

Why you shouldn't exercise to lose weight

Explained with 60+ studies

By Julia Belluz & Javier Zarracina; April 28, 2016

Welcome to Show Me the Evidence, where we go beyond the frenzy of daily headlines to take a deeper look at the state of science around the most pressing health questions of the day.

"I'm going to make you work hard," a blonde and perfectly muscled fitness instructor screamed at me in a recent spinning class, "so you can have that second drink at happy hour!"

At the end of the 45-minute workout, my body was dripping with sweat. I felt like I had worked really, really hard. And according to my bike, I had burned more than 700 calories. Surely I had earned an extra margarita.

The spinning instructor was echoing a message we've been getting for years: As long as you get on that bike or treadmill, you can keep indulging — and still lose weight. It's been reinforced by fitness gurus, celebrities, food and beverage companies like PepsiCo and Coca-Cola, and even public-health officials, doctors, and the first lady of the United States. Countless gym memberships, fitness tracking devices, sports drinks, and workout videos have been sold on this promise.

There's just one problem: This message is not only wrong, it's leading us astray in our fight against obesity.

To find out why, I read through more than 60 studies on exercise and weight loss. I also spoke to nine leading exercise, nutrition, and obesity researchers. Here's what I learned.

What we know:

Despite the prevailing advice, exercise is pretty unhelpful for weight loss. While 100 percent of the energy we gain comes from food, we can only burn about 10 to 30 percent of it with physical activity each day.



What we don't know:

Physical activity seems to set off a cascade of changes that can affect how much you eat, how many calories you use, and, in turn, your body weight. How these effects vary among people isn't clear.



What this means for policy:

We have an obesity problem. But we shouldn't treat low physical activity and eating too many calories as equally responsible for it. Public-health policies should prioritize fighting over-consumption of low-quality food and improving the food environment.



What it means for you:

Don't expect to be able to lose a lot of weight by ramping up physical activity alone. While exercise is hugely important for overall health, how much and what you eat has a much bigger impact on your waistline.



1) An evolutionary clue to how our bodies burn calories

When anthropologist Herman Pontzer set off from Hunter College in New York to Tanzania to study one of the few remaining hunter-gatherer tribes on the planet, he expected to find a group of calorie burning machines.

Unlike Westerners, who increasingly spend their waking hours glued to chairs, the Hadza are on the move most of the time. Men typically go off and hunt — chasing and killing animals, climbing trees in search of wild honey. Women forage for plants, dig up tubers, and comb bushes for berries. "They're on the high end of physical activity for any population that's been looked at ever," Pontzer said.

By studying the Hadza's lifestyle, Pontzer thought he would find evidence to back the conventional wisdom about why obesity has become such a big problem worldwide. Many have argued that one of the reasons we've collectively put on so much weight over the past 50 years is that we're much less active than our ancestors.

Surely, Pontzer thought, the Hadza would be burning lots more calories on average than today's typical Westerner; surely they'd show how sluggish our bodies have become.

On several trips in 2009 and 2010, he and his colleagues headed into the middle of the savanna, packing up a Land Rover with camping supplies, computers, solar panels, liquid nitrogen to freeze urine samples, and respirometry units to measure respiration.

In the dry, open terrain, they found study subjects among several Hadza families. For 11 days, they tracked the movements and energy burn of 13 men and 17 women ages 18 to 75, using a technique called doubly-labeled water — the best known way to measure the carbon dioxide we expel as we burn energy.

When they crunched the numbers, the results were astonishing.

"We were really surprised when the energy expenditure among the Hadza was no higher than it is for people in the US and Europe," says Pontzer, who published the findings in 2012 in the journal *PLoS One*. While the hunter-gatherers were physically active and lean, they actually burned the same amount of calories every day as the average American or European, even after the researchers controlled for body size.

Pontzer's study was preliminary and imperfect. It involved only 30 participants from one small community.

But it raised a tantalizing question: How could the hunting, foraging Hadza possibly burn the same amount of energy as indolent Westerners?

As Pontzer pondered his findings, he began to piece together an explanation.

First, scientists have shown that energy expenditure — or calories burned every day — includes not only movement, but all the energy needed to run the thousands of functions that keep us alive. (Researchers have long known this, but few had considered its significance in the context of the global obesity epidemic.)

Calorie burn also seems to be a trait humans have evolved over time that has little to do with lifestyle. Maybe, Pontzer thought, the Hadza were using the same amount of energy as Westerners because their bodies were conserving energy on other tasks.

Or maybe the Hadza were resting more when they weren't hunter-gathering to make up for all their physical labor, which would also lower their overall energy expenditure.

This science is still evolving. But it has profound implications for how we think about how deeply hardwired energy expenditure is and the extent to which we can hack it with more exercise.

If the "calories out" variable can't be controlled very well, what might account then for the difference in the Hadza's weights?

"The Hadza are burning the same energy, but they're not as obese [as Westerners]," Pontzer said. "They don't overeat so they don't become obese."

This fundamental concept is part of a growing body of evidence that helps explain a phenomenon researchers have been documenting for years: that it's extremely difficult for people to lose weight once they've gained it by simply exercising more.

2) Exercise is excellent for health

Before we dive into why exercise isn't that helpful for slimming, let's make one thing clear: No matter how working out impacts your waistline, it does your body and mind good.

A Cochrane Review of the best-available research found that, while exercise led to only modest weight loss, study participants who exercised more (even without changing their diets) saw a range of health benefits, including reducing their blood pressure and triglycerides in their blood. Exercise reduces the risk of Type 2 diabetes, stroke, and heart attack.

A number of other studies have also shown that people who exercise are at a lower risk of developing cognitive impairment from Alzheimer's and dementia. They also score higher on cognitive ability tests — among many, many other benefits.

If you've lost weight, exercise can also help weight maintenance when it's used along with watching calorie intake.

3) Exercise alone is almost useless for weight loss

So the benefits of exercise are real. And stories about people who have lost a tremendous amount of weight by hitting the treadmill abound. But the bulk of the evidence tells a less impressive story.

Consider this review of exercise intervention studies, published in 2001: It found that after 20 weeks, weight loss was less than expected, and that "the amount of exercise energy expenditure had no correlation with weight loss in these longer studies."

To explore the effects of more exercise on weight, researchers have followed everybody from people training for marathons to sedentary young twins, and post-menopausal overweight and obese women who ramp up their physical activity through running, cycling, or personal training sessions. Most people in these studies typically only lost a few pounds at best, even under highly controlled scenarios where their diets were kept constant.

Other meta-analyses, which looked at a bunch of exercise studies, have come to similarly lackluster conclusions about exercise for losing weight. This Cochrane Review of all the best-available evidence on exercise for weight loss found that physical activity alone led to only modest reductions. Ditto for another review published in 1999.

University of Alabama obesity researcher David Allison sums up the research this way: Adding physical activity has a very modest effect on weight loss — "a lesser effect than you'd mathematically predict," he said.

We've long thought of weight loss in simple "calories in, calories out" terms. In a much-cited 1958 study, researcher Max Wishnofsky outlined a rule that many organizations — from the Mayo Clinic to Livestrong — still use to predict weight loss: A pound of human fat represents about 3,500 calories; therefore cutting 500 calories per day, through diet or physical activity, results in about a pound of weight loss per week. Similarly, adding 500 calories a day results in a weight gain of about the same.

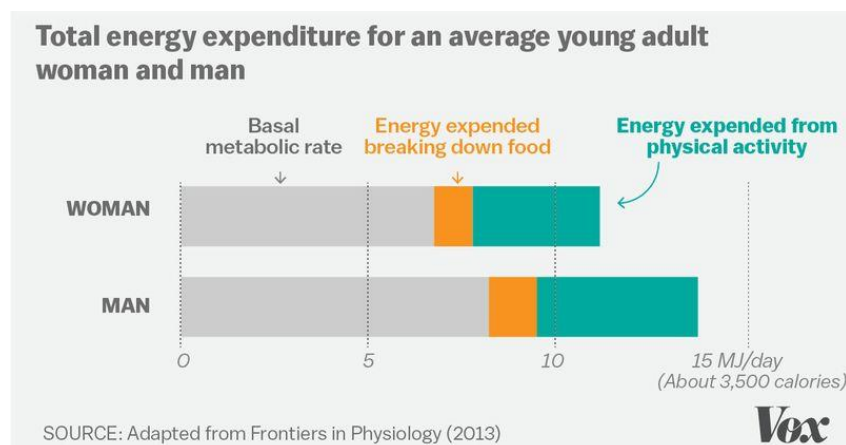
Today, researchers view this rule as overly simple. They now think of human energy balance as "a dynamic and adaptable system," as one study describes. When you alter one component — cutting the number of calories you eat in a day to lose weight, doing more exercise than usual — this sets off a cascade of changes in the body that affect how many calories you use up, and in turn, your body weight.

For weight loss, calorie restriction seems to work better than exercise, and calorie restriction plus exercise can work a little better than calorie restriction alone, according to Allison.

4) Exercise accounts for a small portion of daily calorie burn

One very underappreciated fact about exercise is that, even when you work out, those extra calories burned only account for a tiny part of your total energy expenditure.

"In reality," said Alexxai Kravitz, a neuroscientist and obesity researcher at the National Institutes of Health, "it's only around 10 to 30 percent [of total energy expenditure] depending on the person (and excluding professional athletes that workout as a job)."



Components of total energy expenditure for an average young adult woman and man.

There are three main components to energy expenditure, Kravitz explained: 1) basal metabolic rate, or the energy used for basic functioning when the body is at rest; 2) the energy used to break down food; and 3) the energy used in physical activity.

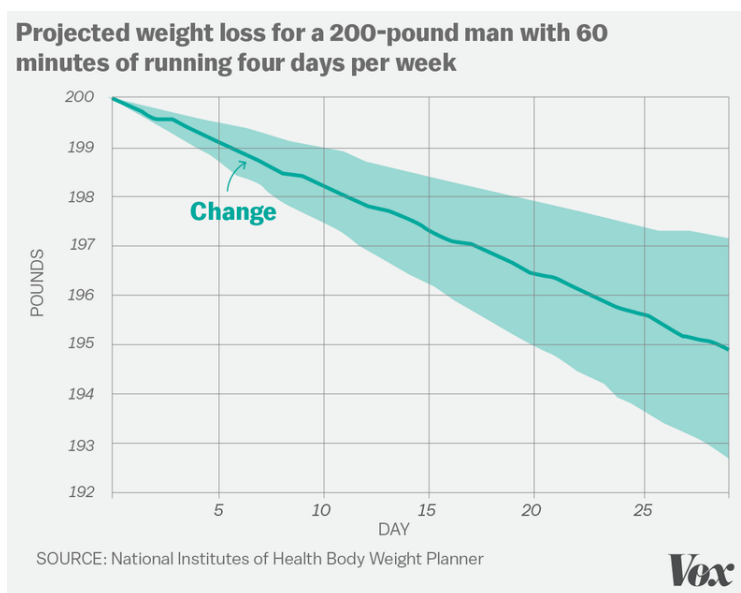
We have no control over our basal metabolic rate, but it's our biggest energy hog. "It's generally accepted that for most people, the basal metabolic rate accounts for 60 to 80 percent of total energy expenditure," Kravitz said. Digesting food accounts for about 10 percent.

That leaves only 10 to 30 percent for physical activity, of which exercise is only a subset. (You can read more about this concept here and here.)

"It's not nothing, but it's not nearly equal to food intake — which accounts for 100 percent of the energy intake of the body," Kravitz said. "This is why it's not so surprising that exercise leads to [statistically] significant, but small, changes in weight."

5) It's hard to create a significant calorie deficit through exercise

Using the National Institutes of Health Body Weight Planner — which gives a more realistic estimation for weight loss than the old 3,500 calorie rule — mathematician and obesity researcher Kevin Hall created this model to show why adding a regular exercise program is unlikely to lead to significant weight loss.



National Institutes of Health Body Weight Planner.

If a hypothetical 200-pound man added 60 minutes of medium intensity running four days per week while keeping his calorie intake the same, and he did this for 30 days, he'd lose five pounds. "If this person decided to increase food intake or relax more to recover from the added exercise, then even less weight would be lost," Hall added. (More on these "compensatory mechanisms" later.)

So if one is overweight or obese, and presumably trying to lose dozens of pounds, it would take an incredible amount of time, will, and effort to make a real impact through exercise.

6) Exercise can undermine weight loss in other, subtle ways

How much we move is connected to how much we eat. As Hall put it, "I don't think anybody believes calories in and calories out are independent of each other." And exercise, of course, has a way of making us hungry — so hungry that we might consume more calories than we just burned off.

One 2009 study shows that people seemed to increase their food intake after exercise — either because they thought they burned off a lot of calories or because they were hungrier. Another review of studies from 2012 found people generally overestimated how much energy exercise burned and ate more when they worked out.

"You work hard on that machine for an hour, and that work can be erased with five minutes of eating afterward," Hall added. A single slice of pizza, for example, could undo the benefit of an hour's workout. So could a cafe mocha or an ice cream cone.

There's also evidence to suggest that some people simply slow down after a workout, using less energy on their non-gym activities. They might decide to lay down for a rest, fidget less because they're tired, or take the elevator instead of the stairs.

These changes are usually called "compensatory behaviors" — and they simply refer to adjustments we may unconsciously make after working out to offset the calories burned.

7) Exercise may cause physiological changes that help us conserve energy

The most intriguing theories about why exercise isn't great for weight loss describe changes in how our organs regulate energy after exercise.

Researchers have discovered a phenomenon called "metabolic compensation," whereby, as people either expend more energy through physical activity or lose weight, their basal metabolic rate slows down.

"The more you stress your body, we think there are changes physiologically — compensatory mechanisms that change given the level of exercise you're pushing yourself at," said Loyola University exercise physiologist Lara Dugas. In other words, our bodies may actively fight our efforts to lose weight.

This effect has been well documented, though it may not be the same for everyone.

For one fascinating study, published in the journal *Obesity Research* in 1994, researchers subjected seven pairs of sedentary young identical twins to a 93-day period of intense exercise. For two hours a day, nearly every day, they'd hit a stationary bike.

The twins were also housed as in-patients in a research lab under 24-hour supervision and fed by watchful nutritionists who measured their every calorie to make sure their energy intake remained constant.

Despite going from being mostly sedentary to spending a couple of hours exercising almost every day, the participants only lost about 11 pounds on average, ranging from as little as 2 pounds to just over 17 pounds, almost all due to fat loss. The participants also burned 22 percent fewer calories through exercise than the researchers calculated prior to the study starting.

By way of explanation, the researchers wrote that either subjects' basal metabolic rates slowed down or they were expending less energy outside of their two-hour daily exercise block.

Dugas called this phenomenon "part of a survival mechanism": The body could be conserving energy after exercise to try to hang on to stored fat for future energy needs. Again, researchers don't yet know why this happens, and how long the effects persist in people.

"We know with confidence that some metabolic adaptations occur under some circumstances," said David Allison, "and we know with confidence some behavioral compensations occur under some circumstances. We don't know how much compensation occurs, under which circumstances, and for whom."

8) Energy expenditure might have an upper limit

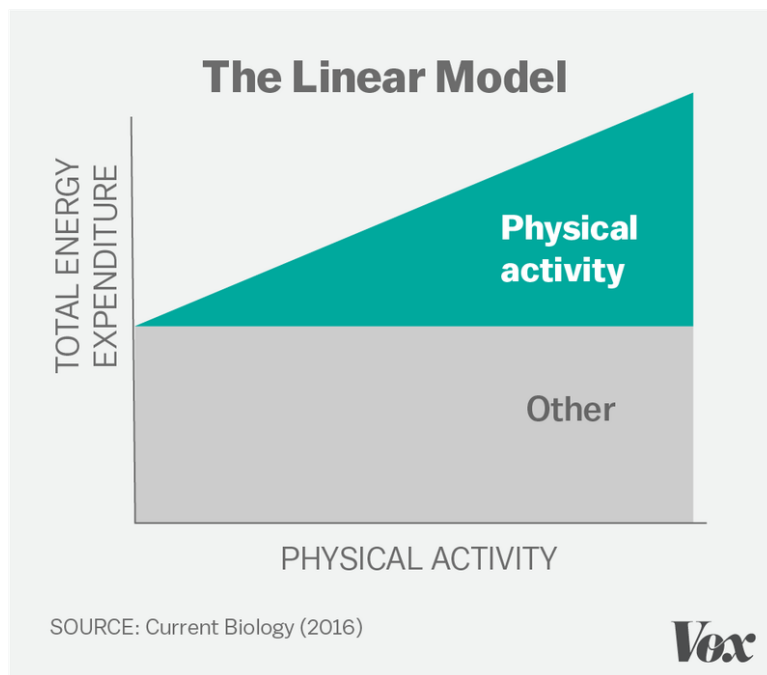
Another hypothesis about why it's hard to lose weight through exercise alone is that energy expenditure plateaus at a certain point. In another Pontzer paper, published in 2016 in the journal *Current Biology*, he and his colleagues found evidence of an upper limit.

They cast a wide geographic net, recruiting 332 adults from Ghana, South Africa, Seychelles, Jamaica, and the United States. Tracking the study participants for eight days, they gathered data on physical activity and energy burned using accelerometers. They classified people into three types: the sedentary folks, the moderately active (who exercised two or three times per week), and the super active (who exercised about every day). Importantly, these were people who were already doing a certain amount of activity, not people who were randomized to working out at various levels.

Here, physical activity accounted for only 7 to 9 percent of the variation in calories burned among the groups. Moderately active people burned more energy than people who were sedentary (about 200 calories more each day), but above that, the energy used up seemed to hit a wall.

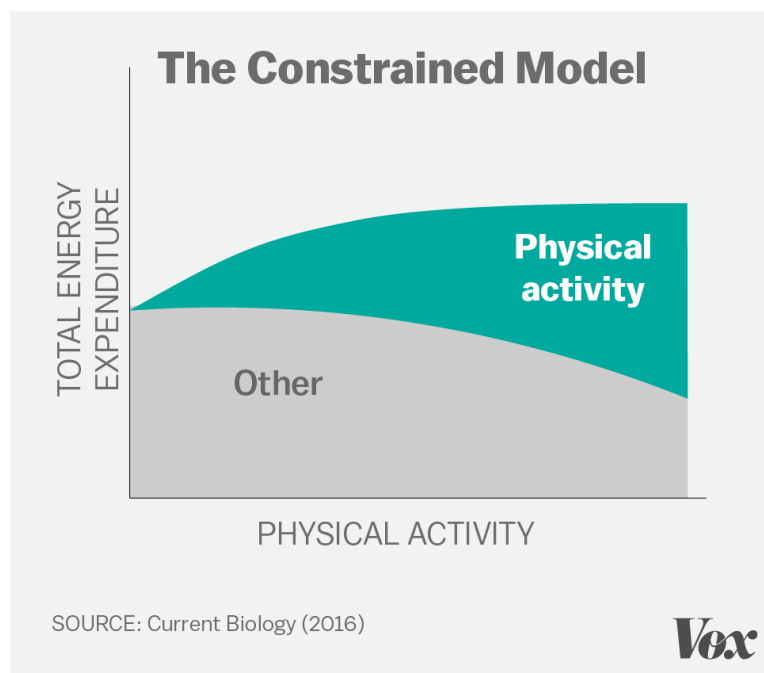
"After adjusting for body size and composition," the researchers concluded in the study, "total energy expenditure was positively correlated with physical activity, but the relationship was markedly stronger over the lower range of physical activity."

In other words, after a certain amount of exercise, you don't keep burning calories at the same rate: Total energy expenditure may eventually plateau.



In the traditional "additive" or "linear" model of total energy expenditure, how many calories one burns is a simple linear function of physical activity.

"That plateau is really different than the standard way of thinking about energy expenditure," Pontzer said. "What the World Health Organization and the people who build the Fitbit would tell you is that the more active you are, the more calories you burn per day. Period, full stop."



In the "constrained" model of total energy expenditure, the body adapts to increased physical activity by reducing energy spent on other physiological activities.

Based on the research, Pontzer has proposed a new model that upends the the old "calories in, calories out" approach to exercise, where the body burns more calories with more physical activity in a linear relationship (also known as the "additive" model of energy expenditure).

He calls this the "constrained model" of energy expenditure, which shows that the effect of more physical activity on the human body is not linear. In light of our evolutionary history — when food sources were less reliable — he argues that the body sets a limit on how much energy it is willing to expend, regardless of how active we are.

"The overarching idea," Pontzer explained, "is that the body is trying to defend a particular energy expenditure level no matter how active you get."

This is still just a hypothesis. He and others will need to gather more evidence to validate it, and reconcile contradictory evidence showing that people can burn more energy as they add physical activity. So for now, it's a fascinating possibility, among all the others, that may help explain why joining a gym as a sole strategy to lose weight is often an exercise in futility.

9) The government and the food industry are doling out unscientific advice

Since 1980, the obesity prevalence has doubled worldwide with about 13 percent of the global population now registering as obese, according to the World Health Organization. In the United States, nearly 70 percent of the population is either overweight or obese.

A lack of exercise and too many calories have been depicted as equal causes of the crisis. But as researchers put it in an article in BMJ, "You cannot outrun a bad diet."

Since at least the 1950s, Americans have been told that we can. This Public Health Reports paper outlines the dozens of government departments and organizations — from the American Heart Association to the US Department of Agriculture — whose campaigns suggested more physical activity (alone or in addition to diet) to reverse weight gain.

Unfortunately, we are losing the obesity battle because we are eating more than ever. But the exercise myth is still regularly deployed by the food and beverage industry — which are increasingly under fire for selling us too many unhealthy products.

"Physical activity is vital to the health and well-being of consumers," Coca-Cola says. The company has been aligning itself with exercise since the 1920s, and was recently exposed by the New York Times for funding obesity researchers who emphasize a lack of physical activity as the cause of the epidemic.

It's just one of many food companies that's encouraging us to get more exercise (and keep buying their products while while we're at it): PepsiCo, Cargill, and Mondelez have all emphasized physical activity as a cause of obesity.

The exercise myth for weight loss also still appears in high-profile initiatives like the first lady's Let's Move! campaign — largely because of the food industry's lobbying efforts, according to Marion Nestle, New York University nutrition professor. The White House's exercise focus to end childhood obesity, Nestle said, was "a strategic decision to make the message positive and doable and, at the same time, keep the food industry off its back."

But this focus on calories-out, or the calories we can potentially burn in exercise, is "an inadequate and a potentially dangerous approach, because it is liable to encourage people to ignore or underestimate the greater impact of energy-in," an obesity doctor and professor wrote in the journal Public Health Nutrition.

In other words, we can lose sight of the fact that it's mostly too much food that's making us fat. "There are all kinds of reasons to exercise that are good for your health," says Diana Thomas, a Montclair State University obesity researcher. "However, if you're trying to lose weight, the biggest problem I see is food. We need to cut back the food we're eating."

The evidence is now clear: Exercise is excellent for health, but it's not important for weight loss. The two things should never be given equal weight in the obesity debate.

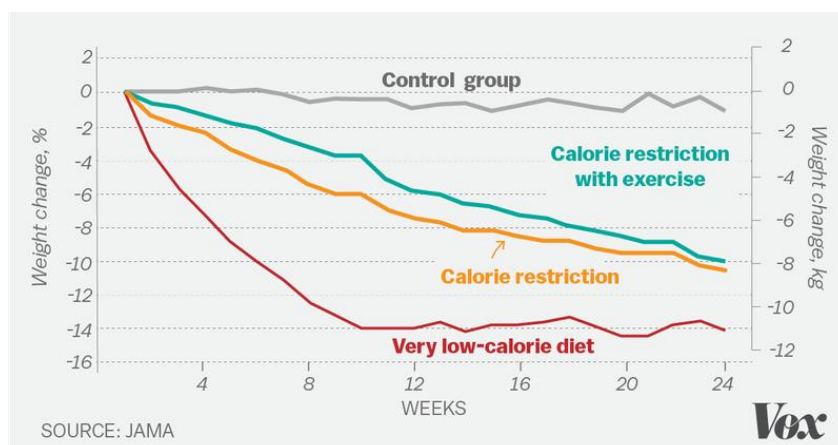
10) So what actually works for weight loss?

At the individual level, some very good research on what works for weight loss comes from the National Weight Control Registry, a study that has parsed the traits, habits, and behaviors of adults who have lost at least 30 pounds and kept it off for a minimum of one year. They currently have more than 10,000 members enrolled in the study, and these folks respond to annual questionnaires about how they've managed to keep their weight down.

The researchers behind the study found that people who have had success losing weight share a few things in common: They weigh themselves at least once a week. They restrict their calorie intake, stay away from high-fat foods, and watch their portion sizes. They also exercise regularly.

But note: These folks use physical activity in addition to calorie counting and other behavioral changes. Every reliable expert I've ever spoken to on weight loss says the most important thing a person can do is to limit calories in a way they like and can sustain, and focus on eating more healthfully.

In general, diet with exercise can work better than calorie cutting alone, but with only marginal additional weight-loss benefits. Consider this chart from a randomized trial that was done on a group of overweight folks: The group that restricted calories lost about the same amount of weight as the group that dieted and exercised, though the exercisers didn't cut as many calories:



The calorie restriction groups lost more weight than the group who both dieted and exercised.

If you embark on a weight-loss journey that involves both adding exercise and cutting calories, Montclair's Diana Thomas warned not to count those calories burned in physical activity toward extra eating.

"Pretend you didn't exercise at all," she said. "You will most likely compensate anyway so think of exercising just for health improvement but not for weight loss."

<http://www.vox.com/2016/4/28/11518804/weight-loss-exercise-myth-burn-calories>