

HOW TO TRAIN TRIATHLON

Triathlon is a demanding multi-discipline sport, calling for high levels of endurance in the water, on a bike and on the road. And, while triathletes spend most of their time swimming, cycling and running, they also need a supplementary resistance-based conditioning programme to enhance overall performance. In this article, Raphael Brandon sets out a programme of strength and conditioning exercises suitable for serious competitive triathletes.

When adding a strength programme to your training routine it is important to consider the following questions:

1. What kind of strength development can deliver a performance improvement? The answer depends on two factors – the strengths and weaknesses of the individual athlete and the nature of his/her sport. Obviously an article like this can only address the second factor, so the programme set out is generic rather than specific. However, it is comprehensive enough to provide a reasonable starting point for a more individualised programme.
2. How will the strength workouts enhance rather than detract from your weekly training schedule? Any serious endurance-trained athlete finds it difficult to commit to – and recover from – extra training time, so a strength programme for triathletes has to yield the maximum results with the minimum expenditure of time and energy.

Strength training can improve performance via two main effects: first, the resultant increase in strength can enhance the skill, power or efficiency of the sporting movement; secondly, it will reduce the risk of injury. When designing a triathlon strength programme, you have to consider whether a performance and/or injury benefit is possible for each of the three disciplines. Once you have done this, you have a rational basis for choosing the best exercises. Based on research and my own experience, I recommend that you target performance for running, and injury prevention for running and swimming (see boxes below).

How strength and conditioning training reduces triathlon injury risks

It is hard to prove that following a strength programme will result in fewer injuries for elite runners, swimmers and cyclists. However, experience and clinical research supports the use of preventive strengthening exercises in specific muscle groups. For example, strength in the calf and anterior tibialis (the muscles at the front and back of the lower leg) has been linked inversely with Achilles tendon overuse injuries.

Core strength exercises are recommended for both running and swimming injury prevention. Balance between the strength of the quadriceps and the hamstrings is recommended specifically for running injury prevention, while good rotator cuff and scapula muscle function is recommended for swimming injury prevention.

Therefore, triathletes should include in their routines exercises for all the trunk and core muscles, rotator cuff and scapula muscles, together with isolated exercises for the calf and hamstrings.

How strength and conditioning training improves triathlon performance

Strength training of the major leg muscles has been shown to improve long distance running performance – specifically running economy – independent of changes in the cardiovascular system. In particular, explosive strength training and plyometric (jumping) training have been proven to be beneficial ⁽¹⁾. The most likely reason for this is that increased strength and recruitment of the major leg muscles boosts the efficiency of the running action. The strengthening of the tendon due to the ability to create a better 'leg spring' may also play a part. Therefore triathletes should include strength and jumping exercises for the major leg muscles in their programmes.

Elite swimmers do perform strength training, but the leg strength exercises that boost power during the dive start and push off the wall in the turns for events in the pool are irrelevant for triathletes, who swim in open water. Core strength, particularly trunk rotation, is recommended for swimming performance, as is upper body strength work to increase the power of the arm pull ⁽²⁾. However, it could be argued that increased upper body force may not improve the efficiency of the swimming stroke in long-distance swimming. Some swim coaches are concerned that 'muscling' the stroke will create extra drag around the swimmer, which is counter-productive. Therefore, triathletes should include core strength and trunk rotation exercises in their programmes, focusing only on the exercises that are most likely to benefit swim performance.

Elite road cyclists perform little strength training. In fact, it has been shown that elite cyclists have quite high maximal strength of the quadriceps compared with untrained adults of a similar age ⁽³⁾. This suggests either that they are naturally strong in the legs, or that cycling training produces a strength training effect in the legs. This may be because of the high-force activities that occur naturally in cycle training and racing, including pedalling in high gears, pedalling up hills and intermittent sprinting. The inference is that leg strength training is unlikely to have any performance benefit for road cyclists. Upper body strength training will be detrimental if it increases muscle mass, as this will slow you down. In summary, triathletes don't need to perform any strength exercises specifically for cycling. Any leg strength training gains will occur as a side benefit of the leg exercises chosen for distance running.

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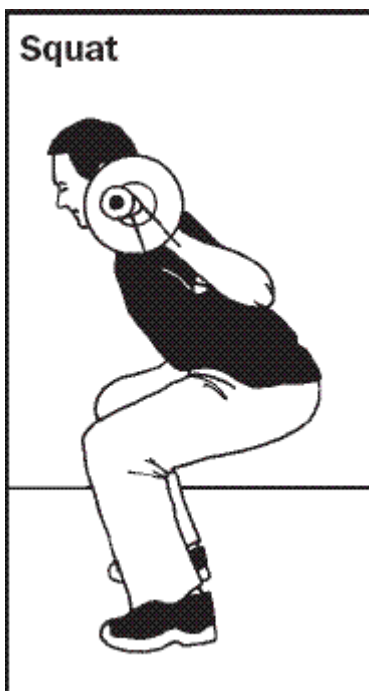
The tables that follow set out four routines that make up the whole strength and conditioning programme. When you put all the routines together, you will find at least one exercise targeting each performance or injury prevention benefit for triathlon. Each routine includes no more than six exercises that should be completed once a week. Strength routines 1 and 2 take about 45 minutes, while the core and jumping routines should take around 20 minutes. This level of time investment is realistic for athletes and allows for a beneficial rather than a tiring effect.

Strength routine 1

Squat *Strengthens the quadriceps, gluteals and trunk muscles and helps strengthen the legs for running, enabling better control of vertical landing forces. Good squat strength may also help prevent knee injury.*

This is performed with a barbell placed across the back of the shoulders. Start with feet shoulder width apart, toes pointing out slightly. Take a deep breath and squat down, taking the hips backwards and feeling the weight pressing down through both heels. Lower yourself to a knee bend of at least 90° (see picture below), ideally with the thigh parallel to the ground to ensure optimal gluteal activation. Return to start position while breathing out – this helps support the spine. Start by mastering the technique with 3-4 sets of 8 repetitions with a light bar. Progress to 4 sets of 5 reps with 2-3 minutes' recovery between sets. Aim to increase the weight you can lift for 5 reps.

Squat

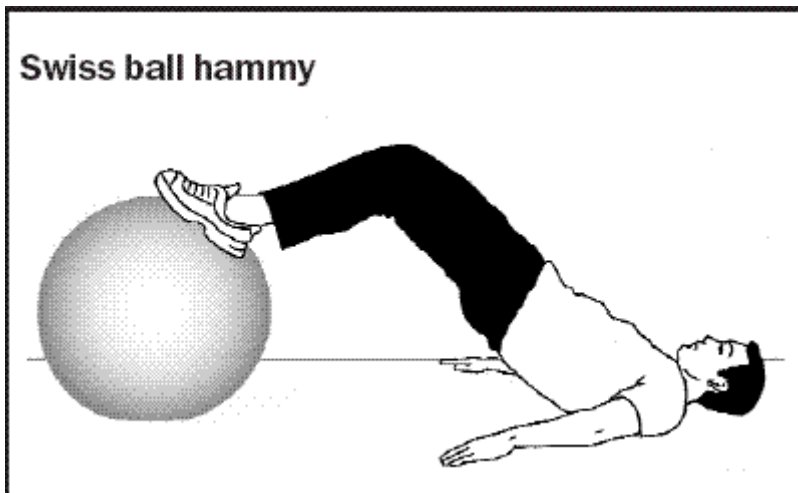


Swimming Article

Swiss ball hammy *Strengthens the hamstrings specific to the running action – with the foot in contact with a surface and the hamstrings acting to extend the hip. Also strengthens the trunk and hip muscles.*

Perform this exercise with the soles of your feet on a Swiss ball and your back on the floor. Start with the whole back on the floor, knees slightly bent, with legs up on the ball. Push down through the feet into the ball, pushing the hips up at the same time. Lift hips until there is a straight line through the knee, hip and shoulder, keeping upper back and neck on the floor. Lower down slowly until hips just touch the floor, then repeat. Start with 3 sets of 10 reps with two feet on the ball. Increase to 3 sets of 20 reps. Progress to 3 sets of 5 reps with one foot on the ball. Increase to 3 sets of 15 reps as you get stronger.

Swiss ball hammy



Rear sling *Strengthens the shoulder and rear rotator cuff muscles and so helps prevent swimming injury. It can also be performed standing on one leg to challenge core stability.*

Perform with a pulley machine, using a handle attached below hip height. Stand with good posture, holding the pulley handle across the body, palm facing back, a slight bend fixed in the elbow. Using only the shoulder, and keeping the elbow stiff, pull the arm up, across and out. The finish position is with the hand above the head out from the body, palm facing forwards. Retain good posture, without using the trunk or rotating the body during the movement, and finish with shoulders wide and relaxed. Use 2-3 sets of 8-10 reps, aiming to increase the weight lifted for 8 reps.

Front sling *Strengthens shoulder and front rotator cuff muscles and so helps prevent swimming injury. It can also be performed standing on one leg to challenge core stability.*

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This is the opposite of the rear sling. Start with the pulley handle attached above head height, holding the handle, arm away from the body, palm facing forward. Pull the arm down and across the body, finishing with the hand by the opposite hip and palm facing back. The same coaching points apply as for rear sling. Use 2-3 sets of 8-10 reps of this exercise. Aim to increase the weight lifted for 8 reps.

Trunk twist standing *Specifically recommended for swimming trunk rotation strength, as it is performed with the body in an extended position, similar to that used in swimming.*

Stand with broomstick or barbell attached to a long resistance band at one end, feet shoulder width apart, knees soft, with good back posture. Then rotate shoulders, pulling on the band. Focus on the trunk muscles to rotate rather than pushing the bar around with your arms. Keep hips facing forwards throughout. Complete 2-3 sets of 8- 10 reps to each side. Increase the strength of the band as you gain strength.

Single-leg calf raise *Specifically strengthens calf muscles to help prevent lower leg running injuries. It can also be performed barefoot to target the foot muscles as well.*

Stand on one leg, with the ball of the foot on a small step. Start by lowering the heel until you feel a little stretch in the calf, then push up onto the ball of the foot. You may need to hold onto something for balance, but do not push yourself up with your hands. Complete 3 sets of 10 reps. Increase to 20 reps, then begin to add weight. Use a barbell or a calf raise machine.

Strength routine 2

Step-up *Strengthens the quadriceps, gluteals and hip muscles and is excellent for running, increasing both leg strength and stability.* Start with a barbell across your back, with one foot on a step, high enough to ensure your knees and hips are bent at an angle of around 90°. Push down through the heel of the foot upon the step and extend the leg, rising up onto the step. Then lower down, taking all the weight back onto the same leg, leaving the foot on the step. When the support leg touches down behind the step, begin to push up again. In this way most of the work is done with the leg on the step. Start by mastering the technique with 3-4 sets of 8 reps, progressing to 4 sets of 5 reps with 2-3 minutes' recovery between sets. Aim to increase the weight you can lift for 5 reps.

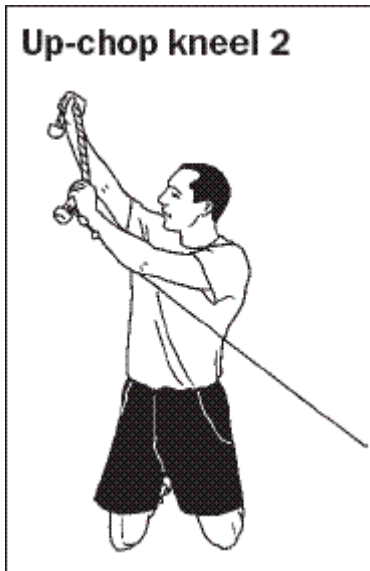
Russian hamstring curl *Develops excellent hamstring strength, which specifically helps the running in terms of injury prevention and increased propulsion forces.* Start in the kneeling position with a partner pressing down firmly onto your calf muscles from behind, aiming to keep the hip extended and the back in neutral. Slowly lean forward from the knees, using the gluteals to keep the hips straight. The hamstrings will be working very hard to control the movement, using an eccentric contraction. Lean forward as far as your hamstring strength will allow, ultimately aiming for an angle of 45°. If you can, pull yourself back upwards; otherwise fall onto the floor, catching yourself in the press-up position, then push back upwards to the start position. Start by mastering the technique with 2-3 sets of 5 reps. Do not progress until you can control the movement out and back, keeping the back straight. Slowly progress up to 3 sets of 8 reps, going out to 45° and coming back up, holding perfect posture and hip extension.

Up-chop kneel *Develops excellent core stability and trunk rotation strength and is therefore useful for both running and swimming.* Kneel next to a pulley machine with a handle attached below hip height. Grasp the handle in both hands to the side of the hip nearest the pulley machine. Lift the arms up and at the same time rotate the shoulders away from the pulley machine, keeping hips facing forwards and arms straight (see pictures below). Complete 2-3 sets of 8-10 reps both sides. Aim to increase the weight lifted for 8 reps.

Up-chop kneel 1



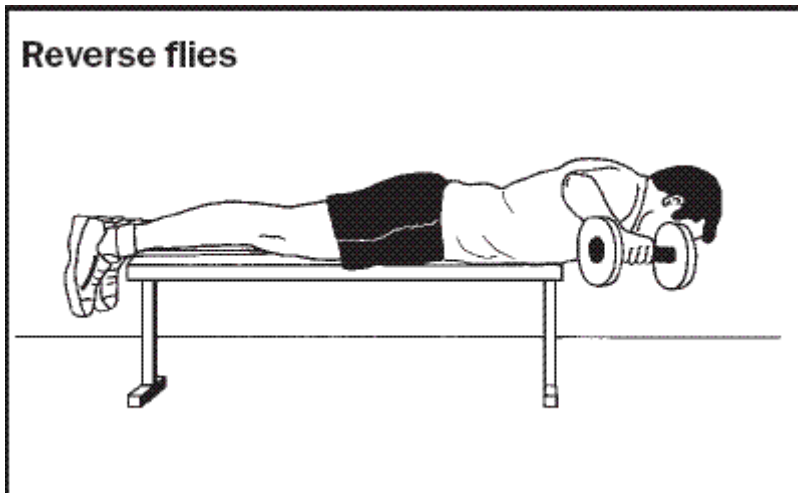
Up-chop kneel 2



Down-chop kneel *Develops excellent core stability and trunk rotation strength and is therefore useful for both running and swimming.* This is the opposite of the up-chop. Begin with the handle attached above head height, grasping the handle in both hands above the head to the side of the pulley machine. Keeping the hips facing front and the arms straight, pull the hands down and turn the shoulders away from the pulley machine. Complete 2-3 sets of 8-10 reps both sides. Aim to increase the weight lifted for 8 reps.

Reverse flies *Develops upper back and rear shoulder musculature and helps stabilise the scapula. It is included as a swimming injury prevention exercise.* Lie face down on a bench with head and neck just off the edge of the bench, holding a dumbbell in each hand, arms straight out to the side. Lift the dumbbells off the floor until the hands are level with the body, arms remaining straight out to the side. Complete 2-3 sets of 8-10 reps both sides. Aim to increase the weight lifted for 8 reps.

Reverse flies



Jumping routine

All these exercises are chosen to benefit running efficiency. These explosive jumping movements train both the major leg muscles and the tendons, helping you become more 'spring-like' and therefore more economical. These exercises require a warm-up and can be performed after the end of a steady run without much difficulty, ideally on a soft flat surface such as a soft running track or cricket pitch. Jumping exercises need to be introduced gradually, which is why I advise controlling the number of contacts for each exercise until you are used to performing them every week.

Vertical jumps Stand feet hip- to shoulder-width apart. Squat down slightly, swinging your arms back, and then rapidly jump up as high as you can, driving your arms upwards. Make sure you fully extend your hips, knees and ankles at take-off. Land softly on the balls of your feet and absorb your landing with a squat. Perform 3 x 5 reps, building up to 3 x 10 reps. Take 1-2 minutes' rest between sets.

Mini hurdle hops Set out 5 x 30cm mini-hurdles with about 1 metre space between each. Hop with both feet together over each hurdle with one 'bouncy' contact between each hurdle. Aim to make quick and light contacts with the floor on the balls of your feet, with a small knee-bend. You can pick your knees up into a tuck position over each hurdle if you like, to increase your jump height. Perform 3 x 5 hurdles, building up to 3 x 10, with 1 minute's rest between sets.

Power skips This is a simple skip, performed very dynamically. The aim is to drive up as high as possible with each skip, then land softly and step onto the other foot to drive up again. Perform 3 sets of 10 skips (5 each leg) and increase to 3 sets of 20 skips.

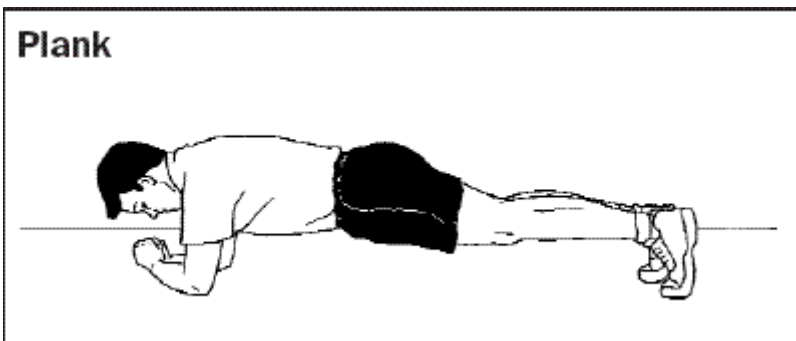
Swimming Article

Core routine

The exercises in this routine are geared to developing good core stability for running and swimming. The routine targets the strength endurance of the abdominal, oblique, low back and gluteal muscles.

Plank Facing the floor, make a bridge with your body by supporting yourself on elbows and toes, forming a straight line with your body, like a 'plank'. Make sure your low back is in a neutral position, bracing your stomach to maintain it. Complete 3 sets of 30 seconds, progressing to 3 x 60 seconds.

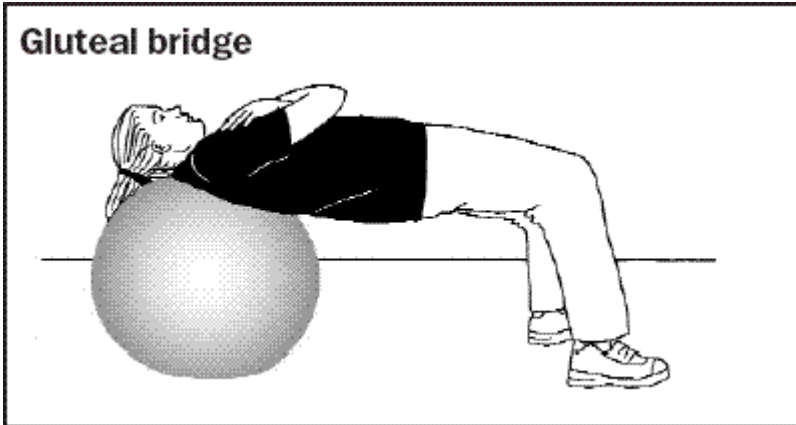
Plank



Side plank On your side, form a bridge with your body by supporting yourself on one elbow and the side of one foot. Lift your hips so your body is in a straight line, like a 'plank'. Make sure your top hip and shoulder are directly above the bottom hip and shoulder. Hold the straight line position. Complete 3 sets of 30 seconds each side, progressing to 3 x 60 seconds.

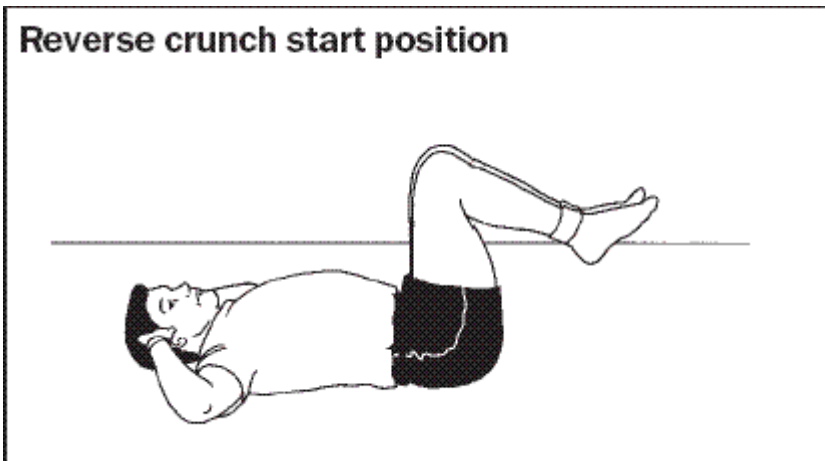
Gluteal bridge Place your feet on the floor and your neck and head on a Swiss ball. Squeezing your gluteal (buttocks) muscles, push your hips up until your back, hips and knees are in a straight line. Make sure your back is in neutral and focus on your gluteals to hold the position. Complete 3 sets of 30 seconds, double leg. Progress to one leg 3 x 30 seconds.

Gluteal bridge

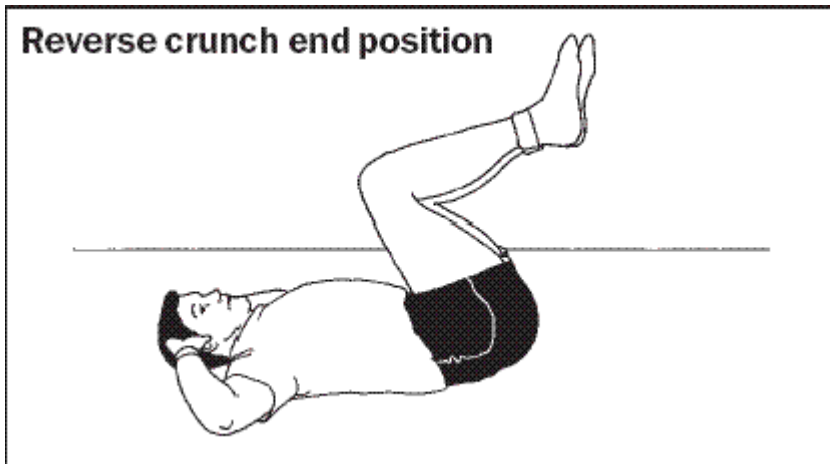


Reverse crunch Lie on your back with arms out to the side, then lift your legs off the floor with knees bent. Focusing on your abs, curl your pelvis and low back off the floor, crunching up. Don't kick or swing your legs to gain momentum – the slower you do the movement the more effective it is. Complete 3 sets of 20 reps. Progress by adding a dumbbell between the ankles to increase the load lifted by the abs.

Reverse crunch start position



Reverse crunch end position



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