

Why Every Runner Needs

HIP STABILITY

Most of us appreciate the concept of core-muscle strength, or core stability, or at the very least have heard about it. In simple terms, core stability pertains to having adequate muscular support of the lower back and pelvic girdle (i.e. hips). This support is required for the efficient and safe performance of all activities of daily living, including sporting pursuits such as running.

WRITTEN BY BRAD BEER
IMAGES COURTESY OF BRAD BEER AND DANIEL GREEN

In physiotherapy, we often refer to core-stability as *lumbo-pelvic* stability; that is, the regions of the hips and lower back are sufficiently corseted or protected by the surrounding musculature. In running terms, having both the hips and lower back stabilised by the core-stability muscles will result in more efficient running and a reduced lower-limb injury risk.

Runners seeking to improve their core stability often place great emphasis on the development of sound abdominal- and trunk-muscle tone and activation. Exercises such as side bridges and front planks are commonly performed in the quest to improve core stability. While such a focus on the development of trunk muscle activation is imperative, the stability of the hips is often overlooked or ignored. Ignoring the hips as a key stability element for runners can be both damaging and counter-productive, so let's dig deeper and explore.

What is hip stability?

Hip stability is simply a subset of core stability. The muscles that serve to stabilise the hips are shown in *Figure 1*. These hip stability muscles will serve to perform one of three actions as summarised in the table below:

Key hip movements	Muscles involved	Importance to a runner	If deficient in strength
Extend the hip	Gluteus maximus	High	Runner will look like they are sitting in a chair as they run.
Externally rotate the hip	Gemelli, obturators, quadratus femoris	High	Runner's hips will drop down and inwards towards the midline of the body.
Laterally support the hip	Gluteus medius	High	Runner's hips will sway sideways excessively

All three of the above-listed hip-stability movements need to be developed and strong enough to support a runner's training load and volume. If one or more of the three key movements (hip extension, sideways support and external rotation) are deficient, a runner will not demonstrate sound hip stability.

Why is it important?

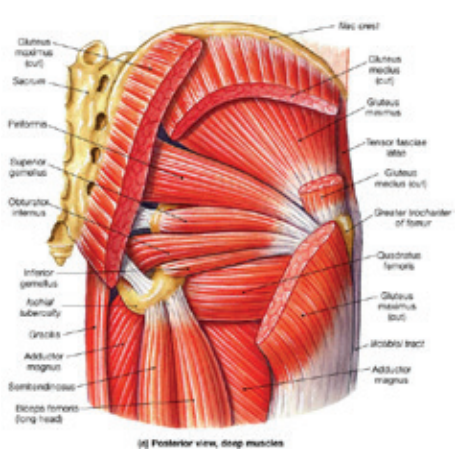
It is widely known and accepted that when a runner makes contact with the ground, the load absorbed by the body is equivalent to 2-3 times the runner's body weight. This can be significantly higher, at 3-4 times the body weight, when a runner overstrides or runs with poor technique. To put this in perspective, if a runner runs 30km in training every week, this volume will equate to 1-1.5 million foot-strikes per year.

By appreciating the enormous repetition of running, we can understand the need to ensure that the loads or forces absorbed by the legs are kept as low as possible. When the loads are minimised, a runner can enjoy injury-free training and racing. Conversely, when the load on the legs is excessive and repetitive, overuse running injuries will develop. In fact, statistics tell us that in any given year, 60-70% of runners can be injured.

One of the chief ways that injuries can be avoided is by ensuring that a runner has adequate core stability – in particular, hip stability. Without this control or support, the hips will drop vertically, pop out to the side and drop inwards, creating a poor body position on foot contact.

The result of such poor body positioning on contact with the ground is a magnified injury risk along with a increased energy cost of running. Consider a runner foot-striking at an ideal cadence of 90 times per minute throughout an hour-long run; they will make contact with the ground 5400 times on each leg over the course of the run. There is therefore little room for poor hip stability if we wish to run injury-free and fast.

Figure 1: The external rotator muscles, which act to stabilise the hips.



How do you know if you have adequate hip stability?

There are several ways to determine whether or not you have sufficient hip stability. These can be broken into *subjective* and *objective* measures as detailed below.

■ Subjective measures
VIDEO ANALYSIS

Have your friend or running partner capture several minutes of you running on video. This can be conveniently performed by using the video function on your iphone or smartphone. You will need be filmed running from *behind* and also running *side on*. When reviewing the footage, look for evidence of hip drop and collapsing of the pelvis with the footage taken from behind. Next, look for evidence of excessive up-and-down movement (or “bopping”) with the side-on footage. If you notice either bopping or collapsing, it will potentially indicate you have deficient hip stability.



Figure 2.1: Good hip control – hip does not move sideways or collapse when squatting on single leg.

PARTNER FEEDBACK

Educate your running partner or a member of your squad on what to look for. As you run, have them run behind you at different stages of the run: early, middle portion and the end. Ask your partner for feedback on what your hips were doing early in the run and towards the end of the run. It is important to note that as you fatigue, your hip stability will normally worsen, which will be evident through greater collapsing of the hips on the landing leg. Remember also that real-time feedback from your running partner during the run will also be useful.

TAKE NOTICE OF HOW YOUR BODY FEELS AS YOU RUN

In the case of running alone, this is a great option. Ask yourself the following questions to get you thinking about your body position:

- Are my hips collapsing when I foot-strike?
- Am I quickly springing off with each foot-strike?
- Am I running “up tall”?
- Do I feel like I am sitting down as I run?

USE MIRRORS AND GLASS

Make it a habit to use reflective glass or mirrors that you run past in training. Rows of shop fronts or bus stops will often afford you the opportunity to see how you are running. It may sound vain, but regularly observing yourself in such a way will at least give you some feedback, particularly if you often run solo.

SINGLE-LEG SQUAT TEST

This test is performed with a runner standing on a single leg and the other leg bent at the knee and not touching the ground (*see Figure 2.1*). The runner squats on the single leg without the support of anything to balance on. The squat should be as deep as possible, though there is no need to go right down. The observer or tester will stand either front- or back-on and should look for hip drop on the stance leg. If hip drop exists, it indicates insufficient hip stability due principally to weakness of the gluteus medius (*see Figure 2.2*). To get a good idea of the relationship between fatigue and stability, ask the runner to repeat the squat 12 times, and note if the hip drop gets more pronounced. To get a true idea of hip stability over an hour run, the equivalent test would be to ask the runner to do a series of 5400 squats on each leg – not recommended, but it certainly drives home the importance of having sound hip stability! The tester can then subjectively assess the runner as having either poor or good hip stability based on the degree of hip drop.



Figure 2.2: Poor hip control – hip moves sideways and body collapses when squatting on single leg.



Figure 3.1: Single-leg bridge start position.



Figure 4.1: Fire hydrant exercise start position.



Figure 5.1: Clam exercise beginning position.



Figure 3.2: Single-leg bridge upward phase, with the extended leg parallel to the thigh of the bent leg. Hold for static exercise, move hips up and down for bridge repetitions.



Figure 4.2: Fire hydrant exercise upward phase.



Figure 5.2: Clam exercise upward phase.

Objective measures

When it comes to performance improvement, the adage that what can be measured can be improved is a powerful principle. While the above subjective measures of hip stability are important, the benefits of measuring a runner's hip stability objectively are even more powerful. In practice, I have time and time again seen runners (beginners through to the elite) make incredible improvements with their hip stability by undergoing objective testing.

HIP EXTERNAL ROTATION TEST

This test is performed with the runner sitting on the edge of a treatment table with the knee of the testing leg positioned at 90 degrees. The tester asks the runner to lift their leg in towards the mid-line of the body as far as they can. It is important that the tester looks for compensatory movements such as lifting of the test hip off the table, trunk lean or thigh lifting, all of which will give an inaccurate measure. The tester uses a measuring tool known as a goniometer (or joint-angle measuring device). The ideal angle achieved is 40 degrees. If the score is less than 40 degrees, it can be interpreted that the hip-stability muscles (the external rotators) do not have sufficient strength to stabilise the hips on foot strike, which will manifest as the hip collapsing inwards and downwards with running. It is important and sobering to also realise that a single measure of the above is equivalent to the support needed for just one foot strike when running, let alone the 5399 that will follow on a one-hour training run. The tester will also need to know what the left side measures compared with the right. Often a large discrepancy exists between the two sides, when ideally, the left and right side scores should be even.

SINGLE-LEG BRIDGE STATIC-HOLD TEST

This test is performed with the runner lying on the ground with one leg extended and the other leg bent. The bent leg should have the foot positioned just slightly in front of the knee, and the extended leg should be parallel to the thigh of the bent leg (see Figure 3.2). You then time how long this position can be held.

How can you improve your hip stability?

There are numerous exercises that runners can do to improve their hip stability. Through years of treating hundreds of injured runners who lacked hip stability, I have developed three golden running hip-stability exercises that I believe every runner should complete:

- 1. SINGLE-LEG BRIDGES** (Figures 3.1 and 3.2): lift the hips high and aim for 3 x 12 repetitions on each leg. To build endurance, work towards being able to complete 36 reps continuously on each side.
- 2. FIRE HYDRANTS** (Figures 4.1 and 4.2): keep the extended leg's foot in line with the hips and do not touch the floor as the leg is lowered. Aim for 3 x 12 repetitions. Progress to 36 reps continuously to build endurance.
- 3. HIP EXTERNAL ROTATIONS (CLAMS)** (Figures 5.1 and 5.2): lay on your side with your legs bent at 90 degrees and your knees and feet touching. Lift your top leg, so that your knees come apart, but your feet remain together. Focus on using your external rotator muscles, rather than hip flexors - small controlled movements are fine to begin with. Aim for 3 x 12 repetitions on each leg.

How often should you do these exercises?

I recommend daily completion of the above three golden hip-stability exercises for runners who are injured or lack hip stability. For those who have adequate hip stability, I recommend the completion of the above a minimum of 2-3 times per week. Obviously with increased volume or longer distance events comes an increased need for consistency.

Finally, don't forget to study the "greats". Watch footage of any of the elite runners and do an inventory of how they move. Typically, you will observe that when they run there is very little movement of their trunk or hips. Good

runners look like they are a box on legs – that is, their top half barely moves while their legs cycle around in a motion similar to a cycling pedal stroke. You may also notice that there is very little vertical movement of their body. This is in contrast to the up-and-down bopping that recreational runners often showcase as a result of their collapsing hips, which we now know are due to their poor hip stability. The elites may make it look impossibly easy, but don't be discouraged. Rather, use your observations of their graceful movement to be inspired!



ABOUT THE AUTHOR...

BRAD BEER, PHYSIOTHERAPIST
B. PT/PHD EX SC,
QUEENSLAND AREA DIRECTOR, BACK
IN MOTION PHYSIOTHERAPY
MERMAID WATERS, QLD
PH: (07) 5572 0133
EMAIL: b.beer@backinmotion.com.au
WEBSITE: www.backinmotion.com.au
 Brad also runs regular Gold Coast running workshops, with more information available from the Back In Motion website.