



Staying Power: New Methods for Training Endurance Athletes

by Nathaniel Mosher

One of the biggest problems with strength training for endurance athletes is the following question: should I train like a strength athlete or like an aerobics instructor, or do I just skip the weights altogether? Most of the time, you'll see runners training with weights one of two ways:

- like a bodybuilder
- like a wimp, meaning they will lift the five-pound dumbbells ad nauseum, thinking it is creating endurance.

Let me state for the record that both methods are completely wrong. Big surprise there, right? There is a lot of research regarding strength training for endurance athletes out there, but you must be selective in where you look. Some of the top sports scientists in the former Soviet Union and East Germany looked into the proper methods of endurance. And while your local Road Runner club president might think he knows the right way to train for runners, I'm willing to bet he doesn't.

So just what have these scientists and coaches found? We'll get to that in short order. Let me first give some definitions of strength endurance. Yuri Verkhoshansky, a top athlete and strength researcher from the Soviet era, describes strength endurance as "involving muscular tension without a decrease in working effectiveness over a long period of time." Thomas Kurz takes a similar approach when he talks about "the ability to continue work for a required time without lowering the quality of work." Notice here the common theme of "resisting fatigue," which is the primary goal of endurance training. After all, if you are fatigued after 15 minutes, you're not much of a runner, are you?

Endurance Performance Factors

The physiological factors most often affecting the endurance athlete are categorized into local endurance and general endurance. Local factors affecting endurance include the strength of a particular muscle group, the energy stores in a particular muscle group (i.e., muscle glycogen, fatty acids, phosphate compounds) and the density of capillaries in a particular muscle.

General muscle endurance factors include the strength of all muscles involved with the activity, the energy stores in the muscles involved, cardiorespiratory factors (i.e., stroke volume, blood vessel integrity, Max Vo₂, etc.) and homeostatic factors that play an essential role in any anaerobic activity (i.e., buffer capacity of blood, ability to tolerate high acidity in the blood).

This stuff makes sense, right? You have to develop endurance in the proper muscles needed for your activity, and you need to make sure all of these muscles can perform for the entire duration of your event, otherwise you will still be limited by your weakest link. Remember, our chain is only that strong.

Hitting the Weights!

So, for the average long-distance runner, just what should that person be doing in the gym? German scientists have utilized two basic strength training programs with their athletes for years with great success. These two basic methods of strength training are known as the extensive interval method and the intensive interval method. Each method has a slightly different focus, and endurance athletes looking for an edge to their performance should utilize both.

The extensive interval method is used primarily for athletes needing to acquire high endurance capacities within a given unit of time. This method increases the athlete's ability to resist fatigue during lengthy activities such as marathons. To train with this method, there are a few guidelines you need to know.

First, all weight training sessions should be performed in a "circuit" format, whereby you train on one exercise, rest, then move to exercise #2, rest, exercise #3, etc. until you have completed all of the exercises for that day. You then repeat the circuit three to six more times. This is critical to perform since "station" training will not be as effective. Station training refers to training one exercise

completely before moving to the next exercise, similar to how most bodybuilders train. Remember your goals: you are not training for a bodybuilding contest, therefore your training should not resemble theirs.

You will also be training the entire body each session. This promotes a greater release of growth hormone and increased levels of lactic acid production, which will enhance the body's ability to remove this waste product when competition arrives.

Extensive Interval Method Guidelines

Resistance	Reps	Sets	Rest Interval	Set Speed	Rest Between Circuits
30-40% of max.	20-30 sec., (set lasts ~60 sec.)	3-6	60 sec.	Brisk with emphasis on exploding on the concentric	3-5 min.

The intensive interval method is most effective with helping to improve resistance to fatigue during short-term muscular endurance training of medium to high intensity. This format will help endurance athletes to generate high-endurance performance by exploiting both the aerobic and anaerobic energy systems. Theory points to the fact that the arteries are blocked during the contraction phase of the exercise and the relatively short breaks involved. The volume for this format is slightly lower than with the extensive interval method, owing to the increased intensity levels.

Another important aspect of the intensive interval method is the regulation of repetitions. For this method, we will be concerned with time and not numbers. You will perform reps for 20-45 seconds, with 30-second sets being the average. You need to time yourself somehow; a digital timer on your watch with a countdown function works best in this regard. Don't worry about the number or reps you complete, just keep repping until the time limit is up.

Intensive Interval Method Guidelines

Resistance	Reps	Sets	Rest Interval	Set Speed	Rest Between Circuits
50-60% of max.	20-45 sec., 30 sec. is optimal	3-6	10-30 sec.	Explosive, focus on fast concentrics	1-3 min.

So What's The Plan?

To periodise these methods, you should focus on the extensive interval method during most of your pre-competitive phase, adding in the intensive interval phase just before your competitive season. Even long-distance runners need to do this, as the intensive interval method will help the athlete with the "burst" needed at the end of a race. Be careful with your planning for each method, since overtraining is a distinct possibility when dealing with strength training and long-endurance training.

The main method of structuring your training program using these methods will depend on your chosen sport, but I can present a few guidelines to help you get started. Remember to adjust the parameters presented above based on your athlete's current abilities and future goals.

The Extensive Interval method is used most often in the preparatory phase of the training cycle. It will prepare the athlete for the necessary utilization of glucose for exercise. Some research also suggests that this method of training increases the number of mitochondria as well as the density of capillaries in the worked muscles. This method is favored by athletes in cyclic-types of sports (e.g., cross-country skiing). In this case, repetitions may be increased to 100 or even close to 200 per set.

The Intensive Interval method would primarily be used in the pre-competitive phase of training for athletes involved in acyclic types of sports (e.g., wrestling). You may begin their preparatory phase with extensive interval work and then shift to the intensive method as you close in to the season. To preserve strength during the season, you would drop the intensive method and rely on wrestling matches to preserve anaerobic endurance.

Sprinters Take Note!

These methods are also useful for track work; the same general principles apply as with the weights. I've presented a chart below for an advanced sprinter that may run the 100, 200 or 400 meters. Notice the similarity in intensities and repetition as we discussed with the weights.

Distance	Running Speed	Break (jogging)	Repetitions
Extensive Interval			
100m	15-14 sec.	60-45 sec.	20-40
200m	33-29 sec.	90-45 sec.	40-50
400m	72-60 sec.	120-60 sec.	16-20
Intensive Interval		(jogging/walking)	
100m	13,5-12.5 sec.	180-90 sec.	8-12
200m	28-26 sec.	200-150 sec.	8-10
400m	66-58 sec.	300-180 sec.	8-10

Table from Schmolinsky 2000

Breaking Away From Tradition...Thankfully!

These routines may seem "different" when compared to what's out there currently, but in many cases, different is what is needed! Ask yourself if your current weight routine has been making any difference in your runs, and then take the chance to try out these methods.

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