

Benefits of Strength Training

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FITNESS

THE BALANCE OF PHYSICAL AND MENTAL HEALTH THAT KEEPS ONE ACTIVE AND INJURY-FREE.

- ❖ STRENGTH
- ❖ ENDURANCE
- ❖ FLEXIBILITY

These three components of a training program are all necessary for fitness. For our purposes here, fitness refers to the balance of physical and mental health that keeps one active and injury-free. If any one of these three elements of fitness is missing or lacking, an injury is likely.

Strength is our focus here.

Running addresses the endurance component of fitness but not strength. For muscles to increase in strength, they must be

exposed to overload, variability, and specificity.

Overload is a gradual increase in resistance. In order to change your body, you have to work out hard enough for your body to react to the stress of the exercise.

Once you've been following a strength training routine for several weeks, you will begin to plateau (achieve marginal strength gains). At this point, your routine needs some **variability**. Over time, your body will adapt to familiar stresses. The body must be challenged in a different way to continue progress.



Specificity is also important for the runner. Your body will respond to certain exercises in certain ways. You need to exercise the muscles used in running in a way that mimics running.

Using these principles to increase your strength will not only improve your running, but will decrease your likelihood of an injury.

Muscle imbalances are at the top of the injury instigator list. Strengthening muscles appropriately is one of the easiest and most important things you can do for injury prevention.

ENDURANCE ATHLETE

As you train for this marathon, your legs will endure hundreds of miles of running. Although it seems that using your legs so much would increase their strength, the opposite actually occurs.

As you run, your muscle mass decreases. This means that your legs will actually weaken with

endurance running if you don't supplement with strength training.

Weakness leads to muscle imbalances and injuries.

So, what do you need to do to prevent this viscous cycle? A few easy exercises are enough for maintenance level injury prevention.

Your workout should be short in duration for two reasons. First, long workouts will fatigue your legs for running. Second, marathon training already takes a lot of time and there are only so many hours in the day. Efficient, quality workouts are more beneficial and more realistic.

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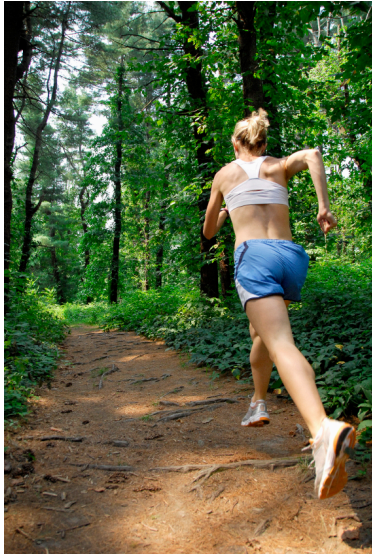
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9 MORE REASONS TO STRENGTH TRAIN

As an endurance athlete strength training is critical, but in reality, every adult can benefit. Here's how:



1. **Decrease Muscle Loss.** Without strength training, adults lose five to seven pounds of muscle mass each decade because of decreased activity levels.
2. **Improve Metabolism.** People assume metabolism slows as age increases. In fact, it slows because inactivity leads to muscle loss, and less muscle means slower metabolism.
3. **Reduce Body Fat.** High body fat is a red flag for heart disease, diabetes, cancer, and most other preventable diseases.
4. **Increase Bone Density.** The greater your bone density, the less risk you have for osteoporosis.
5. **Improve Glucose Metabolism.** Poor glucose metabolism is correlated with adult onset diabetes.
6. **Decrease Blood Pressure.** High blood pressure is correlated with heart disease.
7. **Improve Cholesterol Levels.** Strength and endurance exercise both improve cholesterol levels.
8. **Decrease Low Back Pain.** When done correctly, proper strength training programs improve chronic back pain.
9. **Lessen Arthritic Pain.** Stronger muscles, bones, and ligaments all contribute to decreased arthritis pain.

INJURY PREVENTION

Muscles hold our bodies together. Joints, in particular, need healthy, strong muscles for proper motion and stability. Unfortunately, muscle imbalances and weaknesses usually aren't evident to a runner until an injury develops. Pain may be experienced in the muscle itself or within nearby joints.

Knee problems, for example, plague thousands of runners each year. Although it's the knee that hurts, this

joint is rarely the actual problem. Let's explore further by reminiscing about tug-of-war. Two people pull on a single rope. When they pull evenly, the rope undergoes equal forces and remains still. As soon as one tugs harder, the forces become unequal and the rope shifts.

Now the knee – muscles surround the knee front and back. These muscles play tug-of-war by producing even forces, keeping the knee stable. As

soon as the delicate balance between muscle groups is disrupted by weakness, forces are distributed unevenly through the joint. Pain results, and although the knee hurts, the problem actually exists in the muscles surrounding the knee.

This is just one of many examples of why maintaining muscular strength and balance is critical for the runner. Strength is the best tool you have for injury prevention.

BE CAREFUL

The following strength exercises are only suggestions and are meant to be a general guide. Each individual athlete has his or her own strength imbalances and pre-existing injuries. Although these exercises will be very

beneficial to many, some will be inappropriate for certain individuals. Many injuries and imbalances should be treated by a professional first – before implementing strength training.

Any change in your strength training should be done cautiously and gradually. If you have any questions, immediately speak with your coach, strength trainer, or a qualified physician.

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STRENGTH TRAINING FAQ'S

DOES STRENGTH TRAINING IMPROVE YOUR ENDURANCE?

Opponents of strength training say no. They say that only long slow distance running will improve your muscular endurance. Strength training only improves the strength and power of your muscles, not their endurance. Surprisingly enough, there is agreement on this point. Strength training proponents agree that strength training and plyometrics do little to directly increase your endurance. They think that endurance may be increased indirectly through running economy, but agree that pure cardiovascular endurance is not significantly affected. However, proponents also point out that endurance is not the goal of strength training.

- Current research agrees that cardiovascular endurance and strength training don't go hand in hand.

DOES STRENGTH TRAINING IMPROVE YOUR VO2 MAX?

Just as with endurance, the opponents say that strength training will not increase your VO2 max or your body's ability to deliver and use oxygen to produce energy aerobically. Only running – both long slow distance and shorter intense training – will improve your VO2 max. A French study from 2002 agreed that concurrent strength and endurance training had no effect on VO2 max.

Both the proponents and scientific research agree that strength training and plyometrics don't do a whole lot to improve your VO2 max.

- Strength training does not make any significant improvements in VO2 max.

DOES STRENGTH TRAINING IMPROVE YOUR RUNNING ECONOMY?

Running economy is a measure of how efficiently you run. There is no debate among the two groups about the value of running more economically. What is in debate is whether or not strength training will improve your running economy more than pure running. Opponents say that your time is much better spent with running more miles rather than strength training. If you want to become more efficient as a runner you should spend more time running. Not only does additional running make you more efficient but it also makes further improvements in your VO2 max, lactate turn point and endurance.

Now the disagreements start. Proponents of strength training for runners say that strength training and plyometrics will make big improvements in your running economy. They say that the explosive strength and power gained through strength training will decrease your ground contact time, increase your stride length, make your muscle more elastic – so they return more energy, improve your neuromuscular conditioning and make you a more economical runner. Nearly all current research agrees. There have been numerous studies in recent years that have proven the running economy increasing benefits of strength training and plyometrics. A 2008 study conducted in Norway solicited the services of 17 well trained distance runners. Eight of the runners performed a combination of strength training and running while the other 9 performed only endurance training. The group that included strength training increased their running economy by 5% and even more significantly, they improved their time to exhaustion at maximum aerobic speed by a whopping 21.3% without any increase in VO2 max. The endurance only group showed no improvement in either category.

Another recent study, this one from Australia, investigated the effects of plyometric training on running economy. This one, which used 15 highly trained distance runners, came up with similar results. They found that 9 weeks of plyometric training made significant improvements in running economy.

- It appears clear that strength training does improve your running economy.

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STRENGTH TRAINING FAQ'S

DOES STRENGTH TRAINING MAKE YOU MORE INJURY RESISTANT?

Opponents believe that while injuries can't be eliminated, they can be avoided, without the use of strength training, by making gradual increases in both your training volume and intensity of training. They also believe that most running injuries are caused by high intensity running, which can be avoided by doing more long slow distance training and less high intensity training.

Proponents think this is a no-brainer. How can strength training not help prevent injuries? Strength training improves the strength of your bones, tendons, muscles and connective tissues – so it must help prevent running injuries. Again, experts and research tends to agree with the proponents. A 2006 study concerning stress fractures in female Marine Corps recruits concluded that the incidence of stress fractures would be reduced by frequent lower body strength training. Another study from Stanford University found that long distance runners with illiotibial band syndrome have weak hip abduction strength in their affected leg, which could be solved with lower body strength training.

- Coach, experts and researchers all agree that strength training will help you avoid many running injuries.

WILL STRENGTH TRAINING FIGHT FATIGUE?

Strength training opponents point out that running fatigue is due to metabolic conditions such as acidosis, potassium build up and central nervous system fatigue. Only improving your lactate turn point, VO2 max and endurance will fight the effects of metabolic fatigue.

Proponents of strength training concede that there are metabolic causes of fatigue that are best fought off with endurance, lactate turn point and vVO2 max training. But they also say that there are other causes of running fatigue including neuromuscular fatigue, reduced running economy and a decrease in stride length. It has already been shown that strength training will improve your running economy. Strength training will also improve your neuromuscular conditioning by activating more muscle units. A recent study conducted by researchers at the University of Madrid, looked at the stride length issue. In the Madrid study, 18 highly trained distance runners were assigned to one of 3 groups. Group A performed 8 weeks of periodized strength training; group B did 8 weeks of non-periodized strength training and group C was a control group that did no strength training. After a fatiguing running bout it was found that group A showed no decrease in stride length, group B showed a 1.22 centimeter decrease in stride length and the control group B had a 3.05 centimeter decrease in stride length. The researchers concluded that running specific strength training will minimize stride length loss during exhaustive distance running, with periodized running specific strength training being the most efficient method.

- The research seems to back up the proponents claim that running specific strength training will help maintain your stride length and fight the effect of fatigue during races.

DOES STRENGTH TRAINING IMPROVE YOUR RACE PERFORMANCE?

Opponents to strength training claim that the most important variables in running performance are endurance, lactate threshold and vVO2 max. They say that only running will improve those variables and any other type of training is a waste of time. You would be better served by running more than by using your valuable time with strength training. Proponents again concede the point that endurance, lactate turn point and vVO2 max are best improved by running. But they also say that the improvements made to your running economy, injury resistance, speed and power make strength training a critical part of your training. What does the research say? It agrees with the proponents and it has for quite some time. A study conducted in Finland in 1999 investigated the effects of concurrent explosive strength training and endurance training on performance levels. The 9 week study concluded that explosive strength training improves your 5K running time by improving your muscle power and running economy. (continued...)

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STRENGTH TRAINING FAQ'S

What about the time spent with strength training? Does it interfere with or decrease the results of your running workouts? In a practical sense, proponents say no. A running strength training workout can be completed in minutes per day. Another more recent Finish study from 2007 backs up this claim. This study investigated the effects of concurrent strength and endurance training on 25 participants. The 25 participants were split into two groups. Both groups maintained the same total training volume, but one group replaced 19% of their endurance training with explosive strength training. The study found that the explosive strength group improved their neuromuscular conditioning and running economy without any decrease in maximal aerobic capacity despite the nearly 20% reduction in endurance training.

- Scientific data supports the proponents' view that strength training does improve your race performance.

THE BOTTOM LINE – ARE RUNNING AND STRENGTH TRAINING A GOOD FIT?

This is a controversial topic, but I believe the decision is clear – strength training and running are a good fit. The goal of strength training for runners is to improve your running economy, injury resistance, running strength and power. Current scientific research supports these arguments. Research also supports the first two arguments concerning endurance and VO2 max. Strength training does not improve cardiovascular endurance or maximum aerobic capacity. That isn't the point of strength training. You have to run for that!

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Adapted from: Running and Strength Training – Are They a Good Fit? Arguments for and Against

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WRAP UP

Strength training isn't just for building big, bulky muscles. As a runner, it's a critical component to keep you healthy and on the road. If you're new to strength training, be cautious, but don't ignore the importance of this part of your training.

The aforementioned exercises can all be completed at home without any additional equipment. They don't require much time, just discipline. With all the time and energy invested in your training, the additional 15 minutes a few times per week is nothing – especially if it keeps your body injury free.

Please talk to your coach or contact me if you have any questions.

ADDITIONAL STRENGTH EXERCISES

The exercises previously described are designed for injury prevention maintenance. To an extent, these will also be beneficial for improving your performance. For optimum performance, a more comprehensive strength routine is necessary.

This is where individual weaknesses and imbalances become even more critical to determine. Also, incorporating exercises designed for performance need to be carefully added to your training schedule at the appropriate time. Your training is broken up into various phases. Specific strength workouts will be best depending on the phase you are in. Your coach is the best source for incorporating additional strength exercises.

Following are additional exercises that benefit runners. This list is not comprehensive, but is simply meant to be a starting point.

Lower Body

- Leg Press
- Hack Squats
- Dead Lifts
- Good Mornings
- Heel Raises

Core

- Reverse Hyperextensions
- Progressions of Plank and Side Bridge

Upper Body

- Pull ups
- Rows
- Lat Pull Down



Dr. Grace specializes in treating overuse injuries at Active Recovery Boston. She is an Active Release Techniques and Sound Assisted Soft Tissue Mobilization provider and is Biomechanics certified for Ironman Performance Care. Through the NSCA, she is a Certified Strength and Conditioning Specialist. She is also a certified Kinesio Taping practitioner.

Muscle imbalance, scar tissue accumulation, and proper biomechanics are all elements of healthy training. She addresses each of these problems individually and works with you to correct them, preventing future recurrences and injuries.

Personally, Dr. Grace is active in the running and triathlon community. She has completed road races from 5K to marathons and triathlons from sprint to Ironman. Her experiences as an athlete have helped her immensely with regards to understanding, treating, and preventing training related injuries.