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Do Weak Hips Cause Pronation?

New research suggests weak hips are behind injuries throughout the body

By Mackenzie Lobby

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See if this sounds familiar: First your Achilles flares up. The next week your knee starts bothering you. Then your hamstring gets all hitchy. And all on your left side. It can't be a coincidence. It's gotta be the shoes, right?

Conventional wisdom has cast atypical pronation, or the inward roll of the foot upon striking the ground, as the running injury scapegoat. And while the torsional forces caused by atypical pronation shouldn't be disregarded in diagnosing an injury, new research suggests we look deeper, or rather, higher.

A recent literature review published in *Sports Health* calls for a top-down, rather than ground-up, approach when it comes to identifying the source of running injuries. Reed Ferber, Ph.D., and colleagues looked at 283 studies that examined running-related injuries and concluded that the connections between weak hip stabilization muscles and running injuries were far more conclusive than those of atypical foot pronation.

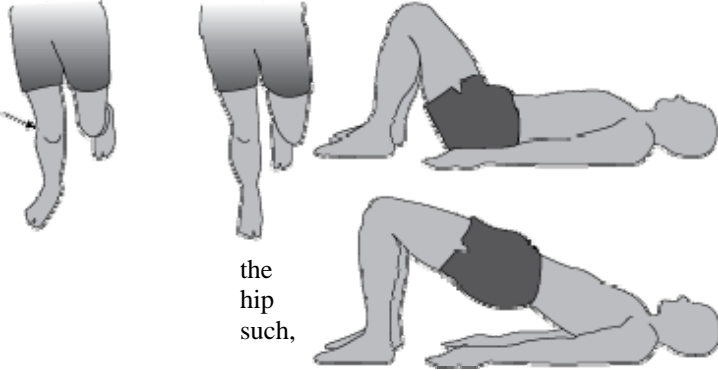
Ferber, the director at the Running Injury Clinic in association with the University of Calgary, describes the kinetic chain that makes up a human body on the run: "Typical mechanics are for your foot to pronate or collapse inwards, the lower leg then internally rotates, and with that, your upper leg internally rotates as well."

He says the foot will automatically collapse inwards because of the force created by its contact with the ground. Since the lower leg must follow the foot, it also internally rotates upon foot strike. "It's like a wrench and a bolt," Ferber says. "If the bolt turns, that being your ankle, the wrench is going to move with it, the wrench being your shin."

So, no matter what, your foot and lower leg respond to the impact force of the foot hitting the ground by rolling. The upper leg is another story. While you want your upper leg to move in conjunction with the foot and lower leg, weak hip stabilization strength prevents you from controlling your femur effectively. This is the root cause of much of patellofemoral pain syndrome, or runner's knee. "There's a misalignment occurring at the knee joint where it's going to collapse too far in because you don't have the strength to control how quickly it moves or how far it moves in," Ferber says. This is when misdiagnosis often occurs. Weak hips lead to a collapse inwards of the knee and thus the foot, called "induced pronation," because the foot is being forced inwards. Since this appears to be an excessively pronating foot, high-stability shoes or orthotics are prescribed. While this will relieve knee pain for some, many will continue to struggle regardless of their shoes because their hips lack strength.

Hip, Hip, Hooray

Ferber drives the point home by referring to research out of the University of Wisconsin, Milwaukee. Jennifer Earl, Ph.D., ATC, and colleagues prescribed a hip-strengthening program to a group of healthy female runners for eight weeks. In addition to showing a predictable increase in hip strength at the end of the program, the runners also exhibited significantly less pronation (measured by how far the heel collapsed inwards). Most impressive, the participants experienced 57 percent less pronation at the ankle joint.



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"Mike Smith, who coaches the distance squad at Kansas State, as well as Olympian Christian Smith, says that this is one of problem areas he focuses on with runners. "We often see poor strength coinciding with poor overall strength," he says. As Smith's runners spend lots of time on what many people consider supplemental exercises, but which Smith, co-creator of runningdvds.com, sees as fundamental for any runner wanting to consistently train injury-free.

Alli Grace (pictured on right, above), who runs for [ZAP Fitness](http://ZAPFitness.com), is a testament to the importance of this type of strengthening. After years of struggling with IT band syndrome at the University of Kentucky, she finally identified hip weakness as the root of the problem. "I could tell my hips and butt areas were weak because once I started doing more core and drills at ZAP, I would feel my hip flexors, tensor fasciae latae, and gluteus medius/maximus muscles tense up during these exercises," Grace says.

She adds, "By strengthening the core and hips, I could handle more training, and was stronger and more powerful as a runner. It's so important to have strength in these areas, especially at the later stages of a race -- you can power through better." Since regularly incorporating hip-strengthening work into her routine and not losing down time to injury, Grace has set PRs at 5,000m (15:47) and 10,000m (33:12).

The Weak Hips Test

Do you need to strengthen your hips? Try the single-leg squat test (pictured right) to find out.

As you would do with a regular squat, keep your back straight and prepare to perform a "sitting" motion. Pick one foot off the ground and put it behind you as you squat on the other leg. Envision a straight line going from the hip, to the knee, and then to the toes of the planted leg. Avoid tilting your pelvis forward as you squat.

If the knee on the side of the planted foot falls inwards and you're unable to maintain that straight line, you need to get hip to the following strengthening exercises.

How to be a Hipster

The main hip muscles to focus on strengthening are the hip adductors, hip abductors, gluteus medius, tensor fasciae latae, piriformis, and hip flexors. If you're already injured, Ferber emphasizes the importance of "positive daily stress." Translation: Do the exercises below every day. Once you're out of the woods, two to three times a week is sufficient.

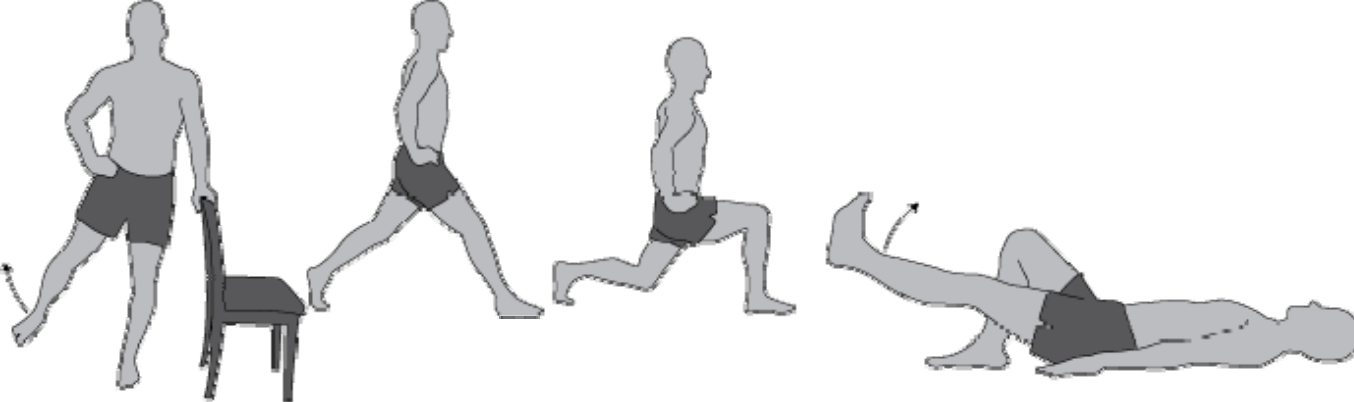
Perform 10 repetitions of each of the following exercises. For those that require you to work each side individually, finish the 10 reps before switching to the other side. Do the exercises in smooth, controlled motions. Hold each rep for two seconds. Start with one set of 10 the first day, two sets the second and third days, and three sets from the fourth day onwards. Once you're familiar with these exercises, they should take about 20 minutes to complete. Says Ferber, "We tell our patients that they are actually going to notice a positive improvement within 10 to 14 days."

1) THE BRIDGE

Lying on your back with your arms at your sides and your knees bent, slowly lift your bottom off the floor. Think of drawing a straight line from your shoulders, through your hips, ending at your knees. Hold for two seconds and lower yourself back to the ground.

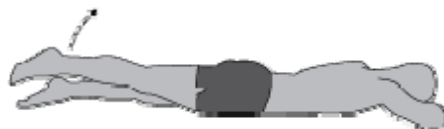
2) LEG RAISE

Stay on your back with your arms at your sides and your knees bent. Straighten one leg and raise it upwards to reach a 45-degree angle with the ground. Be sure your foot is flexed and your toes are facing the sky. Lower slowly and repeat.



3) HIP EXTENSION

Lying face-down with your legs extended, lift one leg and hold for two seconds. As you lift, your gluteus medius muscles should respond by tightening.



4) HIP ABDUCTION

Lie on one side of your body with your arm closest to the ground extended and your legs straight. Use your other arm to brace your body. Lift the upper leg in a scissor-like motion. Hold and lower.



5) STANDING HIP ABDUCTION

Place your right hand on your hip and the left on a chair or table to help balance your body. With your left leg straight and planted firmly on the ground, lift your right leg to the side and hold for two seconds.

6) HIP FLEXION

Remain standing by the chair or table to stabilize your body. While you balance yourself with the hand closest to the chair, lift the opposite leg and bend the knee to a 90-degree angle with your torso.

Once you've mastered the first six, consider trying these more advanced exercises:

7) STANDING LUNGE

With your hands on your hips, take an exaggerated step out, bend the knee, and lower your body so your front leg is bent at a 90-degree angle. You should be able to draw a straight line from your toes up to your knee. Once you reach that 90-degree angle, slowly raise your body back up and step back to your original position. Alternate sides.

8) SINGLE-LEG BRIDGING

As in the original bridge, lie on your back with your hands at your sides. With one knee bent and the other straight, raise your bottom off the ground. Be sure a straight line follows from your shoulders, to the hip, knee, and toes of the extended leg. Hold, lower, repeat, and switch sides.

