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TECH | PERSONAL TECH | PERSONAL TECHNOLOGY

## Stop Counting 10,000 Steps; Check Your Personal Activity Intelligence

PAI, the new fitness metric from wearable maker Mio, gives 24/7 analysis of your heart rate



By

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We've all heard the advice: Take 10,000 steps daily. That seemingly simple goal sold millions of fitness trackers, most of which put your step count front and center.

It's also one reason many of these gadgets end up gathering dust. I have a hard time squeezing in thousands of steps between meetings and lunch over my keyboard. And for those who can do it, 10,000 hardly guarantees a Kardashian physique.

Now fitness gadgets are ditching step counting for heart-rate tracking—and much more personalized measures. Mio Global, familiar to serious athletes for its wrist pulse trackers, developed a fitness metric that interprets your specific heart patterns based on a large health study. To maintain optimal health, Mio claims, just do enough strenuous activities to keep your Personal Activity Intelligence score at 100. Easy as PAI.

Actually, it's a commitment—tough yet attainable for someone like me who's climbing back onto the fitness wagon. But using Mio's new PAI app to monitor my activity has changed the way I think about getting in shape. While Mio's hardware isn't as elegant as others on the market, PAI is the best example yet of how wearables can turn data about our bodies into tailored, actionable advice—and hopefully longer lives.

What's so bad about the old 10,000 step rule? Anything that gets sedentary people moving is a good thing, doctors say. The 10,000 figure originated with a 1960s Japanese step-counter marketing campaign, a time and place that may not have much relevance to 2016 bodies hunched over computers with a bag of Cheetos.

Step counters ignore the imperative to raise your heart rate, which the American Heart Association says is key to stemming our No. 1 killer, heart disease. Regular walking isn't very strenuous, unless you go uphill. And basic step counters also don't give you hard-earned credit for benching 150 pounds or completing a spin class.



People looking for a simple PAI experience can get one this summer, when Mio is set to ship a sleek, made-for-PAI wearable called the Slice. *PHOTO: MIO*

A number of fitness trackers are making progress in turning data into advice. Fitbit, Jawbone, Basis and Microsoft gadgets track your pulse throughout the day and highlight your resting heart rate as an index of overall fitness and stress. Jawbone offers a “smart coach” that looks for patterns in your habits. The Apple Watch records heart rate during workouts, and replaces step-counting with three rings that make a game out of increasing calorie burn, moderate exercise and standing.

Mio’s PAI goes further, turning all that heart rate data into one easy-to-understand number. Connect the PAI smartphone app to a Mio band such as the \$150 Fuse, and every time you raise your heart rate, you contribute to your PAI score. The more you exert yourself, the more points you earn. Research shows keeping your PAI consistently at 100 or higher could increase your lifespan by at least two years, and by up to 10 years if you are under 50, Mio says.

### What’s Your Personal Activity Intelligence?

Mio gives more credit for strenuous activity

#### Activity:

Sarah walks to and from work 20 minutes

+

45 minute walk with dog after work

=



#### Analysis:



Even though Sarah’s step count is over 10,000, the leisurely pace means heart rate stays low and overall health benefits are limited.

DAY 1

Sarah walks to and from work 20 minutes

+

Goes to the gym for 1 hour spin class and weights

=



Sarah didn’t reach her 10,000 daily step goal, but her intense workout elevates her heart rate for greater health benefits.

DAY 2

Source: Mio Global

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Unlike counting steps, where you start over each morning at zero, PAI runs on a rolling weekly tally: You can bank a bunch of points on a Tuesday after getting stuck at your desk on a Monday.

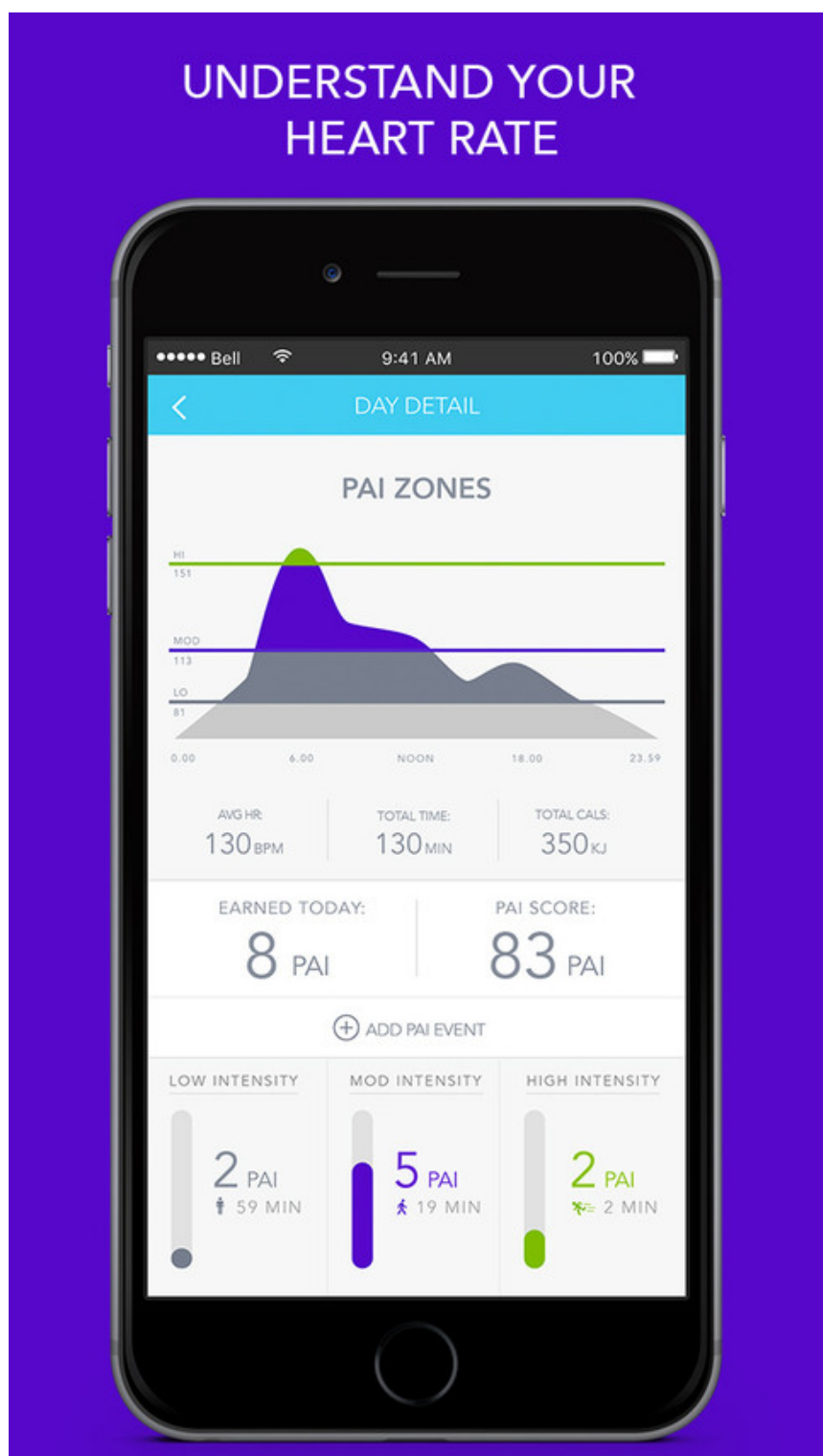
Everyone’s PAI is a little different, by design. The formula takes into account your age, gender, resting heart rate, max heart rate and other

unique signals. It’s personal Big Data—and finally some recognition that my 37-year-old body works harder than the 22-year-old next to me in aerobics class.

Using PAI, I learned that not all steps are equal. I took an hour-long three-mile walk that tallied nearly 6,000 steps, yet earned me just 7 PAI. But 30 intense

minutes on a bike was worth 56 PAI. The app includes a slider tool to help you estimate which activity you need to do, and for how long, to earn PAI. You don't have to tell it you're exercising; as long as the waterproof armband is reading your pulse, it knows.

Mio says PAI works for people who have struggled to adopt a healthy routine because it adjusts its expectations, making it harder to reach 100 as your heart strengthens. "It won't tell you to do things beyond your capability," said Mio chief executive Liz Dickinson.



The Personal Activity Intelligence app displays personalized analysis of your heart-rate activity and goals. Mio says research shows maintaining a PAI score consistently over 100 could increase your lifespan by at least two years. PHOTO: MIO

The fitness industry is filled with pseudoscience, but PAI has roots in one of the largest longitudinal health-research projects ever. The HUNT Study tracked 20 years of activity from 60,000 Norwegian people to gain understanding about what lifestyle factors, including the prevalence of obesity, contribute to disease and death.

Two years ago, a team led by a Norwegian University of Science and Technology professor, Ulrik Wisløff, used HUNT data to create a mathematical model of the optimal amount of cardio activity to lengthen lifespan, giving birth to the PAI score.

Overweight people who keep above 100 PAI are likely to lose weight, but the researchers are still crunching the numbers on what levels are required. "It's not as simple as counting minutes of exercise per week," said Prof. Wisløff in an interview, fresh from cross-country skiing. He says he maintains a PAI of 130 to 150 though there's little statistical longevity advantage to overshooting 100.

Mio won't describe everything that goes into PAI, and Prof. Wisløff's research

has yet to be published in a peer-reviewed journal. He said he prioritized patenting the PAI formula, after which Mio bought it, and the study is in the publication process now. One question: How universal is data obtained from Norway's fairly homogenous population?

Dr. Richard Stein, a cardiology professor at New York University and spokesman for the American Heart Association, said he wasn't familiar with the specifics of PAI but agrees it's useful to consider both quantity and intensity of physical activity. "There's nothing magical about 10,000 steps," he said.

He says it can be difficult, without a clinical exhaustion test, to get an accurate picture of a person's peak heart rate—a key to the PAI algorithm's understanding of how hard your body is working. Mio says its constant monitoring self-corrects whenever the device identifies a new max heart rate while you're working out.

Many wrist-based trackers have a reputation for poor accuracy on heart-rate data. Mio, which has been making heart trackers for 15 years, pointed to a San Francisco State University study finding Mio's tech had a high correlation to electrocardiograph readings during cycling and running.

PAI has a few other problems. The bulky Mio Fuse band was originally designed to measure only workouts, but leaving it on all day to measure PAI means charging it every night. The PAI app also sometimes struggled to connect with the Fuse over Bluetooth. Anyone looking for a simple PAI experience will probably want to wait until this summer, when Mio plans to ship a sleek, new, made-for-PAI wearable called the Slice.

Mio says it is open to making PAI available for other fitness devices. I'd love it as an app on the much more handsome Apple Watch. The fitness software race is still wide open, and it's clear there's plenty of room in the wearable industry for new standard measures.

A bigger problem may be that fitness devices tend to appeal to people who already like to exercise: The HUNT study didn't show that following PAI motivated otherwise less-active people, just that people who earned 100 PAI lived longer.

Fitness gadgets need to focus as much on behavioral psychology as on data, says Michelle Segar, author of the 2015 book "No Sweat: How the Simple Science of Motivation Can Bring You a Lifetime of Fitness." Long term, they don't "link the tracking data with energy levels, joy, feeling effective, making meaning" and other things that really matter, she says.

I've never been drawn to exercise for its own joys, but the PAI app did make fitness feel like a game I could keep up with. It removed the obstacle of figuring out the "right" amount of exercise, so going for a run didn't feel pointless—and I didn't overdo it. Our fitness metrics ought to be as unique as our bodies. PAI may be the one I have no excuse to ignore.

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