

# Anatomy in Action

Your ankle is a pivotal joint. Strengthening it can protect you from injury—and help you run more efficiently.

BY ASHLEY MATEO

Compared to the strong quads and knobby calves running develops, your ankles seem almost dainty. But the powerful ankle-foot complex is made up of 26 bones, 33 joints, and 100 muscles, tendons, and ligaments—all of which make your ankles a crucial part of your gait.



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## How Your Ankles Work

Your ankles allow and restrict movement via two major joints, says Kate VanDamme, a physical therapist and orthopedic clinical specialist at the NYU Langone Health Sports Performance Center. “The talocrural joint is responsible for dorsiflexion (when your foot is pointing up) and plantar flexion (when your foot is pointing down), while the subtalar joint controls pronation and supination, or the inversion or eversion of your foot,” she explains. The movements of the talocrural joint literally propel you forward, while the subtalar joint shifts to your foot to contour to the ground.

One of your ankle’s primary roles is to support the Achilles tendon, which runs up the back of it, says Jason Fitzgerald, a USATF-certified running coach and founder of Strength Running in Denver. “If your ankle is properly mobile and properly aligned, it sets your Achilles tendon up to hold and store as much energy as possible when you hit the ground,” says Fitzgerald. “Then, when your foot pushes off, that energy is going to be returned to your stride.”

Think of your Achilles tendon like a spring. A spring is stiff when it’s stretched out; that stiffness gives it a certain amount of recoil to return to its original shape. When you load the Achilles tendon upon foot strike, it temporarily lengthens to absorb and store those ground reaction forces, says VanDamme. Upon push-off, the tendon recoils back to its original length, propelling you forward with that stored energy.

The key word there is stiffness. “We usually think stiffness is a bad thing,” says VanDamme. “But you do want a baseline of stiffness in your muscles, tendons, and ligaments to provide stability for your ankle.” Achilles tendon stiffness naturally declines over the course of a run, decreasing running economy at the same time, a study published in *PLOS ONE* found. So a certain amount of resting tension actually increases your ability to produce forceful strides.

When you foot strike, the talocrural

joint can reach its limit in dorsiflexion, and “the subtalar joint may take over, overly pronating your foot to try and help absorb some of the shock,” says VanDamme. When that happens, you can’t get your foot off the ground as quickly; the more time your foot spends on the ground, the more susceptible your legs are to the shock of hitting the ground—a force that’s about six times your body weight.

Over time, that repetitive impact can do a number on your ankles and the rest of your legs. “A lack of dorsiflexion can lead to strains to the muscle that stabilizes your lower leg and foot, which is being overly stretched; pulled calf muscles due to their shortened position; and knee pain from externally rotating the feet,” says VanDamme. “Less impact absorption can also lead to stress fractures.”

## Strong Ankles are An Insurance Policy

Having full mobility in these joints is especially important on trails, where the natural motions make you capable of navigating uneven terrain. “Trail running is so much more demanding on the intrinsic muscles of the foot and ankle that stabilize you on obstacles and unstable surfaces,” says Fitzgerald. “The more tired your muscles get, the more your form suffers and the more your decision-making skills start to deteriorate, making you more likely to fall and trip.”

That philosophy still stands for road running, although it may be more useful for performance than injury prevention. “If all your running is on a smooth surface, that doesn’t make for strong ankles,” says Fitzgerald. In a recent study published in *Medicine & Science in Sports & Exercise*, researchers found that runners did less work with their ankles and more with their hips and knees over the course of a 10K; with stronger ankles, they wrote, they could increase their efficiency and—ideally—performance.

## How to Increase Mobility and Strength

Increasing your mobility will ensure that you’re always getting your full range of motion when it comes to dorsiflexion. Ankle rotations—rotating your ankle in wide clockwise and counterclockwise circles—are a classic move for ankle mobility, says Fitzgerald. You can even add resistance by holding a resistance band in your hands and looping it around the ball of your foot, then rocking your foot back up toward your shin over and over again, says VanDamme.

Stretching your calf muscles—by leaning into the wall with your legs in a staggered stance and bending first your front leg and then your back leg—will ensure that you can dorsiflex properly, says Fitzgerald. And “self-massage on the calf muscles plus using a lacrosse ball to work the underside of the foot will loosen up the two big muscle complexes upstream and downstream from the ankle,” he adds. “And that’s really helpful for mobility.”

To strengthen the ankles, “you want to focus on supporting lower-lug muscles like the tibialis posterior, which invert and evert your foot, and the peroneals, which prevent your ankles from overpronating or rolling on an unsteady surface,” says VanDamme. Single-leg calf raises and using a resistance band around your foot for eversion and inversion exercises can help, as can drills like high knees while leaning into the wall or straight leg pawbacks.

The whole point here is to stress your ankle in the same way running would. And one of the easier ways to exaggerate that stress without spending extra time in the gym would be to start running more hills (or trails!). “Hill training—whether that’s long runs on hilly terrain, formal hill workouts, or even hill sprints—are great ways of building additional ankle strength,” says Fitzgerald.

After being cooped inside the same four walls most days, who doesn’t need another excuse to get outside and hit the hills? ♦