

# Myths of Running: Forefoot, Barefoot and Otherwise

By [GINA KOLATA](#)



Gina Kolata on exercise.

It's a topic of endless debate among runners. Is there a best way to run, so that you use the least energy and go the fastest? And does it help to run barefoot or in minimalist shoes?

Most of the scientific research is just inadequate to answer these questions, said Iain Hunter, a biomechanics researcher at Brigham Young University. [Some studies](#) have indicated that the fastest middle-distance runners — those racing between about half a mile and a mile — land on the midfoot or forefoot. But for these runners, economy — using the least amount of energy — is not an issue, because the race is so short.

When people sprint or run very fast for short distances, they naturally change stride, landing more toward the front of the foot. But that does not mean running that way is better for longer distances.

Last spring, Dr. Hunter saw an opportunity to get some data on elite distance runners and to determine if there is a particular style they favor. Do they hit the ground with the heel, midfoot or forefoot?

Because he works with USA Track & Field, Dr. Hunter was able to get onto the field during the 10,000-meter Olympic trials. He photographed the runners' feet with a camera that

records 240 images a second. These were the fastest long-distance runners in the nation; if there is a secret to their success, he hoped the camera might show it.

[The results](#), for both the male and female athletes, were all over the place. Some landed heel first. Some landed on the midfoot. A few landed on the forefoot. Some twisted their feet inward as they struck the ground, while others kept their feet straight.

“None of these things were connected with performance, nor with running economy,” Dr. Hunter said. That is good news in a way, because studies have repeatedly shown that when people try to change their natural running style, they tend to use more energy to cover the same distance.

Another biomechanics researcher, Rodger Kram of the University of Colorado, recently tackled the second question bedeviling runners. What about barefoot running or running in minimalist shoes?

Most recreational runners strike the ground with the heel first — [even many who think they are midfoot strikers](#). But heel striking is just too uncomfortable when people run barefoot, so they change from heel strike to midfoot strike.

Proponents say barefoot running is more natural — humans evolved to run without shoes — and economical. When you lift a shod foot, you have to lift the weight of the shoe, and that requires energy. Added to that effort is the cushioning in shoes, which absorbs energy that should go into propelling you forward.

If you must wear shoes, the argument goes, the next best thing to barefoot running is to strike the ground with the midfoot and not the heel.

But the argument that midfoot or forefoot running is most efficient for nonelite runners has not held up, Dr. Kram said. “Those who extol it overlook three studies showing it is not more efficient,” he said. [Those studies](#) showed striking midfoot or forefoot was no better and no worse than heel striking.

And now Dr. Hunter’s study has found that the very fastest distance runners are often heel strikers.

That still leaves questions about the importance of the weight of a runner’s shoes and their cushioning. In a study published this year, Dr. Kram and his students found that runners who wore very [lightweight shoes were more efficient](#) than those who ran barefoot. (The barefoot runners wore weights on their feet to mimic the weight of the shoes, so that this would not be a factor in the results.)

Runners wearing shoes used 3 to 4 percent less energy to go the same speed and distance as those running barefoot with weights on their feet. Dr. Kram wondered why — could it be the effect of the cushioning? The challenge was to separate the effect of cushioning from every other factor.

Dr. Kram figured out a way. In [his next experiment](#), there was only one variable: the amount of cushioning for runners’ feet. All of his study subjects ran the same way, striking the

ground with the midfoot. And all were experienced barefoot runners, which was important because none wore shoes for the study, to eliminate the issue of the weight of the shoe.

The subjects ran on three different surfaces while Dr. Kram and his associates measured how much energy their effort required: an old-fashioned treadmill that, unlike the modern squishy ones, had a rigid surface; the same treadmill covered with cushioning material about 10 millimeters —thick (about 3/8 inch), exactly like that used in shoes; and then covered with 20-millimeter-thick shoe-cushioning material.

It turned out that 10 millimeters of cushioning was best: The average subject used about 2 percent less energy to run at the same speed for the same distance with that cushioning, compared with running with no cushioning. There was a metabolic cost to running barefoot, and there was a cost to having too much cushioning.

Ten millimeters of cushioning is about the amount in many lightweight running shoes, Dr. Kram said.

He wants to try the experiment with heel strikers. But for now, he said, the message is clear. There is no best way to run for longer distances. And although many people think that lighter shoes are better and that it's best to have no shoes at all, he said, "without cushioning it is not better."

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