

Nailing the Sweet Spots for Exercise Volume

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STORY AT-A-GLANCE

- › If you're sedentary and begin to exercise, you get a dose-dependent decrease in mortality, diabetes, depression, high blood pressure, coronary disease, osteoporosis, sarcopenia, falls and more
- › People who are doing the highest volume of vigorous exercise start losing longevity benefits. If you're doing full distance triathlons when you're in your 40s and 50s, your risk of atrial fibrillation increases by 500% to 800%
- › In the case of moderate exercise — loosely defined as exercising to the point where you're slightly winded but can still carry on a conversation — there's clear evidence that more IS better and cannot be overdone
- › Every 1,000 steps you get on average per day reduces your mortality by 10% to 15%. Benefits plateau around 12,000 steps (6 miles) a day
- › Strength training adds another 19% reduction in all-cause mortality on top of the 45% reduction that you get from one hour of moderate exercise per day. However, benefits cease once you go beyond one hour per week. The sweet spot is 20 to 40 minutes of strength training, two to three times a week. Above 60 minutes per week, the benefits of strength training are nullified, and you're worse off than if you did no resistance training at all

Editor's Note: This article is a reprint. It was originally published November 26, 2023.

In the video above, I interview Dr. James O'Keefe, a cardiologist with the Mid-America Heart Institute at St. Luke's Hospital in Kansas City, about exercise dosing. He

completed his cardiology training at Mayo Clinic.

He and three other coauthors published a meta-analysis in the March-April 2023 issue of Missouri Medicine,¹ the journal of the Missouri State Medical Association, which has profound implications. I view this study as a landmark that radically changed my views on exercise.

Without doubt, we need exercise. The question is, how much? Many of us who are committed to being optimally healthy tend to overdo it, which is certainly true in my case. Had I had the information in O'Keefe's study earlier, I could have saved myself a lot of time and effort.

Too Much Exercise Can Backfire

As it turns out, O'Keefe also has a history, just like me, of overdoing it when it comes to exercise, which is ultimately what led him to pursue this research, trying to find out where the sweet spot is – the amount of exercise that delivers the greatest benefits.

"I've always used exercise, whether I'm nervous or happy or sad. Exercise has been my coping mechanism. I played varsity basketball and ran track. When I quit playing basketball in college and focused on medicine, I made a personal note that I have to exercise every day because this is super important for me.

A lot of people have this notion that if some is good, more is better. So I got into triathlons and I was running 5K, 10K races and occasional marathons. I was really, really fit and I was pushing my body. But when I got to be about 45, I started to get palpitations and sometimes I'd get this aching after a really high intensity bike ride or things like that.

I realized, 'Wait a minute, where did I get this notion that if exercise is good, this extreme exercise in middle age is better?' It's just not. And so I started doing research. I have a lot of connections around the world in the clinical research community. We started looking at this question, and sure enough, it's quite obvious that you can overdo exercise.

I did a TED Talk on it. It has millions of views. And I've just focused on this. Exercise is good for you – 70% of U.S. adults don't get enough exercise, and they would be healthier getting more exercise, any exercise.

In fact, the first 20 minutes of exercise will get you most of the benefits. Even getting out for a walk is dramatically better than sitting on the couch, sitting in front of a screen or sitting behind a windshield.

We have a sedentary lifestyle, and if you don't actively incorporate movement into your day, you're going to be in trouble, no question about it, just like following the standard American diet will absolutely get you in trouble.

But about 2% of people are overdoing it. It might be 5%. Highly active people, competitive people. And it's probably because the world you and I live in – I know a lot of people like this. I see patients like this all the time.

They come with AFib, or accelerated atherosclerosis with a lot of calcium in the coronary, or ventricular problems. It can even shorten your lifespan if you get really extreme about it."

Do We Have Programmed Life Expectancy?

O'Keefe recounts the story of how his mentor at the Mayo Clinic, decades ago, would admonish him when he'd go for a run at lunchtime saying "You know James, you're just wasting your heartbeats. Your heart has only so many heartbeats."

His mentor made the case that everything appears to have a sort of programmed life expectancy that correlates with your heart rate. A hummingbird, for example, has a heart rate of 500 beats a minute and lives a year or two. The mouse has a similarly high heart rate and lives about two years. Animals with really slow heart rates, on the other hand, like the whale, can live 200 years.

This is not to make a case for being a couch potato, though. "It's a complex math problem," O'Keefe says. What you want is to do enough exercise so that your pulse

remains nice and low while you're not exercising.

"That's the way to maximize your heart rate," he says. "But you don't want to be exercising intensely for five, seven hours a day, let alone do a full-distance triathlon. You're just asking way too much of your heart. There's an intuitive logic about this as well. Like everything in nature, you're better off not [being] in the extremes.

And that's true with exercise. When you drill down on what types of exercise really correlate best with longevity, it's not the maximum amount of high intensity interval training. Some of that's important, but more is not necessarily better for vigorous intense exercise."

Take-Home No. 1: Too Much Vigorous Exercise Backfires Big Time

O'Keefe's systematic review revealed that if you're sedentary and begin to exercise, you get a dose-dependent decrease in mortality, diabetes, depression, high blood pressure, coronary disease, osteoporosis, sarcopenia, falls and more. So, most definitely, you can dramatically slow aging and improve life expectancy with exercise.

However, at the very high end, the people who are doing the highest volume of vigorous exercise start losing those benefits.

"They're not as bad off as sedentary people, but virtually every study you can find, they will lose some of those benefits for longevity, and certainly for things like atrial fibrillation.

If you go from sedentary to exercise moderately, you have less atrial fibrillation. But if you're doing full distance triathlons when you're over age 40 or 45, you start seeing a 500% to 800% increase in atrial fibrillation."

O'Keefe cites a large-scale study that followed about 1 million individuals for more than 10 years. While vigorous exercise up to 75 minutes per week reduced the risk of all-

cause mortality and other diseases in a dose-dependent manner, benefits plateaued after that.

So, people who were doing four to seven hours of vigorous exercise per week didn't get any additional benefit, "and probably, from a cardiovascular standpoint, lost a little bit," O'Keefe says.

Take-Home No. 2: You Cannot Overdo Moderate Exercise

In the case of moderate exercise, however — loosely defined as exercising to the point where you're slightly winded but can still carry on a conversation — it's very clear that more IS better and cannot be overdone.

"We're talking gardening, housework, walking, recreational bike riding, yoga, nonintense swimming, pickleball. [When doing] these things, more is better,"
O'Keefe says.

Perhaps even more surprising, moderate exercise also improves all-cause survival better than vigorous exercise — about two times better. "If you look at the people who are doing the most vigorous exercise compared to the people doing the most moderate exercise, the moderate exercisers have twice as good a reduction in long-term mortality as the high volume vigorous exerciser," he says. What this means in practical terms is that:

- a) There's no need to engage in high-intensity strenuous exercise beyond 75 minutes per week. Doing so can be highly counterproductive. If you're an overachiever, stick to moderate exercise instead and your benefits will continue to accrue and your efforts won't eventually backfire.
- b) Once you get into your mid-40s and 50s, exercise should be fun and stress-reducing, not competitive. In his analysis, O'Keefe also stresses the importance of "social exercise" over solo exercise — playing a game of pickleball with friends, for example.

Several years ago, he conducted a study with colleagues in Copenhagen, Denmark, in which they looked at long-term granular data on physical activity and longevity.

Playing tennis conferred 9.5 years of extra life expectancy; playing badminton got seven years; running, swimming and cycling were associated with just 3.5 years of extra life expectancy. Health club activities such as weightlifting and running on a treadmill only conferred 1.5 years of additional life expectancy compared to sedentary life.

At first, O'Keefe thought the analysis had somehow gone wrong. But then he realized it was the social aspects of the sports that conferred the added benefits.

"Exercising and making social connections at the same time, that is an absolute goldmine of a longevity activity," he says. "That means that even walking with your dog or your friend or [playing] pickleball is huge ... The whole thing is to move your body in a fun, playful manner and make it social."

What Big Data Tell Us About the Benefits of Walking

Walking should not be underestimated either. The average American walks about 3,800 steps a day, which is just short of 2 miles. It's about 2,000 steps per mile, and every 1,000 steps you get on average per day reduces your mortality by 10% to 15%, O'Keefe notes.

"There's been more and more studies on this all the time, using activity trackers. We're getting big data, like the UK biobank, which is a half a million people, and there's a sizable subgroup of them who have been wearing activity trackers and been followed for 10 years now."

Clearly, more is better. You get the big gains going from sedentary lifestyles – 2,000 to 3,000 steps a day – up to 7,000 or 8,000. [Here] you have this very steep reduction in mortality, improvement in survival. It continues to about 12,000 steps a day. Most of the studies show that it plateaus at 12,000."

Track Your Steps, but Beware of EMFs

If you're strapped for cash, you don't need to invest in a special fitness tracker. Most cellphones have free activity trackers, so all you need to do is carry your phone with you. It's not ideal due to the electromagnetic fields (EMFs) emitted, but you could put it in airplane mode.

In November 2023, I gave a lecture at an autism event called Documenting Hope in Orlando. They're committed to research and have invested hundreds of thousands of dollars to do detailed analyses of autistic children to identify the causes of autism.

I almost fell off my chair when I heard the results. EMF was the No. 2 cause of autism. No. 1 was antibiotics, No. 3 was toxins and No. 4 was vaccines. So, please, do take EMF exposures seriously. While adults aren't going to develop autism from EMF exposure, it can still cause neurological damage. So, keep your cellphone in airplane mode when not in use, or better yet, in a Faraday bag.

Take-Home No. 3: Overdoing Strength Training Is Worse Than Doing Nothing at All

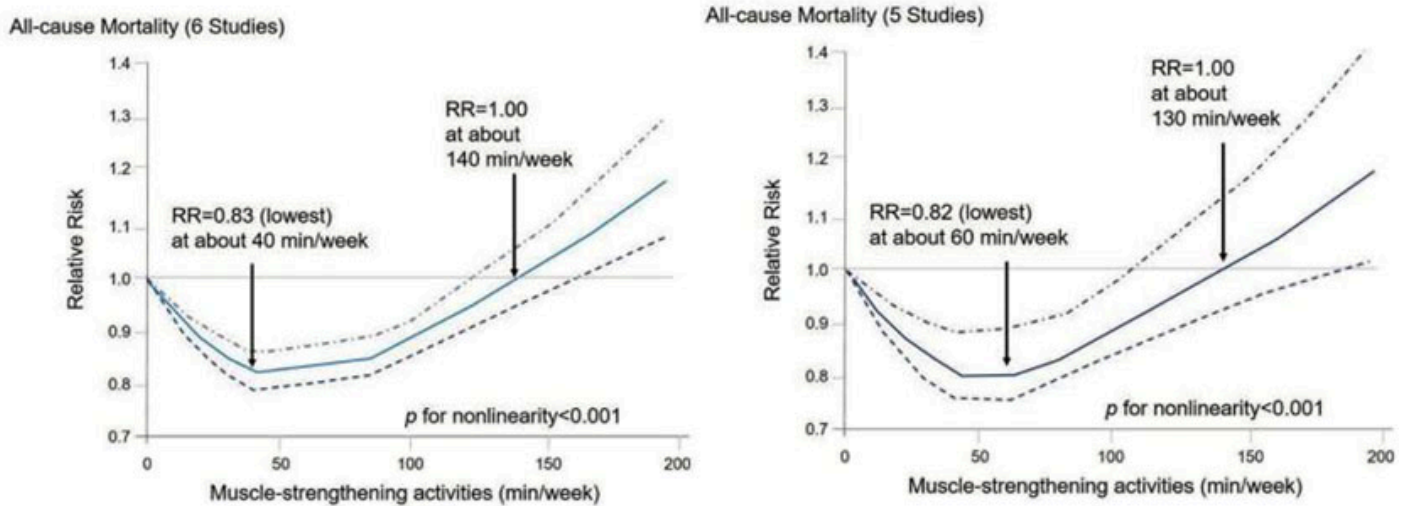
O'Keefe's meta-analysis also detailed the sweet spot for strength training, and the results truly shocked me. I radically changed my exercise program after reviewing these data.

Without question, strength training will improve muscle mass, muscle and bone strength. It can also boost your testosterone level if not overdone. It helps to improve mood and prevent falls. As you get into your 30s, you start to lose muscle mass and if you don't train to maintain muscle mass, you'll eventually end up with sarcopenia (low muscle mass) or osteoporosis (low bone density). O'Keefe comments:

"I've always been a fan of strength training ... But again, the devil is in the details about the dosing. When you look at people who do strength training, it adds

another 19% reduction in all-cause mortality on top of the 45% reduction that you get from one hour of moderate exercise per day.

When I strength train, I go to the gym and spend anywhere from 20 to 40 minutes, and ... I try to use weights that I can do 10 reps with ... After that, you're feeling sort of like spent and ... it takes a couple of days to recover. If you do that two, at the most three, times a week, that looks like the sweet spot for conferring longevity."



The graph above, from the meta-analysis, shows the J-shaped dose-response for strength training activities and all-cause mortality. As you can see, the benefit maxes out right around 40 to 60 minutes a week. Beyond that, you're losing benefit.

Once you get to 130 to 140 minutes of strength training per week, your longevity benefit becomes the same as if you weren't doing anything, which is nothing short of shocking. If you train for three to four hours a week, you actually end up with WORSE long-term survival than people who don't strength train!

Recall, when you're doing intense vigorous exercise in excess, you're still better off than people who are sedentary. But for some (yet undetermined) reason, excessive strength training leaves you worse off than being sedentary.

So, the take-home message here is that 20 minutes twice a week on non-consecutive days, or 40 minutes once a week is the sweet spot. You also don't want your exercise

regimen to center around strength training. It should be an add-on, as you get far greater benefits simply from walking, or any other moderate exercise.

What About When You Do KAATSU?

Now, there may be a caveat to this. Conventional strength training involves lifting weights that are anywhere from 70% to 90% of your one-rep max, and that's the style of weight training most studies are based on. Another form of strength training is blood flow restriction (BFR) training or to use the Japanese term, **KAATSU**.

In KAATSU, you're using very light weights – 70% lower than conventional weightlifting. Considering you're not pushing your body to the max with heavy weights, you can likely train longer than one hour a week without nullifying benefits. It's closer to moderate movement exercise than conventional resistance training.

O'Keefe is not familiar with KAATSU and has not studied its effects, but he agrees that it makes rational sense that you should be able to work out longer when doing KAATSU – maybe two to three hours a week.

Get Your Nature Fix

O'Keefe's paper also discusses the benefits of spending time in nature. A British study cited found you need at least 1.5 to two hours outdoors each week for good health, even if it's only a local park or tree-lined street.

"And then forest bathing is really interesting," he notes. "Japanese people who live in Tokyo, one of the biggest cities in the world, will get on a bullet train and an hour or two later be at the mountains and in the forest. They go hike around or even just sit in nature and smell the pine and the fresh air. Then they get on the bullet train and go back home.

They show reductions in blood pressure and improvement in mood. And there's really, really strong benefits ... It's been shown to ... reduce anxiety and improve

sleep and all those kinds of things that are important for well-being."

The Sit-Rise Test

Lastly, we review a simple clinical assessment that gauges nonaerobic components of fitness – strength, balance and flexibility – skills that undergird long-term survival. It's called the sitting-rising test (or sit-to-stand test). To perform this test:

- a) Standing, cross your feet at the ankles
- b) Squat down until you're sitting cross-legged on the floor
- c) Raise yourself back up to standing

The object of the exercise is to sit down and stand back up using as few supports as possible. A perfect score of 10 – 5 points down and 5 points up – is obtained if you can squat down and stand back up without using your hands, elbows or knees for added stability or support. For each body part that touches the floor – a hand, forearm, elbow, knee or side of the leg – either on the way down or up, deduct 1 point.

This test has been shown to be remarkably accurate for predicting longevity. Having a score of 8 to 10 means you have a very low risk of dying within the next 14 years while a score of 0 to 3 is associated with sixfold higher all-cause mortality.

As noted by O'Keefe, the ability of this test to predict survivability "speaks to the fact that fitness is a multifaceted thing and you need to work on all those different things," meaning balance and flexibility, in addition to aerobic exercise and strength training.

Sources and References

- ¹ [Missouri Medicine March-April 2023; 120\(2\): 155–162](#)