

New York **runner**

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The Biomechanics of Running

For better performance and fewer injuries, practice proper form

by Mindy Solkin

What does it mean to run well? There are two broad components: One is training your heart, lungs, muscles, tendons, and ligaments to perform. The other, equally important but often neglected, is paying attention to your running biomechanics, or proper form.

Good biomechanics are as important in running as they are in any other sport, such as swimming or tennis. Poor biomechanics can cause injury and detract from both enjoyment and peak performance. You may have heard there's little you can do about poor form—a shuffling stride or faulty arm swing, for example—but that's not the case.

The components of good running form are listed below, along with steps you can take to improve them.

POSTURE

Running is a controlled forward fall. A lean from the ankles of 10 degrees is optimal, with no bending at the waist.

Tip: Standing with legs shoulder-width apart, lean forward. The point at which you need to step out to catch yourself is the proper body position.

HEAD AND EYES

Your head should be held upright with your gaze focused down the road in front of you. Do not tuck your chin into your chest.

Tip: In your peripheral vision, you should just be able to see your hands on the upswing.

MOUTH

Hold your mouth slightly open and breathe through it, not your nose. This allows you to take in and expel more air and to relax your features.

Tip: Belly breathing will improve oxygen exchange. Practice belly breathing by lying on your back and

placing your hands or a light book on your belly. As you inhale, distend your stomach upward; as you exhale, let your stomach drop.

SHOULDERS

Hold your shoulders low, relaxed, and away from your ears. Runners raise their shoulders when they get tired, causing tension. Do not rotate or twist the shoulders from side to side.

Tip: Shoulder rotation is a sign of weak chest and back muscles. Strengthen these muscles with resistance exercises.

ARMS

Hold elbows at a 90-degree angle with forearms parallel to the ground. Swing the arms forward and backward at upper hip level with a pivot from the shoulder. Avoid swinging the arms across your body, which will slow you down.

Tip: Drive your elbows straight back so that your hands come to the side-seam of your shorts on the backswing, and to mid-chest on the upswing.

HANDS

Your hands should be loosely cupped with your thumb resting lightly on your index finger and palms facing each other.

Tip: Make sure both thumbs point straight ahead.

STRIDE LENGTH

Stride length is determined by the angle of your legs when they are the greatest distance apart. If this angle is too small, it will result in a "sinking-into-the-ground" effect, which restricts forward momentum. If it's too great, over-striding will occur with each foot remaining on the ground too long. This can slow you down and increase the risk of injury.

Tip: Lifting your knees as you stride forward and kicking back as you follow through can help increase stride length. Try doing knee lift and butt kick exercises while walking forward for about 30 yards at a time. To avoid over-striding, plant your foot directly under your center of gravity as you run, not out in front of you.



Mindy Solkin is a USA Track & Field Level III-certified running coach and the owner and head coach of The Running Center in New York City.

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training advice

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FEET

Running feet strike the ground on either the heel, the midfoot, or the ball of the foot (forefoot). Heel strikers are susceptible to injury if they land too far back on their heels because this position over-flexes the foot; it can also hurt performance by causing a braking action. Forefoot strikers put extra stress on the calf muscles, which can cause achilles tendon and lower leg injuries. The ideal is to strike with the midfoot, which promotes stability through the stride and allows the foot to stay on the ground for the least amount of time.

Tip: Though foot strike is somewhat genetically determined, you can improve the stability of your feet—thus encouraging a midfoot strike—by doing balance exercises. Stand on one leg and raise the opposite leg so the thigh is parallel to the ground, with the knee bent 90 degrees and the foot at a 90-degree angle to the lower leg. Hold your arms as though you were running. Maintain this position for 30 to 60 seconds. As your balance improves you should be able to increase the time by 15-second increments. Eventually, try standing in this position on a wobble board for maximum benefit.

Changing your running biomechanics takes time. Be patient, and don't try to alter everything at once. Over time you should see improvements in your performance and a reduced incidence of injury. ■



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