Humans, once in constant motion as hunters and gatherers, are moving less than ever. At first, this trend seemed like progress: Transferring our heavy and dangerous work to
animals, then machines, enabled more people to live longer. As recently as the 1950s, doctors considered exercise dangerous for people over age 40; for heart disease, which was then killing a record number of Americans, they prescribed bed rest. This was partly based on their concept of what “exercise” was: Early physiologists conducted studies on their (typically young, male) graduate students or on military servicemen — and in order to become more fit than they already were, these subjects needed to work out hard. “The mantra was, You have to go to a gym, you have to do high-intensity physical activity,” says Abby C. King, a professor of health research and policy and medicine at Stanford University: “this sort of ‘no pain, no gain’ phenomenon.”

That notion began to change with the 1968 publication of “Aerobics,” by Kenneth Cooper, an Air Force physician, who argued that anyone could take measures to prevent heart disease with regular “aerobic” exercise, like swimming or jogging, that increases heart rate and oxygen uptake, “improving the overall condition of the body” and thereby “building a bulwark against many forms of illness and disease.” But it was hard to tease apart whether physical activity made people healthier or whether healthier people were more likely to be active. In a landmark study published in 1989, Cooper and colleagues tried to address this problem by considering subjects’ physical fitness, a metric determined by assessing performance on a treadmill test. Theirs is believed to be the first long-term study of men and women to show that the higher a person’s fitness level, the lower their risk of mortality, especially from cardiovascular disease and cancer. But physical fitness, they noted, is not the same as physical activity, the amount of movement a person gets in the course of their daily life. The only way researchers could learn about the latter was by asking people to describe their behavior — a much less precise method than measuring their cardiovascular capacity in a lab.

Not having an objective way of measuring how much activity people were doing made it difficult to observe the full range of that activity’s health benefits. Until 2008, the federal government usually offered physical-activity recommendations as part of its official dietary guidelines, as a way of balancing energy intake with expenditure. But by that year, when the United States Department of Health and Human Services issued its first set of physical-activity guidelines, there was ample evidence that the more “moderate” to “vigorous” activity people reported doing, like brisk walking or raking leaves, the lower their risk of diabetes, certain cancers and cardiovascular disease. Now the department includes Alzheimer’s disease, depression, anxiety and insomnia and recommends that adults get at least 150 minutes of moderate-to-vigorous exercise a week.

Such a broad goal was necessary largely because activity that takes place at a lower intensity for less than 10 minutes had been nearly impossible to study. “We never asked about light-intensity physical activity, because we realized it’s poorly reported,” says I-Min
Lee, a professor of medicine at Harvard Medical School. “Putzing around your house, picking up after yourself, doing a little bit of light gardening — how well do people remember that?”

Increasingly, though, there were hints that such activity might be more critical than previously thought, especially as societies became more sedentary. On average, adults in Western countries spend nine to 11 hours per day sitting, and a growing body of research shows that among people who do similar amounts of moderate to vigorous activity, those who sit longer have more adverse outcomes. “What are the people who sit less doing during the time when the longer-sitters are sitting?” says Kenneth E. Powell, a former epidemiologist with the Centers for Disease Control and Prevention. “That difference must be what we’ve now called lighter physical activity.”

Over the last decade, that activity suddenly became measurable in real time with the advent of iPhones and wearable fitness trackers, many of which track “steps.” There’s no evidence that steps are better for health than other kinds of light-intensity activity; they just happen to be a movement people make often that is also detectable. But these same qualities make them uniquely relevant to researchers: Because so many people are able to easily count their steps, it’s important to understand the effect of steps, per se, on health.

In May, Lee and colleagues published, in JAMA Internal Medicine, one of the first studies to examine the relationship between steps and mortality, inspired partly by a workplace exercise competition she had entered that used Fitbits. Many of her colleagues, she noticed, felt discouraged by a popular goal of 10,000 steps. But that figure, she learned, most likely comes from the word for pedometers sold in Japan since the 1960s, manpo-kei, which translates to “10,000 steps meter” — a number apparently chosen in part because the Japanese character for it looks like a walking man. How many steps, Lee wondered, did people actually need to take to see health benefits?

To find out, she recruited more than 16,000 female volunteers, whose average age was 72, to wear accelerometers during their waking hours for a week. Then she followed up with them after about four years to see if they were still living. She found that increasing your average step count by even a small amount reduced your risk of mortality — and that, among the older women in her study, those benefits plateaued at about 7,500 steps per day. The least-active women averaged about 2,700 steps per day; those who averaged just 1,700 more than that, a difference of about a mile, were 41 percent less likely to die of any cause.
Lee’s study measured steps per minute, and found that only the total number of steps, not how quickly the women took them, seemed to matter. But devices can’t yet tell how steps are taken within each minute. “One of the big questions is: Does every step count?” says David Bassett, a co-author on Lee’s study and a professor of exercise physiology at the University of Tennessee. “Does it matter whether you’re doing continuous walking at a certain pace? Or do these intermittent steps that you accumulate when you’re sweeping the kitchen or preparing a meal or making the bed — do they count equally for health benefit?”

It’s possible to imagine a day when doctors can prescribe an optimal step “dose” for individual patients, who could then measure their progress in real time. But even if they could, it’s still unclear how valuable steps are compared with other movements. For instance, focusing on steps might mean that both researchers and the public ignore activities that are equally vital but trickier to capture, like strength training. In terms of being able to track how much cumulative muscle strength you’ve used on a given day by hoisting a toddler or a bag of groceries, says Kathleen Janz, a professor of health and human physiology at the University of Iowa, “We don’t have an app for that.”

Supposing a device could differentiate the sublest movements, it still wouldn’t explain their health impact. The ubiquity of smartphones and wearable step counters has offered researchers access to anonymous data about the behavior of millions of technology users “in the wild,” King says. But while the number and diversity of those subjects can reveal patterns previously too subtle to see — she and co-authors reported in Nature in 2017 that the walkability of a city has a greater impact on the physical activity of women than men — the devices’ very objectivity prevents them from revealing potentially relevant subjective information. A step counter can’t detect the context in which those steps were taken (strolling with a friend, say, versus running for a train), which researchers believe may also influence their health benefit.

Context is also crucial to understanding why people move; step-trackers alone can’t reveal whether being able to count steps in particular actually encourages, or discourages, people to take more of them. And motivation, unique to each person, may be the most essential aspect of physical activity to decode, and the least possible to quantify.
“People who are very inactive, they get benefits from adding just a little bit more,” Powell says. “That has been a hard message to get across, because people like to know how much.”

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