

# The New York Times

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PHYS ED

## Sitting for More Than 13 Hours a Day May Sabotage the Benefits of Exercise

People who sat for long periods and took fewer than 4,000 steps a day developed metabolic problems, even if they exercised.



By **Gretchen Reynolds**

April 10, 2019

Sitting for most of the day could make us resistant to the usual metabolic benefits of exercise, according to a small but worrying new study. The findings, in the *Journal of Applied Physiology*, suggest that inactivity may alter our bodies in ways that are not just unhealthy on their own but also blunt the healthfulness of exercise.

We know, of course, that physical activity is good for us and being sedentary, for the most part, is not.

Regular exercise reduces the risk of heart disease, Type 2 diabetes and many other chronic conditions. Even a single workout can improve our metabolisms, studies show, so that we burn fat more efficiently after meals and keep our blood sugar and insulin levels steady.

Inactivity, meanwhile, has almost the opposite physiological effects. People who spend most of their waking hours sitting face heightened risks for many chronic diseases. They often also experience metabolic problems that raise the risk of

diabetes and heart disease, including insulin resistance, poor blood sugar control and high levels of triglycerides, the fatty acids from food that linger in the blood if they are not metabolized.

But the biological interplay between inactivity and exercise has been puzzling. Is sitting unhealthy for us primarily because we are not exercising when we are sitting? Or does sitting have its own unique effects on our bodies and, if so, could those outcomes somehow alter or even overpower the positive contributions of exercise?

Those questions recently prompted scientists at the University of Texas at Austin to decide to ask a group of 10 healthy, physically active graduate students if they would take to their couches or chairs and remain there, unmoving, for days on end.

The researchers hoped to learn from this experiment more about the separate and intertwined effects of inactivity and exercise on healthy people's metabolisms, and whether one could outshine the effects of the other.

They began by checking the health and aerobic fitness of the 10 young men and women who had volunteered and fitting them with activity monitors to measure how much they normally moved.

Then they asked the volunteers to stop moving around so much and instead confine themselves to fewer than 4,000 steps a day and at least 13 hours of remaining still.

The volunteers complied, sitting, almost uninterrupted, for four days in a row.

They also changed their diets slightly, consuming fewer calories, so that they would not gain weight, which might have changed their metabolisms, separately from the sitting.

Next, on the morning of the fifth day, the volunteers visited the university's

human performance lab. There they were given a large breakfast shake composed of half-and-half and melted ice cream.

The idea, says Edward Coyle, a professor of kinesiology at UT-Austin and senior author of the new study, was to see how their metabolisms would respond to this outlandishly fatty, sugary meal after their days of enforced idleness.

So, the researchers monitored their blood for triglycerides, blood sugar and insulin for the next six hours.

Finally, the researchers had their volunteers repeat the entire four-days-in-a-chair portion of the experiment, asking them once more to be almost completely sedentary.

But this time, on the evening of the fourth day, the volunteers exercised, running briskly for an hour on treadmills at the lab.

The following morning, they returned to the lab and downed the same creamy shake as before. The researchers again scrutinized their blood for levels of fatty acids and blood sugar. Then they compared the metabolic results after each session of prolonged sitting.

It turned out, to no one's surprise, that four days of virtually zero exercise had left the students with somewhat sluggish, overtaxed metabolisms. Even hours after their unctuous breakfast, they displayed high levels of triglycerides and blood sugar and low insulin sensitivity.

More discouraging, the exercise did not seem to help. The students' triglycerides and blood sugar levels were no better on the morning after they had run than when they had not.

These results suggest that being sedentary for long periods of time may create conditions inside our bodies "that make us resistant to the usual metabolic improvements after acute exercise," Dr. Coyle says.

In other words, if we sit too much, our workouts may lose some of their expected punch.

This study was small, short-term and narrowly focused, though. It cannot tell us whether different amounts or timing of sitting — say, 10 hours a day, or five or 15 — or of exercise might affect our metabolisms differently. It also involved only healthy, young, active volunteers.

And it does not explain how inactivity might be undercutting the benefits of exercise, although Dr. Coyle suspects that lengthy sitting increases the body's production of certain undesirable biochemical substances and may hinder the release of other, beneficial substances that normally would be produced during exercise.

He and his colleagues hope to explore some of those issues in future studies. But even now, he says, the data indicate that “it is a very good idea not to sit all day.”

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