

of intense work then 10 seconds of rest, done five days a week for six weeks resulted in greater aerobic improvement than moderate, hour-long workouts done over the same time frame.

Since then, many trials have confirmed the power of HIIT. "If you want a quick increase [in fitness] over four to six weeks, purely intervals would do the job," says Lane. The key is working as hard as you can during the intense intervals. Just six HIIT sessions over two weeks significantly improves VO<sub>2</sub> max and endurance capacity, but, remarkably, a 2021 study found similar improvements could be achieved if these HIIT sessions were squeezed into a five-day period.

Adam Sharples at the Norwegian School of Sport Sciences in Oslo says beginners should start with two to three HIIT sessions per week. You can intersperse these with longer-duration endurance activities, such as jogging or swimming, to further boost results, he says. Once you notice that your strength has plateaued with HIIT, you can add two or three full-body strength-training sessions, says Lane.

However, the best exercise is ultimately the one you will be able to stick with, not necessarily the one that leads to the quickest improvements. "We sometimes get in the weeds with what is the perfect plan, but I think for most people, we just need to get out there and get moving," says Gray.

The trick is to continuously challenge yourself. If you do, you may be surprised to discover your own peak performance.

**Grace Wade**

## HOW MUCH EXERCISE IS TOO MUCH?

**THE BENEFITS** of exercise are so

great that if it were a drug, it would be a miracle cure. But what is the optimal dose for better health: are people who run ultramarathons, lift weights every day or swim the English Channel better off than those who just go for gentle walks? And is it possible to overdose? Now, thanks to large-scale studies that follow cohorts of people over long time periods, we can finally find the answers.

Firstly, these studies show a dose-related effect of exercise, with the health benefits kicking in at even low levels of activity. For instance, a 2022 study that followed more than 400,000 US adults over nearly two decades found that 1 hour of aerobic exercise per week was associated with a 10 to 20 per cent lower risk of dying during the study period. The

good news for sedentary types is that the biggest gains come from changing from doing nothing to doing something (see chart, below). And the health benefits for people aged over 60 seem to be stronger than for adults below this age, for a given amount of exertion.

We can also look into the impact of different intensities of physical activity. Moderately intense activities are things that significantly raise your heart rate, such as brisk walking or playing a fun game of badminton, where you can still talk but not sing. Activities that make you out of breath, such as riding a bike fast or hiking in the mountains, are classed as vigorous. A number of studies show that you don't need to be a committed athlete to gain near-maximal health benefits from either. These can be achieved surprisingly easily, from doing around 150 to 300 minutes per week of vigorous physical activity, 300 to 600 minutes at moderate activity levels or an equivalent combination of both.

After this point, it is a case of diminishing returns for additional health benefits – but the devil is in the detail.

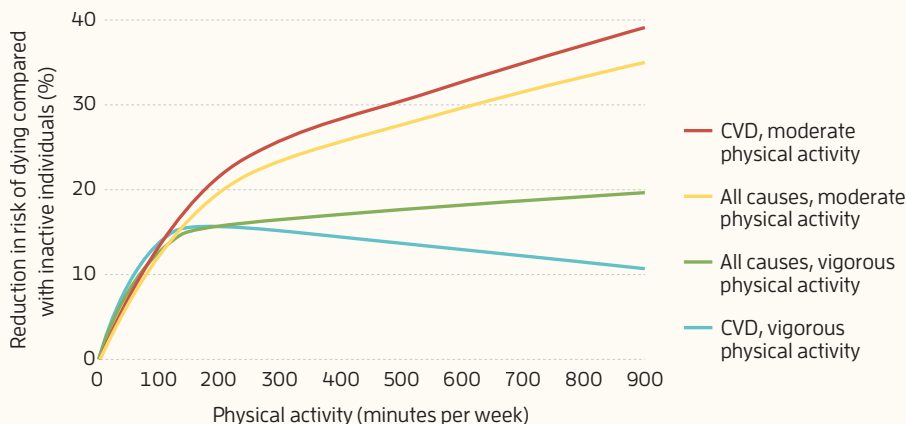
For moderate-intensity exercise, more is still better: your risk of dying early, say from a heart attack, will keep decreasing the more you do. "There's no such thing as too much exercise if it's moderate-intensity aerobic exercise," says Duck-chul Lee at the University of Pittsburgh in Pennsylvania.

Vigorous aerobic exercise may be a different matter, but it is a confusing picture. Some studies from around a decade ago seemed to show associations between participating in extreme events like marathons, ultramarathons and Iron Man distance triathlons and having an increased risk of cardiovascular problems.

However, in a 2016 study of more than 55,000 runners, Lee and his colleagues found that the most extreme runners weren't at a higher risk of death than those who ran less. They weren't getting any extra benefits – at least not in reduced mortality risk – but nor were they worse off. A 2022 study of 116,000 US adults found a similar pattern. Likewise, in a study published in May, researchers found that the first 200 men to run a mile in less than 4 minutes lived, on average, 4.7 years beyond their predicted life expectancy.

### Tortoise vs the hare

Even a small amount of physical activity boosts long-term health, but this effect tapers off with increasing time spent exercising, especially for vigorous-intensity exercise



SOURCE <https://pubmed.ncbi.nlm.nih.gov/35876019/>

CVD = cardiovascular disease

So the “extreme exercise hypothesis” – that excessive exercise, particularly high intensity training, can harm overall health – “is still a hypothesis, so not confirmed yet”, says Thijs Eijsvogels at Radboud University Medical Center in the Netherlands. He warns that many studies use questionnaires to find out how much people exercised, which is unreliable due to inaccurate reporting of activity levels, and most include only a small number of people who did extreme amounts of exercise, so the apparent harms come with large uncertainties. Research is now under way that uses more objective measures like pedometers, along with larger sample sizes, so we may soon have a clearer picture.

As for resistance exercises like weightlifting, there is even less evidence of the harms of overdoing it – partly because there are no validated wearable fitness trackers that can keep a record of muscle exertion. Nevertheless, in 2023, Lee and a colleague reviewed the limited available data. They found an optimum of 40 to 60 minutes of training per week, above which the cardiovascular benefits don’t increase and may decrease. Lee is now starting a controlled trial to see if this apparent pattern holds true.

Finally, there are also the psychological impacts of exercise. In general, it is beneficial, says Lee. “It lowers the incidence and prevalence of depression, anxiety and so on.” However, in some

## “You don’t need to be a committed athlete to gain near-maximal health benefits”

cases, it may take over a person’s life to an unhealthy degree.

“There is growing evidence of an exercise addiction,” says Débora Godoy Izquierdo at the University of Granada in Spain. This isn’t about simply training a lot and enjoying it, she says, it is about whether you can manage your enthusiasm for exercise and still participate in other activities like work, socialising and family life. “If you cannot manage your passion, then you are in trouble,” she says.

What does all this mean for aspiring athletes? The first thing to note is that the possible health risks are only relevant to those who are doing a lot of high-intensity exercise. And even for extreme athletes, Eijsvogels says there is no general recommendation to stop or ease off, because the data remains weak.

For most of us, who aren’t doing anything of the kind, more exercise is good – and you might not need to do as much as you think to gain the health benefits.

**Michael Marshall**

## WHAT IS LOST – AND GAINED – WHEN YOUR GYM INSTRUCTOR IS AN IPAD?

**I HAVE NEVER** attended the same gym as Eric Drinkwater, a sports scientist at Deakin University in Melbourne, Australia. In fact, we live over 1000 kilometres apart. But as soon as we start talking on the phone, we discover that we share the same gym instructors, located on the other side of the world in Los Angeles.

We are just two members of a growing cohort training online with coaches they have never met, uncoupled from timetables and venues. This is a phenomenon that was waiting to erupt since the advent of the internet and smart devices, and the covid-19 pandemic provided the impetus for it to explode.

In 2016, fitness apps were downloaded just over 200 million times. In 2022, in the wake of the pandemic, the figure was nearly 900 million, with the number only dropping slightly in 2023. A great deal of gyms were forced to temporarily close as the coronavirus swept the world, but when they reopened, many people’s exercise regimes had changed and some, like me, never went back.

But does it make a difference if you exercise alone at home rather than with a group or in a busy gym? After all, there are many well-documented benefits of working out alongside other people. “The social aspect of fitness training is important to many,” says Drinkwater. For instance, a 2021 study by Emma Cohen at the University of Oxford and her colleagues found that the social nature of exercising with others at parkruns – free 5-kilometre community events that take place around the world – was associated with greater enjoyment, which in turn was linked ➤

