**The Myth Of Interval Training And EPOC**



You may have heard of EPOC, or as it’s commonly known, the “afterburn” effect. Recently, it’s been widely publicized as an explanation for the benefits of high intensity interval training (HIIT). **People claim that interval training is better than continuous cardio,** and specifically that interval training is more effective for weight loss or fat burning because it increases EPOC more than continuous cardio. By that logic, you burn more calories after you finish interval training, which leads to weight loss. It’s such a common argument that it must be true, right?

***Nope.*** This is a case of research being taken out of context and misrepresented to provide an argument for one type of exercise over another. [This happens way too often](https://breakingmuscle.com/learn/the-dark-and-bewildering-world-of-fitness-studies) in the fitness industry. Let’s dispel this myth right now so you can make an informed decision about your cardio training.

**What is EPOC?**

EPOC stands for Excess Post-exercise Oxygen Consumption. It’s an increase in oxygen uptake above resting levels that occurs after exercise. Increased oxygen consumption requires energy, so **EPOC means that you burn calories even after an exercise bout.** The purpose of EPOC is to restore the body to its resting state and create physiological adaptations which will help the body handle the same amount of exercise-related stress more easily in the future.

EPOC is the greatest immediately after exercise. Some studies have found that EPOC lasts up to 24 hours, while others have found it to be much shorter, less than an hour in some cases.[1](http://www.academia.edu/download/5114409/effect_of_exercise_intensity__duration_no_epoc.pdf)The large range of EPOC durations across studies has been attributed to differences in exercise intensity and duration, as well as differences in study methodologies.

Despite sensational claims from some in the fitness industry, **research suggests that the EPOC effect is fairly small,** and probably makes only a minor contribution to weight loss compared to the energy cost during the actual exercise. The amount of extra energy burned during EPOC is only about 6-15% as much as is used during the exercise itself.[2](http://jap.physiology.org/content/82/2/661.full.pdf%2Bhtml) For example, 20 rounds of 1-minute running intervals performed at 105% of VO2max, separated by 2 minutes of rest, burned an average of 537 calories during exercise, and an extra 64 calories in the 9 hours after the session.[3](http://shapeamerica.tandfonline.com/doi/abs/10.1080/02640410600552064)

Research has also demonstrated large individual differences in EPOC responses.[1](http://www.academia.edu/download/5114409/effect_of_exercise_intensity__duration_no_epoc.pdf) That means that two people who do the exact same workout would likely burn different amounts of calories both during and after the session, based on differences in their gender, age, physiology, training status, and lifestyle factors such as diet, sleep, and stress. Keep that in mind next time you hear that a certain workout or exercise will burn X number of calories, or when you look at the calorie counter on your treadmill or exercise app. Chances are, [it’s not accurate for you](https://breakingmuscle.com/fitness/tabata-training-and-the-myth-of-the-4-minute-workout).

**The Root of the EPOC and Intervals Myth**

The magnitude of EPOC increases exponentially with increased exercise intensity for the same distance or time.[1](http://www.academia.edu/download/5114409/effect_of_exercise_intensity__duration_no_epoc.pdf) In other words, **if you run five miles in 25 minutes, you are going to get a larger EPOC effect than if it takes you 50 minutes** to run those same five miles. If that’s the case, it would make sense that intervals, which are performed at a much higher intensity than continuous cardio (also known as steady-state cardio), would have a much greater EPOC effect.

That idea has been suggested as one reason for the similar weight or fat loss observed between interval training and continuous cardio, despite the much lower exercise volume needed for intervals to achieve those results. As interval research became more well-known, the idea of a greater EPOC effect became more widely publicized.

Although this explanation makes logical sense, studies that have directly investigated EPOC between interval training and continuous cardio don’t exactly back up the theory, especially when you consider the research in terms of its real-world application.

**What Does the Research Say?**

Studies have shown that when energy expenditure is measured for several hours after a training session, **intervals and continuous cardio burn about the same amount of post-exercise calories.**

Three studies found that participants burned a similar number of calories in the hours after they did either interval training or steady state cardio, but the interval session only required 20 total minutes (only about 2-10 minutes of high intensity exercise) while the steady state cardio session lasted for 30, 50, or 60 minutes.[4](http://journals.humankinetics.com/doi/abs/10.1123/ijsnem.22.4.276),[5](https://www.researchgate.net/profile/Lauren_Skelly/publication/261952856_High-intensity_interval_exercise_induces_24-h_energy_expenditure_similar_to_traditional_endurance_exercise_despite_reduced_time_commitment/links/004635367a42407f8f000000.pdf),[6](https://www.researchgate.net/profile/Brendon_Gurd/publication/258334395_Changes_in_mechanisms_proposed_to_mediate_fat_loss_following_an_acute_bout_of_high-intensity_interval_and_endurance_exercise/links/0f31753c7e39e15a8f000000.pdf)

Another study matched the exercise bouts by duration, so participants did about 45 minutes of interval training, 45 minutes of resistance training, and 45 minutes of continuous cardio. EPOC was higher after interval and resistance training than continuous cardio, with participants burning about 12 calories per hour more after intervals compared with continuous cardio.[7](http://www.tandfonline.com/doi/full/10.1080/02701367.2014.999190) Of course, one of the major benefits of interval training is the ability to get similar fitness improvements and weight loss results with a much shorter exercise time than steady state cardio, so **matching the duration of the interval session with continuous cardio sort of defeats the purpose** in terms of the way people actually exercise in real life.

Based on those studies, it does appear that interval training has a greater capacity to induce EPOC than continuous cardio. It only takes a relatively short time for intervals to create the same amount of EPOC as continuous cardio, although the exercise needs to be done at a much higher intensity to get that effect.

**Where Research Meets the Real World**

**But now let’s think about this in terms of its practical implications.**I’ll use the data from the Skelly study[5](https://www.researchgate.net/profile/Lauren_Skelly/publication/261952856_High-intensity_interval_exercise_induces_24-h_energy_expenditure_similar_to_traditional_endurance_exercise_despite_reduced_time_commitment/links/004635367a42407f8f000000.pdf) as an example. In that study, participants breathed through a mouthpiece, and their exhaled air was analyzed to measure oxygen consumption and calculate their energy expenditure. Expired air was collected every few hours over a 24-hour period, including for one full hour during which participants rested or exercised. During that hour, they either rested for the entire hour, rested for 10 minutes and then cycled for 50 minutes continuously at a moderate intensity, or rested for 40 minutes and then did 10 x 60-second high intensity cycling intervals with 60 seconds’ rest in between. During those one-hour periods, here’s the average number of calories they burned:

* Rest: 125 calories
* 50min cycling: 547 calories
* 20min intervals: 352 calories

**Over the full 24 hours (including the exercise period), here’s approximately how many calories they burned:**

* Rest: 3005 calories
* 50min cycling: 3464 calories
* 20min intervals: 3368 calories

These participants burned more calories during 50 minutes of continuous cycling than they did during the 20-minute interval session, and they burned more total calories over 24 hours when they did continuous cycling. **The difference between continuous cardio and interval training in this case is only about 100 calories over 24 hours.**More importantly, as you would expect, both continuous cardio and interval training burned more calories than not exercising at all (about 350-450 extra calories over 24 hours).

So you’re probably going to burn a similar amount of calories if you do a short but very intense interval session, or a long, moderate intensity cardio session. If you do a long interval session, you should get a bigger EPOC effect than if you did the same duration of moderate intensity cardio, but remember that intervals need to be performed at a very high intensity to get the benefits. I wouldn’t recommend stretching an interval session past about 20-25 minutes, because most people won’t be able to maintain the necessary intensity over that amount of time.

To be clear, **I’m not trying to discourage anyone from interval training.**Intervals have been shown to be a very time-efficient way to increase fitness and promote weight and fat loss. The mechanism for that just doesn’t seem to be extra EPOC, as has been commonly suggested. Other suggested mechanisms for [the benefits of interval training](https://breakingmuscle.com/learn/the-fast-way-to-long-health-move-really-quickly) are hormonal and/or appetite changes that promote fat burning and decreased calorie intake, and/or an increase in the body’s ability to preferentially use fat as a fuel.[6](http://www.researchgate.net/profile/Brendon_Gurd/publication/258334395_Changes_in_mechanisms_proposed_to_mediate_fat_loss_following_an_acute_bout_of_high-intensity_interval_and_endurance_exercise/links/0f31753c7e39e15a8f000000.pdf) Any of those could result in weight loss over time.

**Why Does It Matter How They Work?**

The reality is that many people struggle to lose weight, and misleading messages from the fitness community (especially when they appear to be backed by research) only exacerbate that struggle. In my experience, **too many people get bogged down with calorie counting or performing the “right” type of exercise, and end up sabotaging their own weight loss efforts.**

For example, I once had a client who had been trying to lose weight for a long time before she came to me. She thought she was doing the right things: counting her calories using an app, and going several times a week to a fitness class that advertised “high intensity intervals for maximum fat burning”. The instructor told her that she was burning 800 calories during the 30-minute class, and that she would keep burning even more calories for the next 24 hours. Of course, that instructor had no way of knowing how many calories she had actually burned during the class, and I would bet that it really wasn’t anywhere near 800. In any case, it sounded great to her, and she would go home and enter into her app that she had burned 900 calories that day from exercise (adding 100 calories to the 800 from the class to take into account that afterburn effect, of course). According to the app, she could now eat more and still maintain a calorie deficit. You can probably guess whether or not she lost weight that way.

**That kind of transaction mindset, where you earn food based on calories you’ve burned with exercise, is a recipe for failure.**

I also had a client refuse to do continuous cardio because he was afraid it would cause him to lose muscle and make him look like a marathon runner. That’s ridiculous, and it’s another example of how[the fitness industry confuses and overwhelms people](https://breakingmuscle.com/learn/how-sports-performance-can-fix-functional-training)until they don’t know what to do. To be clear, I never suggested to that client that he should be running marathons, only that he should work up to being able to run continuously for 30 minutes.

**Don't Overthink Your Cardio**

One exercise isn’t “better” or “worse” than another. People claiming that interval training is flat-out better than steady state cardio (or that steady state cardio is bad for you), and using EPOC to back up that claim, are mistaken, and it’s a problem. **Pitting one form of exercise against another just makes it more difficult for people to do the right thing,**which is to find a type of exercise that you enjoy, that’s appropriate for you and your individual goals, and that [you can maintain over time](https://breakingmuscle.com/fitness/changing-your-life-is-not-a-45-day-challenge).

Interval training can be great for you. So can continuous cardio. Any type of physical activity that you can perform safely is great for you. Do one or the other, or do both. Just do something and don’t worry about what’s going to burn more calories, or if this exercise is better than that exercise. Don’t overthink it. **Find what works for you, and get moving!**

**Source**: https://breakingmuscle.com/fitness/the-myth-of-interval-training-and-epoc



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Strength and Conditioning