

# Walk this way.....

## The ergonomics of walking, running, and hiking



By Tamara Mitchell

Walking, running, and hiking are some of the most popular types of exercise. These activities require only a good pair of shoes, can be done in just about any location, in most weather, and at any time that fits into your schedule. Because of this flexibility, it's much easier to stay dedicated to this type of exercise program. In addition, there is virtually no "learning curve". You can be a great walker without hours of practice!

The most common injuries associated with walking, running, hiking, and using a treadmill are stress fractures and overuse injuries to the knee, shin, Achilles tendon, and plantar fascia (heel), caused by repetitive motions.<sup>1</sup> If you have a history of knee or foot problems, you may be able to incorporate some walking, hiking, and/or treadmilling into your exercise program.

Shoe selection, warm-up, core strengthening, and an incrementally progressive exercise schedule are necessary to avoid repetitive strain injuries (RSI).<sup>1,2,3,4</sup>

Always let someone know where you're going and when you'll be back when you walk, run, or hike. Better yet, exercise with a friend or a big dog. Then get out there, breathe in that wonderful fresh air, listen to the birds, and enjoy the sunshine! You're doing something great for YOU!

### **Shoes**

Since this is virtually the only piece of equipment you need, invest in a good pair of shoes designed for the activity you plan to do.

### ***Dead or Alive?***

You need to replace your shoes after 500 miles of use, or every 3-6 months.<sup>5</sup> If you weigh more, or if you run, walk, or hike many miles per week, your shoes will wear out a lot faster than if you exercise less.<sup>5</sup> Many discounted shoes are already old if they have been sitting in the store a few months. The materials and glues are breaking down and cushioning is deteriorating.<sup>5</sup> You can tell if your shoes are dead or starting to die by buying a new pair of shoes as the old ones reach their life expectancy. If you rotate between the new shoes and the old shoes, the new shoes may feel a whole lot better if the old ones are dead or dying.<sup>5</sup> Even if the shoes don't feel a whole lot different, your shoes are dead if the sole tread pattern is worn down in any spot or all over.<sup>5</sup>

### ***What is a good shoe?***

Shoe technology has taken a pretty dramatic turn within the past few years. Barefoot technology has taken off and just about every athletic shoe manufacturer offers some choices in what is called barefoot or minimalist athletic shoes. Former (and still many current) athletic shoe designs featured multi-layered technology with some combination of cushioning, stability, and motion control, or the aggressive inhibition of rear-foot pronation.<sup>6</sup>

### ***Barefoot History***

Obviously, people have been running, walking, and hiking barefoot or with minimally supportive footwear such as moccasins or sandals since the beginning of time.<sup>7,8</sup> In fact, several Olympic champions have famously competed and won barefoot: Abebe Bikilia from Ethiopia in the 1960 Olympic marathon,

Zola Budd from South Africa set the world record for the 5k in the 1984 Olympics running barefoot, and Tegla Loroupe from Kenya holds several world records and ran barefoot.<sup>7</sup> Nike is credited with revolutionizing the running shoe in 1979 in a move to provide more support, and then again in 2001, when Nike introduced the minimal running shoe, the Nike Free.<sup>8</sup> Runners started to question the necessity for high-tech footwear and a Harvard study published in Nature magazine showed that the foot strike pattern of barefoot runners is quite different from runners wearing traditional running shoes.<sup>6, 7</sup> In fact, not one research article has been done to support the practice of padding the heel and providing pronation control systems in the type of athletic shoes that have been marketed by shoe manufacturers for the past few decades.<sup>9</sup>

### **Shoe Research**

The foot strike of barefoot runners is usually centered midfoot or on the forefoot.<sup>8</sup> Since traditional running shoes have a built-up, cushioned heel that is higher than the ball of the foot, the heel usually strikes first when running or walking in this type of shoe.<sup>8</sup> Distance runners wearing traditional shoes tend to heel strike, but shod sprinters contact the ground midfoot.<sup>8</sup> The difference between the heel height and the toe height is typically 12-14 mm creating a forward-leaning shoe that is intended to reduce the stress on the Achilles heel.<sup>10, 11</sup> Minimalist shoes have much less difference between the heel and toe, a 2 to 10 mm drop. Zero drop from heel to toe is the ultimate goal to enable a landing midfoot and the natural arch of the foot cushions the landing.<sup>10</sup>

It has been shown that running barefoot or with minimalist shoes results in a shorter stride, less time in contact with the ground, lower impact peaks. Pre-activation of the plantar flexor muscles of the foot in anticipation of the impact, contraction of the calf muscles to cushion the impact, and flexion of the foot all help to absorb energy of impact.<sup>8, 12, 13</sup> Barefoot runners exhibit less contact time with the ground.<sup>13</sup> The preactivation and stretch cycle of the plantar flexor muscles may allow for better storage and restitution of elastic energy with barefoot running.<sup>8, 12</sup> Actually, there are many muscle/tendon springs in the lower leg that lower the energy cost of running by about 50% over what it would take with simple muscle contraction and propulsion.<sup>8</sup> Studies have previously shown *higher energy costs and worse elastic energy storage and restitution of runners wearing shoes.*<sup>8, 12</sup> This cushioning and elastic effect of the more than 10 muscles in the lower leg and foot, along with the flexion of the foot and removing the heel strike in traditional running shoes add up to a lower likelihood of shin splints.

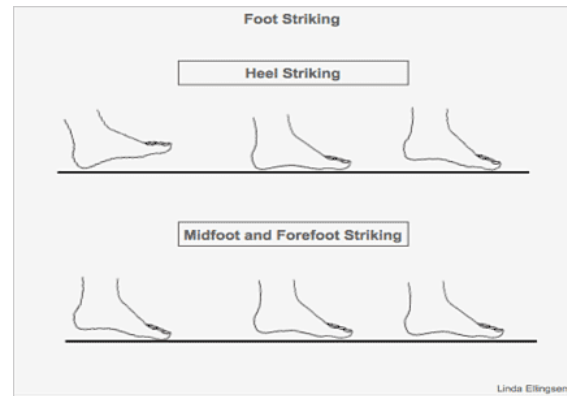


Illustration courtesy Reference 7

## Muscles and tendons of the bottom of the foot

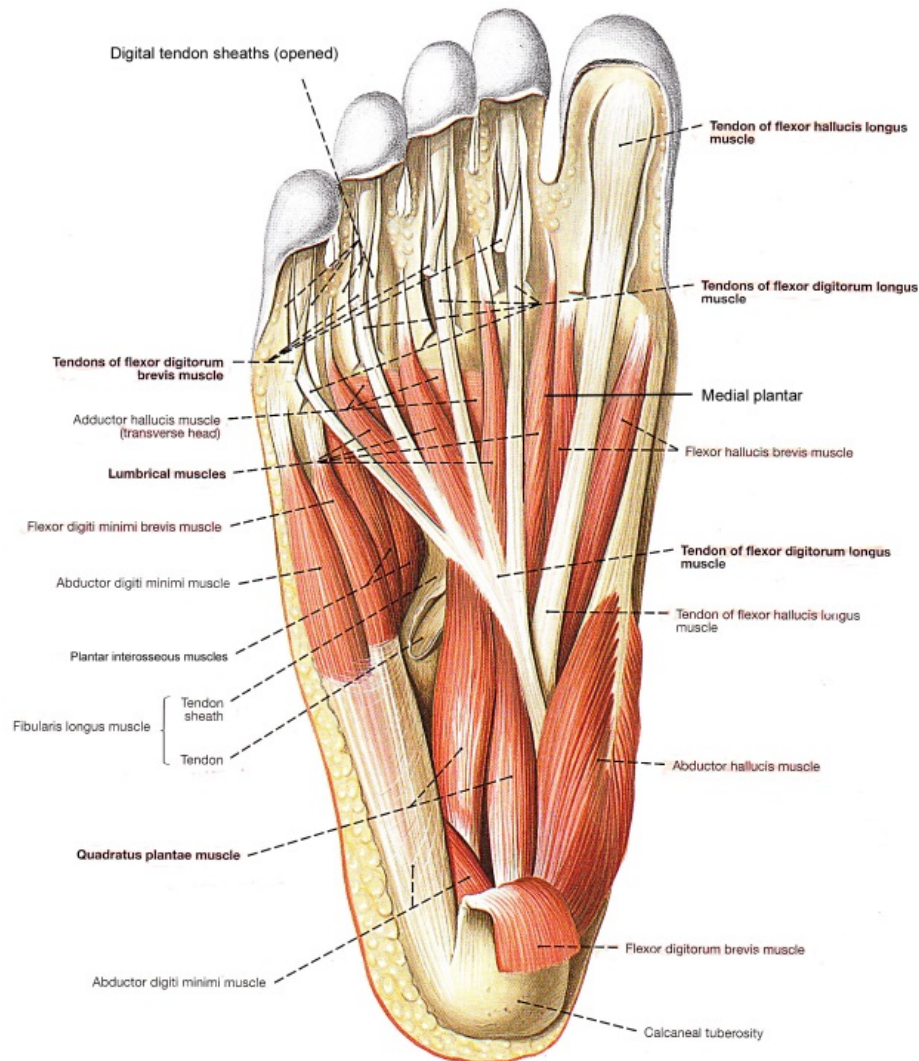


Illustration courtesy of Reference 14

In fact, there are now two types of running styles that are being trained with barefoot or minimal shoe styles: ChiRunning based on Tai Chi uses a midfoot strike and is a proponent of midfoot cushioning with minimal heel height, and the Pose Method which is a forefoot strike and is a proponent of very light, thin-soled shoes with essentially no cushioning.<sup>7</sup>

Another big advantage of barefoot and many minimalist shoe designs is that they do not squeeze and constrict the outer toes especially the pinkie toe.<sup>15</sup> With the use of all 10 toes, balance, agility, and body control is improved.<sup>15</sup> Posture is improved and this may lead to fewer problems with the hips, back, shoulders, and neck.<sup>15</sup> The improved gripping ability enabled through the use of your toes will keep you from slipping on slippery, rough, and uneven surfaces.<sup>15</sup> In fact, using barefoot or minimal shoes allows for much finer feedback from the ground which optimizes movement efficiency.<sup>6</sup> Traditional running shoes alter the mechanics of the stride, increase the pounding on the heel by as much as three times your body weight, and then transmit these forces upward through the body's entire kinetic chain.<sup>6</sup>

In contrast, some research on various running shoe styles has actually shown that runners training for a 10K event experienced a significantly higher incidence of shin and calf pain when running with a full minimalist design shoe (Vibram Five Fingers Bikila) and the most injuries reported with the partial-minimalist shoe design (Nike Free 3.0 V2). The fewest injuries were with a very traditional, rigid, supportive shoe design (Nike Pegasus 28).<sup>16</sup> Unfortunately, training was only over a 12-week period for this study<sup>16</sup> and virtually all of the minimalist and barefoot shoe manufacturers as well as barefoot and minimalist trainers emphasize that it takes up to a year of very gradual transition from standing, walking, and running before the feet and legs can adapt without injury.<sup>7,13,17,18,19,20</sup>

Since the advent of “high tech” running shoes with flared, elevated heels, rigid soles, and stiff arch supports encouraging heel-to-toe running, 6 out of 10 runners get injured every year.<sup>8</sup> These shoes also limit proprioception and increase the chances of ankle strains.<sup>8</sup> The claims by shoe manufacturers promoting this type of shoe for running or for walking have not been supported by independent research.<sup>8</sup> Even in a controlled study where specific shoes were prescribed based on foot type (motion control for low arches, stability for medium arches, and cushioning for high arches), there was little difference in injury risk for either males or females.<sup>8</sup> Another study looked at the use of traditional running shoes versus ultra-flexible minimalist shoes during a 12-week exercise program for people with plantar fasciitis.<sup>8</sup> The minimalist shoes resulted in lower reported pain and speedier recovery than the traditional shoes.<sup>8</sup>

Since minimalist running is fairly new and dramatically different for people in the Western world, the jury is still out on whether it will be an improvement for people across the board.<sup>7, 8</sup> And research has shown significant difference in stride length, peak forces, step rate, oxygen consumption, and flatness of the foot between Vibram Fivefingers, barefoot, and traditional running shoes.<sup>8</sup> So, one cannot conclude that minimalist shoes truly mimic the benefits of barefoot running. When people try minimalist shoes, there will likely be cases where people try to do too much, too soon resulting in very painful injuries. And it may prove that people born with weak Achilles tendons or problems with plantar fasciitis are not well-suited to going without more foot support.<sup>7</sup> There are claims that shoes with support or wearing of rigid orthotics cause weakening of the foot muscles and the arch, but so far, research has not found a difference in strength between shod and unshod runners.<sup>8</sup> At the same time, there are many anecdotal reports of people with all types of injuries that have gone through the transition to minimalist/barefoot shoes and they can now perform painlessly at a level that was never possible with traditional athletic shoes. At this point, there just isn't enough research on any particular type of shoe to draw conclusions.<sup>8</sup> What we suggest is that, if you want to try to gradually strengthen your legs and feet, transition to these types of shoes with all the necessary training suggestions, stay off hard surfaces, and listen to your body. Additionally, research has shown that long-time traditional shoe wearers continue to heelstrike for quite a long time.<sup>8</sup> It is important to specifically train to land on the midfoot or forefoot to enable the natural elastic resistance of the body to cushion against impact forces.<sup>8</sup> If something hurts, don't do it. But most reports from wearers, especially those who wear the Vibram Five-Fingers shoes for walking and hiking, are that they are extremely comfortable and enable the use of the feet in a way that nature intended.<sup>15</sup>

### ***Minimalist Training***

There is a potential for injury when people begin to use barefoot or minimalist shoes since your feet and leg muscles and tendons have become lazy and weak by wearing what amounts to casts on your feet for most of your life.<sup>6</sup> It's important to heed the following advice to avoid injuries, especially if you are planning to use them for running.

- Start building up very slowly from walking to running or hiking if those are your sports.<sup>7,13,17,18</sup> Just 10% increase per week is recommended for either distance or speed.<sup>17</sup> In fact, it's important to re-learn and re-train your body to stand, walk, squat, and jump prior to starting a program of training in minimalist shoes.<sup>19</sup> A lifetime of wearing athletic shoes with raised heels cannot be unlearned quickly.

- Go to the REI, SoleTraining and Vivobarefoot websites and train your feet to get ready for barefoot exercising.<sup>7,18, 19, 20</sup>
- Consider graduating from traditional running or walking shoes to more minimalist styles as you purchase replacement shoes to allow your legs and feet to adapt.<sup>7</sup>
- Pay attention to your posture and form.<sup>21</sup> Watch the video online with coach Lee Saxby explaining the correct stride and posture for upright barefoot running.<sup>21</sup> An upright stance is very important, take shorter strides with a bouncy cadence, and relax the body to conserve energy and enable proper rhythm.<sup>20</sup>
- Do not attempt to run on hard surfaces such as concrete or tarmac (blacktop) with inadequate shoe cushioning. Many barefoot or minimalist shoe styles do not have enough cushioning to protect you from the impact of these hard surfaces, at least until your feet are strengthened.<sup>8,13</sup>
- Be aware that running, walking, or hiking barefoot with no shoes subjects you to cuts, puncture wounds, and infections. Running or walking on a track is much safer if you want to try going completely without shoes.<sup>7</sup>
- Never exercise if it causes pain.<sup>17</sup>
- Get a good coach.<sup>17</sup>
- Cross-train by doing other cardio sports such as riding a bicycle on days off from running or walking.<sup>17</sup>
- If you have diabetes, neuropathy, or other condition where you do not have normal sensation in your feet, do not attempt to exercise barefoot.<sup>6</sup> Wear some type of shoes to prevent inadvertent injuries.

### ***Minimalist Shoe Features***

Minimalist shoe features to look for are:<sup>10</sup>

- Absence of a thick, rigid heel pad
- Lightweight material for the upper part of the shoe
- A flexible sole so your foot can bend.
- Little or no drop or heel to toe height differential
- Extremely light weight
- The footbed is very flat and has little cushioning support.
- Doesn't constrict the outer toes, especially the pinkie toe.<sup>15</sup>

## Examples of minimalist and/or zero drop shoes

<p>Encourages Better Running Technique      1-to-1 Ratio Naturally Aligns Feet, Back &amp; Body Posture      Zero Drop Platform Designed to Reduced Initial Impact by 3 -5x</p>  <p><b>HEEL AND FOREFOOT ARE THE SAME DISTANCE FROM THE GROUND</b></p> <p><b>Designed to Reduce:</b></p> <p>Forefoot Pain      Shin Splints      Runner's Knee</p> <p>Excessive Pronation      IT Band Pain (side of knee)</p> <p>Running shoe by Altra. Zero drop, but added cushioning on sole for running impact. Courtesy: Altrarunning.com</p>	
 <p><b>Skora running shoe.</b> Rounded sole, side lacing, and ample toe space. Courtesy: Skorarunning.com</p>	 <p><b>Vibram Five Fingers Trail Running Shoe.</b> 3.5 mm Vibram sole, aggressive tread, separate toe pockets Courtesy: VibramFiveFingers.com</p>
 <p><b>VivoBarefoot hiking shoe.</b> Aggressive tread, protection from trail hazards, ankle support Courtesy: Vivobarefoot.com</p>	 <p><b>VivoBarefoot Training Clinic.</b> Intended for learning to use barefoot shoes. Zero drop, no cushioning, inside or treadmill use. Courtesy: Vivobarefoot.com</p>

### ***Walking vs. Running Shoe Features***

It's all right to walk in running shoes, but walking shoes do not have enough cushioning and support for running and they may be too heavy. Walking shoes need flexibility in the ball of the foot. Try bending



the shoe in half by pushing the heel towards the toe.<sup>23</sup> The shoe should bend at the ball of the foot, not at the middle of the arch.<sup>23</sup> The shoe should also have little or zero drop from the toe to the heel.<sup>23</sup> If you walk for an hour or more at a time, you will probably want more cushioning than a very minimalist shoe. Too little cushioning may lead to overuse injuries such as plantar faciitis.<sup>23</sup>

***Hiking Shoe and Trail Runner Features.*** Hiking shoes and boots generally have superior support and thicker, knobby soles necessary for uneven, slippery terrain and rocky surfaces, and they often have a rock guard layer in the soles to avoid rocks poking through or bruising your feet.<sup>24</sup> Trail-runners are designed for people who run cross-country, so they offer support, superior cushioning, flexibility, are lightweight, and have knobby soles for slippery terrain. In fact, trail-running shoes may be an excellent choice for day hikers who need more cushioning than is available from hiking shoes and boots. Both hiking shoes and trail runners usually have a gusseted tongue so the tongue is fully attached to the shoe and keeps the dirt and debris from sifting down into the shoe.<sup>24</sup> Trail shoes are often made of water-resistant materials or are quick drying if you are hiking through wet areas or in rain.<sup>24</sup> Trail shoes also have uppers made of tougher materials that can stand up to a day of hiking through brush and rocky terrain that would rip and tear through regular running shoes.<sup>24</sup>

### ***Shoe Shopping Tips***

Follow these tips when shopping for shoes:

- Shop later in the day when your feet are largest. Wear the socks you will normally wear with the shoes.
- Bring along a well-worn pair of shoes you have used for your chosen activity. A knowledgeable salesperson will probably be able to tell from the wear pattern which shoes will provide you the features you need. Make sure they are familiar with minimalist styles.
- Try on different sizes. Running causes your foot to spread, different companies use different sizing, and one foot may be larger than the other.
- Shoes should fit and feel comfortable right out of the box; they do not need to be “broken in.” This is not the case with hiking boots.
- Test flexibility. Shoes should not be so rigid the forefoot won’t bend.
- Make sure the toe box is spacious. It should be wide and high enough to let you wiggle your toes. For hiking and cross-country running, make sure the shoes are long enough so that your toe won’t touch the end of the shoe on downhill slopes. The heel of the shoe should feel snug, but the shoe’s collar shouldn’t cut into your ankles. You should be able to lace the shoes snugly over your instep.
- Jog a little in the store...or shop in a store that will allow you to take the shoes for a trial run or walk around the block.
- Find out about return policies. You should be able to take the shoes for a short run on an inside treadmill and still return them as long as they haven’t been worn for a long time or worn outside.

### **Training**

Incremental and progressive training is the final component of injury prevention. Increasing the workload by small amounts results in strengthening, but increasing the workload too quickly causes the body to react negatively and will actually delay further progress. To prevent injury do not increase time and/or mileage by more than 10 to 15 percent of the previous week.<sup>1</sup> Rest days, cross training, and strength and flexibility training should balance days of increased workload. Injuries occur when people participate in a major event (e.g., a marathon or a long hike) without scheduling the necessary time to prepare for it. Increase your fitness level by going on increasingly difficult, shorter hikes or runs before tackling long, intense hikes or runs.

Successful injury prevention is a result of a balanced exercise program. Cross training is always beneficial by strengthening other body parts and giving the lower body a break. Though avid runners are

frequently slim because they burn a lot of calories, runners, walkers, and hikers are often weak in their upper bodies and not toned around the middle. If your whole body is toned, you will be faster, stronger, and less prone to injury.<sup>3</sup> *Following a strength-training workout specifically designed for runners will make a big difference in your performance and minimize injury risk.*<sup>3,4</sup> *Following a traditional weight training workout will make very little difference in your running or walking performance and you do not want to bulk up unnecessarily in your upper body.*<sup>3</sup>

If you decide to transition to zero drop or minimalist shoes, extra conditioning is required. Please review the YouTube video with expert trainer Lee Saxby to understand the changes in stride, foot placement, and upright posture correction necessary to avoid injury when running with a more barefoot style.<sup>21</sup>

Use of weights while walking increases the risk of injury to the elbows and arms. The repetitive arm swing with extra weight puts too much stress on extremities. It is best to separate your aerobic and strength training workouts.

Warm up for 5 to 10 minutes before exercising to avoid muscle tears and ligament damage. To warm up, walk at a slow pace, then gradually increasing intensity just until you start to break a sweat.

### Walking vs. Running physical stresses

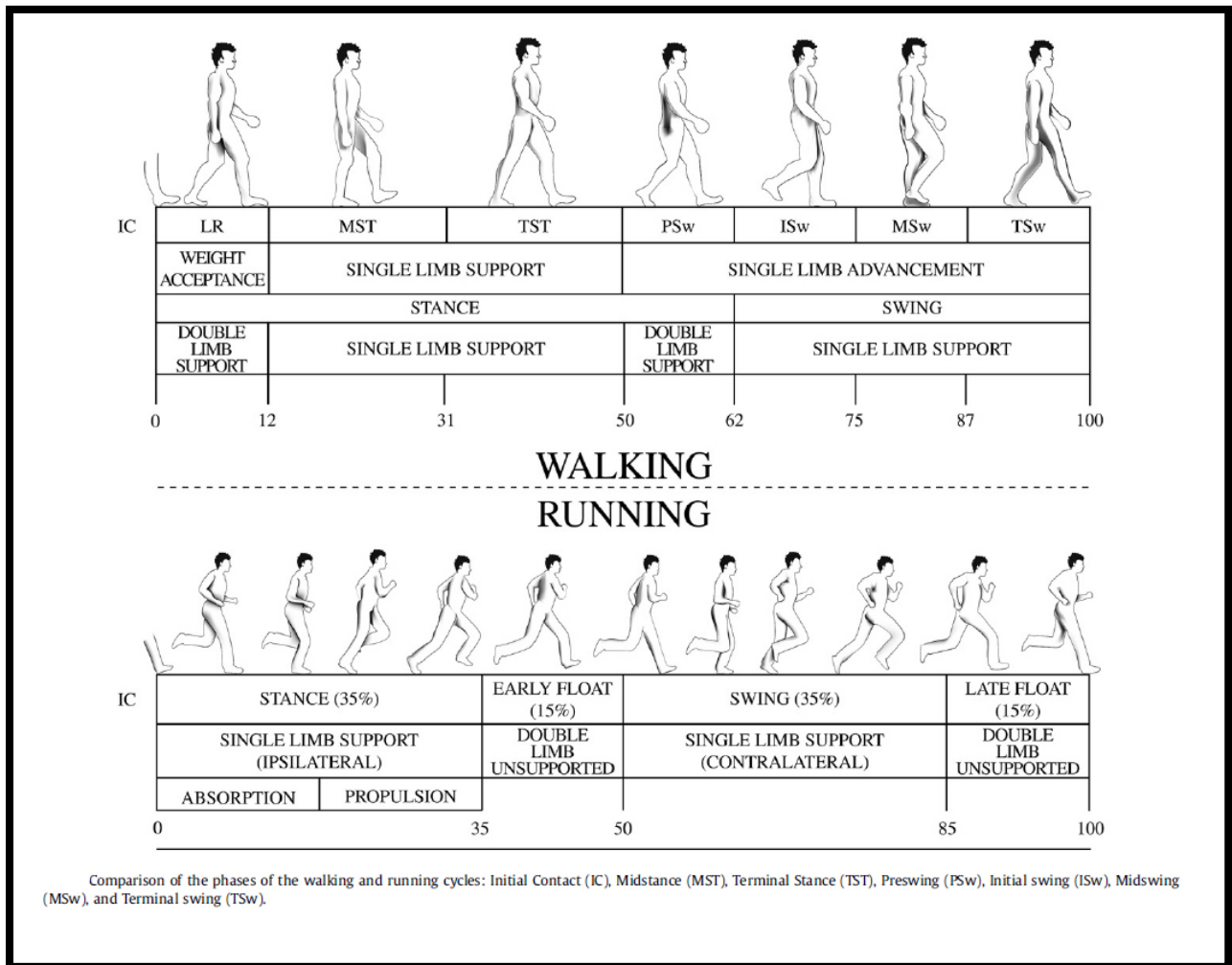


Illustration courtesy Reference 8



Running produces greater forces and requires more energy than walking, specifically:<sup>8</sup>

- joint stress
- motion
- eccentric muscle contraction
- trunk rotation
- pelvic rotation
- hip flexion
- knee flexion
- ankle dorsiflexion (movement of the foot upward toward the shin)

As might be expected, running faster generally increases the forces and motions, though ankle range of motion does not appear to differ between fast and slow paced shod runner.<sup>8</sup> Running on a treadmill show very similar joint motion to running on terrain, so research is facilitated through studying treadmill running.<sup>8</sup>

There are differences between walking and running on both the knees and ankles. Ankles dorsiflex (bend toward the knee) about  $17^\circ$  at the end of the stance phase of running (both shod and unshod) while ankle dorsiflexion during walking is only about  $10^\circ$ . Knee flexion is generally about  $15^\circ$  upon impact with recreational runners, about three times the knee flexion found in walkers.<sup>8</sup> During early stance, the knee flexes further. Overstriding will result in greater knee extension (less flexion) at the end of the swing phase and the start of the stance phase which reduces the ability to absorb the forces of ground impact.<sup>8</sup> This can cause injuries to the back of the lower legs, so overstriding should be avoided.<sup>8</sup> Proper stride length is quite individual with taller individuals having a longer natural stride than shorter people.<sup>8</sup>

Research has revealed that when the surface material or the shoe/insole is harder, the muscles of the leg stiffen to offset the surface impact forces.<sup>8</sup> Whether shod or unshod, this leg stiffening occurs and muscle activation within 50 milliseconds prior to impact in preparation to dampen the vibration.<sup>8</sup> In addition, the knees bend less (up to  $7^\circ$  less than more resilient surfaces).<sup>8</sup> Although researchers maintain that the hardness of the surface does not cause physical damage to the body, these adjustments to maintain a consistent stride, contact time, and various ground surfaces may increase the likelihood for injury.<sup>8</sup> People with smaller feet relative to body size must make greater adjustments to leg stiffness, so are at greater likelihood for injury.<sup>8</sup>

Roads and trails are canted or sloped for drainage. Just as with the automatic adjustment of leg stiffness to adjust to surface or shoe hardness, the legs adjust automatically to maintain an upright body posture.<sup>8</sup> The uphill leg will have a shorter distance to hit the ground than the downhill leg on the sloping surface. This has been identified as a possible risk to injuring the iliotibial band as a result of the adaptations required, especially if the direction of slope is the same throughout the entire session.<sup>8</sup> For example, when a track surface is sloped, the runner runs the entire distance with one leg adapting to a higher surface and the other leg to a lower surface and leaning into the curve.<sup>8</sup> Reversing direction halfway through the session would present balanced stresses to the body.<sup>8</sup>

The slope of the road or trail in the direction of travel also has effects on the joints and muscles.<sup>8</sup> Impact is greater than level surfaces for downhill travel and impact is less than level surfaces for uphill travel.<sup>8</sup> People with damage or injury to the legs, hips, ankles, and feet should avoid downhill inclines, especially steep slopes, because they generate a lot more force on impact.<sup>8</sup>

Running on a variety of surfaces is a good idea, but since there are so many factors involved that require the legs to adapt and adjust, it's advisable to build up gradually to avoid injuries due to fatigue.<sup>8</sup>

People generally switch from walking to running at about 5.1 to 5.6 miles per hour.<sup>8</sup> In running, elite runners tend to have a shorter stride than experienced runners.<sup>8</sup> The running stride is longer than a walking stride.<sup>8</sup> Stride length shortens as the uphill incline increases, while the stride rate (cadence) increases.<sup>8</sup> Downhill inclines generally result in a longer stride length, but a decrease in cadence.<sup>8</sup>

### **Aches and Pains**

- **Back pain.** If you experience back pain after running, walking, hiking, or treadmilling, you should have the cause of the pain evaluated.<sup>25</sup> Aching in your mid to low back can occur when you don't walk, run, or hike with good posture and if your trunk muscles aren't strong.<sup>2</sup> Engage your abs and pull your stomach in, avoid bending at the waist and slumping when going uphill, and pull yourself up tall.<sup>2</sup> Rather than bending at the waist when going uphill, lean forward all the way from the ankles.<sup>2</sup> Arthritis, muscular tightness, disc degeneration, poor posture, or improper body mechanics can all be sources of back pain.<sup>25</sup> Walking has been shown to be a very effective therapy for people with back pain, so as long as you maintain proper posture, it is likely that walking will help in the long run.<sup>26</sup> Runners usually experience back pain because they have weak midsection/core muscles, poor technique, or foot imbalances which all can throw off the equilibrium of your body mechanics and result in back problems.<sup>25</sup> Running may not be the cause of your back pain. Improper lifting of heavy objects, poor sleeping positions, an improper pillow, heavy backpacks, and sudden movements can all result in back pain.<sup>25</sup> Make sure you strengthen your core, hips, and legs with workouts designed for runners/walkers.<sup>3,4</sup>
- **Plantar faciitis.** Pounding the feet on hard surfaces often leads to plantar faciitis, a pain in the heel or arch, especially first thing in the morning.<sup>2</sup> Avoid hard surfaces when walking or running. If you must exercise on these surfaces, you will need more cushioning in your shoes.
- **Ingrown toenails.** Shoes that are too short or too tight can lead to ingrown toenails which cause pain on the sides of the toes.<sup>2</sup> Make sure the toe box of the shoe is roomy and/or buy a size larger shoe if necessary because your feet tend to swell during exercise.<sup>2</sup> If you are exercising on hilly terrain or hiking, you probably know that your feet tend to move forward in your shoes when you on the downhill slope, so shoes that feel fine on level terrain or in the shoe store can pinch your toes when walking or running downhill. Of course, the Vibram Five-Fingers Shoes separate the toes into their own compartments, so this is never a problem with these.
- **Achilles tendinitis/tendinosis.** Pain up the back of the heel or lower calf can signal that the tendon connecting your calf muscle to your heel is inflamed.<sup>2</sup> This generally occurs when people try to increase mileage too soon, especially uphill, which puts a greater load on this tendon. When this problem occurs, back off the mileage, walk on level surfaces, and if the problem persists, switch to another form of exercise, such as swimming until the pain is gone and the tendon has healed....possibly several weeks.<sup>2</sup> More commonly, there is a chronic condition that develops termed tendinosis, in response to repeated microtrauma.<sup>14</sup> Scar tissue forms in response to repeated trauma, this results in reduced blood flow, decreased oxygenation of the tissues, which leads to more scar tissue.<sup>14</sup> Various other complications of the foot and arch can lead to pain in the Achilles area. Stretching and deep myofascial massage and release are the two things that will eventually break down the scar tissue that has built up after repeated trauma to the feet.<sup>14</sup>
- **Bunions.** A bunion is a painful swelling of the joint of the big toe or the pinkie toe.<sup>2</sup> Wearing shoes with a wide toe box that doesn't push the toes inward is the way to prevent bunions.<sup>2</sup>
- **Morton's neuroma.** Tingling, numbness, or pain near the base of the third and fourth toes is caused by a thickening of the tissue surrounding a nerve at that location.<sup>2</sup> As soon as you feel this, make sure you switch to shoes that have a roomier toe box and avoid shoes that have a raised heel.<sup>2</sup> Adequate padding can make your feet more comfortable.
- **Shin splints.** If you are feeling stiffness or soreness in your shins, you are likely to have shin splints.<sup>2</sup> This is caused by strong calf muscles pulling repeatedly on weaker shin muscles and is usually caused by walking, running, or hiking too much, too soon, and/or who do a lot of uphill

climbs.<sup>2</sup> Exercising on concrete is also a culprit due to the pounding on a hard surface. If you start to feel pain in your shins, cut back on walking, running, or hiking and do some exercises to strengthen your shins.<sup>2</sup> While standing, lift your toes toward your shins 20 times. Work up to 3 sets, then start laying a 2-3 pound ankle weight on your feet as you get stronger.<sup>2</sup>

- Bursitis. Soreness on the outside of your hips is often caused by inflammation of the fluid-filled sacs (bursa) that cushion the hip joint as a result of repetitive stress.<sup>2</sup> People with one leg longer than the other are especially prone to this problem.<sup>2</sup> Walking, running, or hiking too much too quickly is often the cause. Lay off these activities for a few weeks and substitute swimming, bike riding, or some other non-weight-bearing activity for a few weeks.<sup>2</sup> When you start to walk, run, or hike again, build up very slowly and make sure you warm up before you exercise.<sup>2</sup>
- Runner's knee. To avoid patellar tendonitis (kneecap tendon inflammation) in running and jumping sports, shoes should have minimal heel height, have firm midsoles, yet still be flexible.<sup>22</sup> A minimalist athletic shoe may well be a good option for people with kneecap problems. If your kneecap feels sore, take some time off walking, running, or hiking until the pain subsides, then start a program of strengthening the quadriceps.<sup>2</sup> When traversing downhill, try to take smaller steps to reduce the pounding on your kneecaps and ligaments.<sup>2</sup>
- Stress fracture. Stress fractures in the lower leg are tiny cracks in the bone resulting from repeated trauma from walking, running, or hiking. They occur when muscles and other tissues become fatigued and are no longer able to support the activity, so the bone takes the pounding without the natural shock absorbing systems.<sup>2</sup> Shin splints as well as other aches and pains in the legs and feet can lead to stress fractures if ignored.<sup>2</sup> Stress fractures result in severe aches and pains in the lower legs or feet and it is critical to get off your feet and allow them to heal for several weeks.<sup>2</sup> It's possible to maintain fitness through other activities like swimming, water aerobics, or upper body workouts.<sup>2</sup>

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This article and all of our articles are intended for your information and education. We are not experts in the diagnosis and treatment of specific medical or mental problems. When dealing with a severe problem, please consult your healthcare or mental health professional and research the alternatives available for your particular diagnosis prior to embarking on a treatment plan. You are ultimately responsible for your health and treatment!

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