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## Well

Tara Parker-Pope on Health

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### Phys Ed: How Necessary Is Stretching?

By *GRETCHEN REYNOLDS*

Max Oppenheim/Getty Images

For research [published earlier this year](#), physiologists at Nebraska Wesleyan University had distance-running members of the school's track and field team sit on the ground, legs stretched before them, feet pressed firmly up against a box; then the runners, both men and women, bent forward, reaching as far as they could past their toes. This is the classic sit-and-reach test, a well-established measurement of hamstring flexibility. The runners, as a group, didn't have exceptional elasticity, although this varied from person to person.

Overall, the women were more supple, as might have been expected. Far more telling was the correlation between the various runners' tight or loose hamstring muscles and their running economy, a measure of how much oxygen they used while striding. Economy is often cited as one of the factors that divide great runners from merely fast ones. Kenyan distance runners, for instance, have been found to be significantly more economical in their running than comparable Western elites.

When the Nebraska Wesleyan researchers compared the runners' sit-and-reach scores to the measurements of their economy, which had been garnered from a treadmill test, they found that, across the board, the tightest runners were the most economical. This was true throughout the groups and within the genders. The inflexible men were more economical than the women, and for both men and women, those with the tightest hamstrings had the best running economy. They also typically had the fastest 10-kilometer race times. Probably, the researchers concluded, tighter muscles allow "for greater elastic energy storage and use" during each stride. Inflexibility, in other words, seems to make running easier.

For years, flexibility has been widely considered a cornerstone of health and fitness. Many of us stretch before or after every workout and fret if we can't lean over and touch our toes. We gape enviously at yogis wrapping their legs around their ears. "It's been drummed into people that they should stretch, stretch, stretch — that they have to be flexible," says Dr. Duane Knudson, professor of biomechanics at Texas State University in San Marcos, who has

extensively studied flexibility and muscle response. “But there’s not much scientific support for that.”

In fact, the latest science suggests that extremely loose muscles and tendons are generally unnecessary (unless you aspire to join a gymnastics squad), may be undesirable and are, for the most part, unachievable, anyway. “To a large degree, flexibility is genetic,” says Dr. Malachy McHugh, the director of research for the Nicholas Institute of Sports Medicine and Athletic Trauma at Lenox Hill Hospital in New York and an expert on flexibility. You’re born stretchy or not. “Some small portion” of each person’s flexibility “is adaptable,” McHugh adds, “but it takes a long time and a lot of work to get even that small adaptation. It’s a bit depressing, really.”

What happens to our muscles and tendons, then, when we dutifully stretch before a run or other workout? Doesn’t this lengthen our muscles, increasing our flexibility and range of motion?

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According to the science, the answer appears to be no. “There are two elements” involved in stretching a muscle, Dr. McHugh says. One is the muscle itself. The other is the mind, which sends various messages to the muscles and tendons telling them how to respond to your stretching when the discomfort of the stretching becomes too much. What changes as you stretch a muscle is primarily the message, not the physical structure of the muscle. “You’ll start to develop a tolerance” for the discomfort of the stretch, Dr. McHugh says. Your brain will allow you to hold the stretch longer. But the muscles and tendons themselves will not have changed much. You will feel less tight. But even this sensation of elasticity is short-lived, Dr. McHugh says. In a new review article of the effects of stretching that he co-wrote and that will be published soon in *The Scandinavian Journal of Medicine and Science in Sports*, he looked at the measurable impacts of a number of different stretching regimens. What he found was that when people performed four 90-second stretches of their hamstrings, their “passive resistance” to the stretching decreased by about 18 percent — they felt much looser — but the effect had passed in less than an hour. To achieve a longer-lasting impact, and to stretch all of the muscles involved in running or other sports, he says, would

probably require as much as an hour of concerted stretching. “And the effects still wouldn’t be permanent,” he says. “You only see changes” in the actual, physical structure of the muscles “after months of stretching, for hours at a time. Most people aren’t going to do that.”

And most of us don’t need to. “Flexibility is a functional thing,” Dr. Knudson says. “You only need enough range of motion in your joints to avoid injury. More is not necessarily better.” For runners, extremely tight hamstrings and joints have been found in some studies (but not all studies) to contribute to overuse injuries. But somewhat tight hamstrings, as the Nebraska Wesleyan study showed, can make you more economical. Some degree of inflexibility may make you a better runner.

How then to judge your own flexibility? “The sit-and-reach test is pretty good” for at-home evaluations, Dr. Knudson says, at least of your back and hamstring muscles. Using a staircase, sit and straighten your legs so that your feet push against the bottom step, toes upright. Stretch forward. “Try to lay your chest onto your thighs,” he says. If you can reach past your toes, you’re more than flexible enough. (No one yet has devised a way to reduce flexibility, by the way, although some Olympic-level coaches in other countries are rumored to be trying.)

If, on the other hand, “you can’t get anywhere near your toes, and the lower part of your back is practically pointing backward” as you reach, then you might need to try to increase your hamstring flexibility, Dr. Knudson says, to avoid injuring yourself while running, cycling or otherwise exercising. You can find multiple hamstring stretches on YouTube, although you should consult with a physical therapist before replicating them at home; proper technique is important to avoid injury. “You won’t get a lot of change,” Dr. Knudson says, “but a little may be all you need.”

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