

Strength Training and the Endurance Athlete

Which mode is the most effective?

Training for a long event requires a great deal of time commitment throughout the week. As a strength coach, it is my responsibility to assure that time spent in the gym -and away from the pool or the pavement- is of the highest value. If the exercise provides no benefit to the athlete, it can- and should be- dismissed as frivolous. This leads to the question, *what is* effective strength training for an endurance athlete, if it exists at all? At this point, I feel it is vital that we all take a step back and look at the whole picture. Before we can talk about what the endurance athlete should do, let's look at the world of strength training in some of its myriad of forms.

1. **Body Building-** ("hypertrophy") If I say "weight lifting", you may picture Arnold Schwarzenegger. Body Building is a form of weight lifting that strives to create large, symmetrical muscles. Body builders perform isolated lifts (one muscle group at a time) using high weights and moderate (6-8) reps. "Sculptors" loosely fall in to this category as they are also lifting weights for the primary intention of creating definition. In both cases, exercise selection is based on aesthetics over function. Generally, little emphasis is placed on cardiovascular fitness, therefore it is highly unlikely that you will see these folks at the start (and certainly not the finish) of an endurance event.

2. **Power Lifters-** ("max strength") Three exercises, as heavy as possible. Squat. Bench Press. Deadlift. These guys (and gals) are strong by the literal definition of the word – seeking the maximum weight in one repetition. Conditioning is centered around these three lifts, utilizing complementary training in order to further enhance their strength. While there are many "big" athletes in this arena, I knew a Power lifter who was 5'6" and 165 pounds that could out-Deadlift everyone else in the gym. Cardiovascular conditioning depends on the athlete, but- considering that they are not specifically trained for endurance- don't expect top finishes from them in the next Olympic tri.

3. **Olympic Lifting-** ("explosive strength/power") Wikipedia sums it up nicely "In comparison with other [strength sports](#) which test limit strength (with or without lifting aids), Olympic Weightlifting tests aspects of human ballistic limits (explosive strength) and are therefore executed faster - and with more mobility and a greater range of motion during their execution - than other lifts." ¹(Olympic lifters have incredible range of motion and body awareness. While very strong, they must also be very flexible in order to properly execute the Snatch and the Clean and Jerk. Of the 3 styles of strength listed so far, Olympic lifters may have some of the

¹ http://en.wikipedia.org/wiki/Olympic_weightlifting

greatest balance between strength and cardiovascular fitness. Generally, they require functional movement in order to perform their event safely. They may or may not perform in an endurance event, but I would be willing to assume that they could at least tolerate going for a run.

4. **Functional Training-** (“real world conditioning”/injury prevention”)- Exercise is based on real world/sport specific movement. Generally, training is built upon the athlete's needs for balance, symmetry, joint mobility/stability. Functional training's roots are in physical therapy, therefore it tends to have a heavy emphasis on injury prevention and rehab (though one does not require an injury to utilize the training). Sets, reps, weight, and volume become secondary to *quality* of movement. Further, experts in functional training are constantly evolving the field to improve transference between exercises and sport. Currently, you may read about athletes of every caliber from Olympic athletes to weekend warriors who use functional conditioning to not only reduce their chance for injury, but to build strength for improved performance.

5. **General Strengthening-** (“Overall fitness”)- Ok, this is not really a category, technically. You may consider this "gym lifting". Average exercisers as well as athletes enter a gym and pick exercises to perform based on various goals. Maybe the machines, maybe free weights. The goal could be to “get toned”, “lose weight”, or “feel better”. Sport specific exercises may or may not be included, depending on the exerciser. Essentially, this covers everything that does not fall specifically into one of the other 3 categories. You could very well be lined up next to someone who performs general lifting at your next race; however, there are several recent studies that indicate that strength conditioning does little to enhance endurance performance. This is a controversial topic amongst coaches and athletes. What is important to note is that many of the studies investigate strength conditioning that is not specific to an endurance athlete’s needs. For example, a cyclist who performs 6 weeks of leg curls on a machine is not very likely to note major improvements in overall power output on the bike. The field of exercise science is rapidly evolving, both in research and application. For the immediate future, we must apply science and a little bit of art to create the right conditioning for optimal endurance performance.

With the areas of strength training defined, let’s reconsider the endurance athlete. In order to determine the most effective course of action, we must first address an endurance athlete’s needs. There are many needs; but, for now, we will look at three.

1. **Economy of movement-** When attempting to move for long periods of time- whether an hour or 12 hours – you want to go as fast as you can while using as little energy as possible. You want to be *efficient*. This requires maximizing your technique in your event. For example, triathletes are skilled at swimming, biking, *and* running. Unfortunately, most of us are not born athletes. In fact,

many current endurance athletes enter their sport later in life. Most of us are learning how to swim, bike, and run after sitting at desks, behind computers, in front of TVs, and in cars. These seated, sedentary activities put us in compromised positions that take away from our economy of movement. Sport specific drills can aid in overcoming poor posture while in the pool or on the pavement. Conversely, sitting at a leg press machine encourages more sitting- more compromise. Ironically, while sedentary activities encourage a forward, crouched, position, sitting on a bike further encourages a forward, crouched position. Properly selected functional exercises can help to offset these potentially damaging postures, thereby giving you the freedom to continue your sport specific training.

2. **Cardiorespiratory fitness**- Your heart and lungs need to move oxygen to your muscles. Your muscles need to be able to use as much of that oxygen as possible to generate movement. Obviously, you should train *in* your sport to further improve your cardiorespiratory fitness *for that sport*. Sitting on a leg press will probably not help you as it has minimal sustained impact on your breathing. On the other hand, kettlebell swings- famous for developing powerful glutes, rock hard abs, and stable shoulders- are so demanding that a recent study in the Journal of Strength and Conditioning Research stated that “continuous kettlebell swings can impart a metabolic challenge of sufficient intensity to increase Vo2max” (Farrar RE, 2010 Apr) (More information on kettlebells will come in future articles.)
3. **Resilience**- Some may refer to injury prevention; however, this simplifies it to a matter of “pre-hab” and re-hab. The concept of resilience is more global; based around the idea of being able to consistently train, and recover, while staying free of injury. An endurance athlete must be able to survive not just a day or week of training, but a demanding race season that involves cumulative hours of repetitive motion and high impact. For example, a major area of potential concern is the eccentric loading that occurs with high volume run training. Eccentric loading is, essentially, your body actively slowing itself down. This happens with every single stride that you take in a run- you land on one leg, “catch” yourself, and then push off. The “catch” is the eccentric action. This is a moment in your run of very high force. All other biomechanical issues aside, your joints, ligaments, tendons, bones, and muscles need to be capable of handling this force or you can become prone to injury and fatigue. One of the best ways to re-coup from the prior season and prepare for the following season is to spend the off-season conditioning the body to accept those eccentric loads. Certain functional exercises, particularly explosive power moves, are specifically designed to build your body’s resiliency, without the constant pounding of running.

Let us return to the original question, what is *effective* strength training for an endurance athlete? Clearly, body building is out. Isolating muscle groups and building mass-while giving you nice arms-will do very little to enhance your speed on the race course. Power lifting? Again, it likely will not improve your speed. (There are aspects of power lifting that are highly valuable for strengthening, but we will save that for another article.) Olympic lifting requires mobility, stability, explosive strength, mental focus, and body awareness. Is it perfect for endurance athletes? In part; unfortunately, the skills required to perform the movements are so demanding that the time spent training for them could detract from other aspects of conditioning. Clearly, generic gym lifting is ineffective for improving speed. The perfect answer is that there is no one answer. A cookie cutter approach does not address the individuality of the athlete. A human body contains a great deal of potential. Most of that potential will be expressed on the field, on the road, or in a pool. However, if the human body is incapable of moving functionally, that potential will never be fully realized. Functional training will begin the process. A focused blend of body weight exercises, explosive moves, and mobility drills will progress the athlete in developing to their maximum potential.

A well-developed strength plan does not need to be complicated. Push-ups are functional. Pull-ups are functional. Monkey bars, planks, swim drills, run drills, stretching, foam rollers, therabands- all functional. Simple acts of jumping, hopping, and throwing, add power. Each exercise is easily accessible and costs little to nothing. All that you need to do is understand what your needs are and which tools will address them.

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