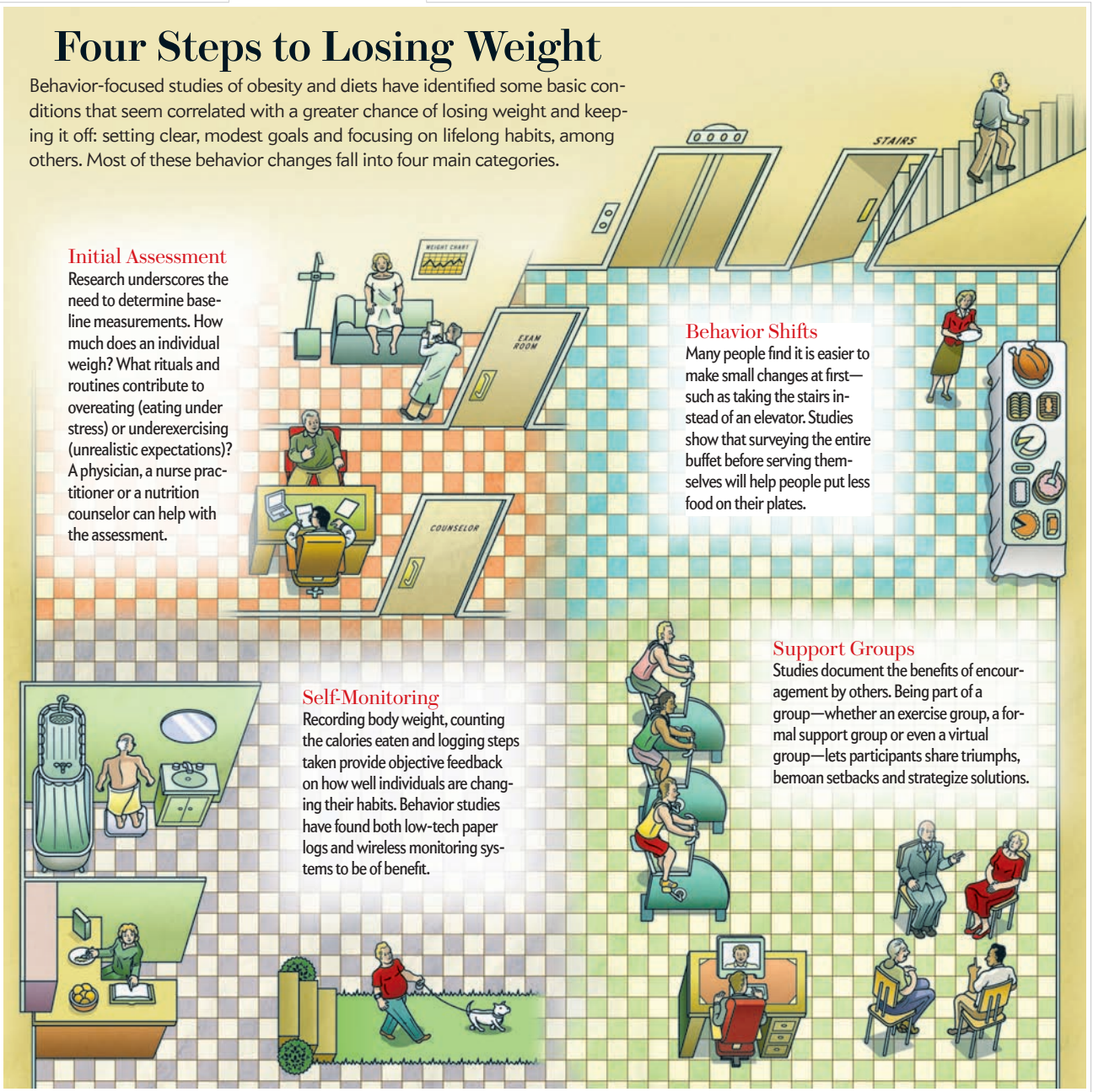
To close that gap, a number of researchers have turned their attention in recent years to improving, expanding and tailoring behavioral techniques, with encouraging results. For example, Michael Cameron, head of the graduate behavioral analysis department at Simmons College and a faculty member at Harvard Medical School, is now focusing his research on behavioral weight-loss techniques. He is one year into a four-person study—behavioral analysts generally do very small group or even single-subject studies to more closely tailor the intervention and observe individual effects—in which the subjects meet together with him via online videoconferencing for reinforcement, weigh themselves on scales that transmit results via wireless networks, and have their diets optimized to both reduce caloric density and address individual food preferences. Favorite foods are used as a reward for exercise. So far the subjects have lost between 8 and 20 percent of their body weight.

Matt Normand, a behavioral analyst at the University of the Pacific, has focused on finding ways to more precisely track subjects' calorie intake and expenditure by, for example, collecting receipts for food purchases, providing food checklists to record what is eaten, and enlisting various types of pedometers and other devices for measuring physical activity. He then provides participants with daily detailed accounts of their calorie flow and in one published study showed three of four subjects reduced calorie intake to recommended levels. Richard Fleming, a researcher at the University of Massachusetts Medical School's Shriver Cen-

WHAT WORKS?

Four Steps to Losing Weight

Behavior-focused studies of obesity and diets have identified some basic conditions that seem correlated with a greater chance of losing weight and keeping it off: setting clear, modest goals and focusing on lifelong habits, among others. Most of these behavior changes fall into four main categories.



Initial Assessment

Research underscores the need to determine baseline measurements. How much does an individual weigh? What rituals and routines contribute to overeating (eating under stress) or underexercising (unrealistic expectations)? A physician, a nurse practitioner or a nutrition counselor can help with the assessment.

Behavior Shifts

Many people find it is easier to make small changes at first—such as taking the stairs instead of an elevator. Studies show that surveying the entire buffet before serving themselves will help people put less food on their plates.

Self-Monitoring

Recording body weight, counting the calories eaten and logging steps taken provide objective feedback on how well individuals are changing their habits. Behavior studies have found both low-tech paper logs and wireless monitoring systems to be of benefit.

Support Groups

Studies document the benefits of encouragement by others. Being part of a group—whether an exercise group, a formal support group or even a virtual group—lets participants share triumphs, bemoan setbacks and strategize solutions.

Illustration by Peter and Maria Hoey

A Healthier Urban Jungle

New York City is using policy and economics to improve its "food environment"

By Thomas Farley

A RESEARCHER ONCE told me that progress in biomedical science could be measured by the ever shrinking size of our focus. Long ago we understood only the differences between sick and healthy individuals, but now we have zoomed through organs and cells into studying sick and healthy molecules. This type of thinking has led some to search for the solution to the national epidemic of obesity within our body's cells.

They won't find it there. We will reverse this epidemic not with a better microscope but rather with a better macroscope—not through genetics or physiology but through sociology and economics. In New York City, where we must reach millions of people who are overweight or headed there, we are using public policy and economic incentives to create a healthier food environment.

Eating is individual behavior, so why should we focus on the environment instead of educating people to make better choices? The simple answer is that people haven't changed over the past three decades. We're the same creatures we were in the 1970s, but the world we inhabit has changed radically.

Food is now ubiquitous, cheap, calorie-dense, and delivered to us in superphysiologic portion sizes. While there has been much talk of "food deserts" and their shortage of healthy foods in low-income neighborhoods, in fact most of us live in food swamps, where we drown in food laden with excess calories. Today it is hard to imagine a building without a soda vending machine or an intersection without a fast-food outlet. At bodegas in the South Bronx, the most prominent shelf items are three-liter bottles of soda, selling for $2 each, and huge bags of chips. Those chips pack about five calories per gram, which is more than 10 times the calorie density of a carrot.

It is far easier to describe this "obesogenic" food environment than to change it for the better. But in New York City we have been trying to nudge the system toward offering a healthier mix of products in human-size portions. We provide "Health Bucks"—$2 vouchers to use at farmers' markets—to people in the Supplemental Nutrition Assistance Program, or SNAP (formerly known as food stamps), as an incentive to buy low-calorie-density fresh fruits and vegetables. We encourage bodega operators to stock lower-calorie foods, and we have adopted zoning and financial incentives to draw supermarkets into neighborhoods that have nothing but bodegas. We are also improving the quality of foods sold in school cafeterias, while removing calorie-dense beverages from school vending machines. And we have established nutrition standards for foods sold or distributed by all city agencies, which together deliver some 225 million meals every year.

In 2008 New York City started requiring chain restaurants to post the calorie counts on their menus and menu boards. The immediate effect has been modest: about 25 percent of customers who see the calorie counts use them in choosing what to buy, and those who do so purchase about 100 fewer calories per meal. The greater potential payoff is that restaurants, ashamed to post a count of more than 1,000 calories for a sandwich, may reduce their portion sizes.

Any effort to create a healthier food environment must address sugar-sweetened beverages, which account for a third to a half of the 300-calorie increase in Americans' daily diets over the past 30 years. Sugar-sweetened drinks have been linked to obesity or weight gain in both observational studies and randomized clinical trials. New York City has supported state legislation that would balance the incentives to supersize by placing a penny-per-ounce excise tax on sugary drinks. Economic models suggest that a 10 percent increase in price would reduce the sale of these beverages by about 8 percent.

Choices: About 25 percent of customers who see calorie counts on restaurant menus use them in deciding what to buy and purchase about 100 fewer calories per meal.

Last fall New York City proposed a demonstration project to test the effect of ending the subsidy of sugar-sweetened products in the SNAP program. The measure would address a basic contradiction in public policy. When we are telling New Yorkers in every possible way that sugar-sweetened beverages cause obesity and diabetes, how can we justify giving vouchers to get these products for free, especially as part of a nutrition program? Our initiative could also change incentives in the market. If bodegas cannot sell three-liter bottles of sugary soda through the SNAP program, maybe they will promote something healthier that is SNAP-eligible.

Surveys that we have conducted show that adults have cut back somewhat on sugar-sweetened beverages since 2007. Those same surveys track self-reported height and weight in adults, and we actively monitor fitness and body mass index among the city's 1.2 million public school students. It is far too early to know if the changes we have made are affecting obesity rates. We are more than 30 years into this epidemic, and reversing it will take more than a few. But we believe we have found the right target. Unless our vision of a brighter future is a majority of Americans taking an antiobesity pill every day, it is our environment that needs to change, not our physiology.

Thomas Farley, M.D., M.P.H., is New York City's Health Commissioner.

STEPHEN CHERNIN *Getty Images*

ter, has in *Obesity* looked at ways to encourage parents to steer their children to healthier choices. He has found, among other techniques, that showing parents in person what appropriate serving sizes of foods look like on plates is helpful. Another successful Fleming trick: letting children pick out a small treat at a food store—as long as they walk there. "Kids can really respond to that reward for being active," he says.

Why are behavioral interventions effective? Laurette Dubé, a lifestyle psychology and marketing researcher at McGill University's Faculty of Management, notes that our environment is currently one in which ubiquitous, sophisticated marketing efforts prey on our need for sensory gratification as well as our vulnerability to misinformation. In addition, the poor eating and exercise habits we observe in our friends, family and colleagues encourage us to follow suit. In essence, behavioral interventions seek to reconfigure this environment into one in which our needs for information, gratification and social encouragement are tapped to pull us toward healthy food and exercise choices rather than away from them. "When we are getting the right messages in enough ways, we have a better chance of resisting the urge to eat more than we need," Dubé says.

Our environment is one in which ubiquitous, sophisticated marketing efforts prey on our need for sensory gratification as well as our vulnerability to misinformation.

CHANGING POLICY

THERE IS NO ONE-SIZE-FITS-ALL solution, behavioral or otherwise, to the problem of obesity. But although behavioral interventions work best when they are customized to individuals, mass-market behavioral approaches such as Weight Watchers and TOPS are at least fairly effective. Why don't more people lose weight with them? The main reason is that people simply do not sign up for them, often because would-be weight losers are chasing fad diets or supplements or have read that obesity is locked into our genes. Weight Watchers, by far the most popular behavioral weight-loss program, counts only 600,000 meeting-attending members in its ranks in North America. That means that fewer than one out of 100 obese people in the U.S. and about one out of 200 overweight people are part of a formal behavioral-modification program.

TAKE OUR WEIGHT-LOSS POLL
ScientificAmerican.com/feb2011/obesity-poll

Public policy may be changing, however. The U.S. Surgeon General's office and the CDC have both publicly lined up behind behavioral approaches as the main weapon in what is becoming a war on obesity. First Lady Michelle Obama's high-profile Let's Move campaign against childhood obesity consists almost entirely of behavioral weight-loss wisdom—that is, find ways to encourage children to eat less-calorie-dense foods, to become more active, and to enjoy doing it. The recent proposed ban of toys in Happy Meals in San Francisco suggests that more officials may be getting ready to pressure the food industry into easing up on contaminating the environment with what are essentially obesity-supportive marketing tactics. To make it easier and more tempting to buy healthier food in poorer, disproportionately overweight communities, the White House has proposed subsidizing the costs of fruits and vegetables. Approaching the problem from the other direction, New York City Mayor Michael Bloomberg is among those who have advocated modifying food-assistance programs to restrict the purchase of high-sugar beverages [*see box on opposite page*], and last year Washington, D.C., enacted a 6 percent tax on sugary drinks. New York City has also offered vouchers for buying produce at farmers' markets to low-income families and incentives to stores to offer healthier fare.

Some experts are trying to push the government to rewrite zoning and building codes to ensure that neighborhoods and buildings become friendlier to walkers, bikers and stair climbers. A 2009 study by researchers at Louisiana State University Medical School found that a mere 2.8 percent increase in a person's stair usage alone would keep off almost a pound a year. "The correlation between activity levels and healthy weight is one of the best-established ones in all of obesity research," says William M. Hartman, a psychologist and director of the behavioral program of the highly regarded Weight Management Program of the California Pacific Medical Center in San Francisco.

Increasing access to behavior therapy would help, too. Many overweight people might only need online behavioral monitoring, support and progress-sharing tools, which have proved moderately effective in studies. Others may need much more intensive, more personal interventions of the kind Cameron is developing. Given that obesity especially plagues the economically disadvantaged, fees for these programs may have to be heavily subsidized by the government and health care insurers. A weekly session with a behavioral therapist costing $50 would amount to $2,500 a year, or a bit more than a third of the $7,000 per year societal and medical costs of obesity—and the sessions might only be needed for a year or two to establish new, permanent eating and exercise habits, whereas the savings would continue on for a lifetime.

It is too soon to say whether the public will accept government efforts to push it toward healthier choices. In San Francisco, a community known to be especially friendly to public health initiatives, the plan to ban Happy Meals has provoked angry reactions, and Mayor Gavin Newsom vetoed it. Efforts by Let's Move to bring healthier food to school cafeterias have been intensely criticized by some as overly intrusive. Even if these efforts are eventually fully implemented nationwide, there is no way of being sure they will significantly reduce obesity. The current rate of obesity is far beyond any ever seen before on the planet, and thus a large-scale solution will necessarily be an experiment in mass behavior change. But the research suggests that such a grand experiment would be our best shot at fixing obesity and that there is reason to be hopeful it will succeed. Given that more and more scientists, public policy experts and government officials seem eager to get it off the ground, we may well have early findings within this decade. SA

MORE TO EXPLORE

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The entry portal to the range of NIH research on obesity: **obesityresearch.nih.gov**