

## **Running Specific Strengthening Exercises**

### **1. Introduction & motivation**

To run to your full potential strength is essential for:

1. Running efficiency.
2. Injury prevention.

Strength should be developed only in muscles used for running, therefore developing strength through exercises similar to the running action ensures the right muscle groups are worked on. Surplus muscle bulk will slow the runner down.

As well as strengthening the muscles used to provide the power to propel the runner, running specific exercises work all the muscles used to stabilise the runner and enhance motor control skills for the running action.

These exercises use your body weight as resistance, just as in running, so you don't develop excessive strength and muscle bulk. They focus on producing controlled power as the foot pushes off the ground during the running motion, just what is needed to run fast and efficiently.

Popular strengthening method use free-weights or gym machine weights. Although some free-weight exercises like the single-leg squat can achieve important strength and stability benefits mentioned, the exercises outlined here should be your primary method of strength training because:

1. Very few free weight lifts or weights machines mimic the running action, and certainly cannot reproduce the dynamic reflex actions involved in running.
2. Unless you have a good knowledge of weight training it's hard to know the exact lifts to do to target the right muscle groups.
3. Weights only work on specific muscle groups in isolation, and ignore the complex, co-ordinated motor patterns required for running.
4. Machine weights do not even require you to stabilise yourself, so the benefit of the exercise is reduced further.
5. There's no definitive guide to how much weight to lift and what repetition to develop the right kind of strength for long distance running.
6. There's a large risk of injuring yourself if you haven't done weights before.

Thus, the following set of exercises provides an effective, safe and easy way to develop the right kind of strength needed to run efficiently and with a much lower risk of injury.

They are possibly the most pain free yet effective single way of improving your running. If you work on these you should soon begin to feel like a different runner; more fluid, lighter on your feet and injury free.

### **2. Running kinetics**

As can be observed watching most world class runners, the bio mechanically perfect running action that induces the least stress on all parts of the body, is to swing the leg from the hip so that the toe, knee and hip remain vertically in line throughout the stride. Thus your weight is transferred directly through your leg to the ground and doesn't exert any extra twisting effect on your joints and bones. The hips should not dip left to right. Likewise the shoulders should remain at the same level, back and neck aligned and head held still.

Nearly all leg injuries (shin splints, knee pain etc) are caused by an alignment problem placing extra stress on a part of the leg. These alignment problems are normally caused by weak muscle groups, or an imbalance.

- Undertaking these exercises whilst maintaining the form and body posture as described above will strengthen any weak muscle groups and help ensure you maintain a "stress free" style when running.

For nearly all today's mass participation runners/joggers the foot's impact with the ground occurs nearest the heel first; contact is just in front of a point directly below the hip. As the foot travels under the body, contact is transferred from back to front to drive off on the toes. As the contact moves forwards along the foot, the foot rolls outwards slightly to flatten the arch of your foot, absorbing impact. The weight is then spread across the ball of the foot and toes which the runner drives off.

The opposite happens for faster runners; it is clear to see sprinters land on the ball of their foot first on the outside edge, the foot then rolls inwards and the knee bends to absorb the shock. In fact nearly all elite runners land on their toes, even if competing in races as long as the marathon. (Some appear to be running heel-toe, but this is because the heel drops to gently touch the ground as the knee bends.) Weight is then re-transferred to the front of the foot to drive off the toes just as done with the heel-toe action.

This toe-toe action may seem counter intuitive, especially after years of being sold shoes with enough heel cushioning to give Pavarotti a smooth ride, but trainers were only developed like this at the advent of the running boom and runners who didn't know how to run!

Landing on the ball of your feet allows you to extend your stride length, essential to run faster. It is also a lot more efficient as the energy of impact is absorbed by your calves, Achilles and foot arch, instead of being dissipated by thumping into the ground! Thus this is a much more efficient style of running and it's also less likely to cause serious injury due to the reduced impact.\*

The obvious difficulty with running like this is that it puts a lot of stress on your foot and lower leg muscles. For most runners at our level the muscles haven't been developed with enough strength to maintain this form, style deteriorates and it's more efficient to run heel-toe which won't leave you legless before the end of a run! But, we can all strengthen the lower leg muscles to some extent so less energy is wasted on footstrike, whether heel-toe or toe striker.

- Undertaking these exercises is an excellent work out for the lower leg muscles and you'll soon notice the difference it makes to your stride pattern.

\*It is of course possible to land too high on your toes, minimizing cushioning, and bouncing too much, wasting energy. This places too much stress on lower legs and can lead to injury.

### **3. The exercises**

These are split into two stages. Start by trying the first stage, comprising mainly of static or slow controlled actions. They maybe easy, or very difficult, depending on your current strength levels. When you're able to undertake the suggested number of repetitions of the stage one exercises without straining, you're strong enough to move onto stage two which are more dynamic. If you're carrying any injuries, don't try the dynamic ones until all symptoms have gone.

It takes most people 36-48 hours to recover fully from strength work, so it's best to do them on a day of rest, or easy run. If you try combine strength work with hard running (above the lactate threshold) the effect will be cancelled out, so don't be tempted to do these immediately before or after a hard session, it'll mean both the strength work and run are wasted! Following these guidelines fit them into your training schedule, try to do them at least once a week.

#### **3.1 Stage one**

All the below involve supporting weight on one leg, just as it is during the running stride. They should be undertaken without shoes on and obviously be repeated for both legs!

##### ***Gluteus- bum***

When you stand on one leg, your opposite gluteus muscle works to prevent your hip dropping. If your hip drops this may force rotation of the leg, thus the hip, knee and toe are not inline. Therefore, the first exercise is to strengthen the gluts standing against the wall:

Stand with your feet parallel to the wall ten inches apart, with the foot closest to the wall almost touching it. Lift the knee of the leg closest to the wall so the thigh is horizontal, then bend the outer leg slightly and press the inner thigh onto the wall still holding it horizontal. Hold this position, focusing on pressing the knee against the wall into the wall.

This should be practised until the position can be held for 5mins.

##### ***Lower Leg***

The next set of exercises focuses on strengthening the lower leg muscles which stabilise the leg through the stride. Calf, Achilles, ankles, and foot. All exercises should be undertaken with hip, knee and toe in line vertically.

Balance on one foot, then:

1. With foot flat on floor, bend and straighten leg at the knee maintaining balance.
2. Balancing on ball of foot, bend and straighten leg at the knee maintaining balance.
3. With leg bent at the knee, raise foot from flat onto balls of feet and back again.
4. Hop up and down as high as you can, land on the balls of your feet and aim to land on the same spot, maintaining balance.

For all the above try to reach 3x15-20 with 60 sec rest. Focus on the ones you find difficult if you've mastered the easy ones.

5. With leg bent at the knee, rotate hips from furthest left position to furthest right ~160 degrees and back, whilst keeping knee and toes aligned in the initial direction. Practice until you can maintain your balance and then try balancing on the balls of your feet.

The above exercise aims to strengthen and coordinate muscle groups, so that rotation of the hips about a vertical axis is independent from swinging of leg.

To strengthen the ankles: Lie on sofa/bed on your side with foot protruding over end. Place a thera band (or any strong elastic material) around toes and anchor other end to floor (under sofa/bed leg). Keep leg still and rotate ankles to lift toes. The band should be very tight so 15 reps is to exhaustion. Aim for 3x15 lifts with 60 sec rest. Increase tightness of band to make harder.

Initially these exercises may be difficult; both to coordinate without losing balance, and hard on the muscles. Keep doing them until completely in control and all could be repeated without too much pain!

### 3.2 Stage two

You can now start to work on developing your explosive power. These exercises again develop strength, coordination and motor control. They should be done with maximum explosive effort, whilst maintaining control so as not to lose balance or lapse into poor form. Again the hip, knee and toe should be aligned vertically, back and neck aligned so head doesn't drop. Look forward during the action, and not at your toes!

If you can find some soft grass, it's possible to do these exercises in bare feet, your feet will become much stronger without shoes. Initially if it doesn't feel comfortable try them with shoes on.

As the exercises are more intense, they should not be attempted more frequently than every 36 hours, but you'll see benefits from once a week.

#### The hop

1. Balance on one foot, knee slightly bent, holding the other out behind you as if in the middle of a running stride. Photo A.
2. From this position hop *as far forwards as you can*, using your arms to drive you forwards and for balance. Photos B, C and D.

3. Land on the same leg, leaving your other leg trailing behind you as in the starting position. Photo E.
4. **Hold the landing position for five seconds.** For the first few attempts it will be difficult to land and keep your balance, or if you really push to hop a long distance. Your balance (this strength and coordination) will improve as you practice more.
5. Repeat five times forwards, then turn round and hop back on the other leg. Build up to doing this three times on each leg comfortably, then start trying to increase the distance you hop each time.



E

D

C

B

A

### The leap and hop

1. Stand with two feet together and leap **as far forwards as possible.**
2. Land on one leg in the same position as the first exercise. Photo F.
3. Once you have found your balance, on the same leg hop **on the spot, as high as you can** eight times.
4. Drop to both feet and repeat from 1. eight times forwards.
5. Return on the other leg. Build up to do this three times on each leg comfortably.



F

### The step hop

1. Determine how far you normally hop forwards in the first exercise.
2. Place a flat platform ~12cm high in front of you, 20cm closer than you normally hop.
3. Starting from the position in photo A, hop forwards onto the platform and regain your balance. Photo G.

4. Hop forwards again off the platform as far as you can, but on landing go straight into 3 short, fast hops forwards, not pausing in between.
5. After the third hop jog back to the start and repeat for 1 min.
6. Repeat on the other leg and build up to three sets.



G

All these exercises will probably make you slightly out of breath, but it's not an aerobic work out and you should put maximum explosive effort in, whilst maintaining control, and all the time focusing on leg position and remembering about posture. Your muscles should tire out pretty fast and if you start losing control, stop, and wait until next time to do some more.

Once you feel you've mastered them, you can try the next level of difficulty by landing on the balls of your feet, and holding this position, balancing on your toes.

Have fun, and look forward to faster, more efficient running.