Smart Running

Outersoles, Midsoles, Insoles and Barefoot

Prior to 1970, runners ran with shoes that had no padding, no pronation control, no orthotics, and no high-tech materials.

Since the 1970s, runners have been sold on the need for good running shoes — if you want to prevent injuries, invest in good shoes. Proper cushioning, and sometimes rigid motion control or stability features, were needed, and if you had injuries, you probably had the wrong shoes.

While barefoot running isn't new, it's popularity has been going through the roof since Christopher McDougall's book, *Born To Run*, became popular in 2009

More running sneakers are moving to less is better and this also could be hidden contributors to foot pain if you don't adapt your foot to the sneaker over time.

Or as Daniel Lieberman, the Harvard evolutionary biologist in the forefront (forefoot?) of the barefoot running movement, put it in a 2012 review of the research at the time: "How one runs probably is more important than what is on one's feet, but what is on one's feet may affect how one runs."

What you should know about sneakers and selecting the appropriate footwear for your feet. Midsoles/Insoles and Outsoles

A running shoe is built to give you support and stability as you move your foot through the running gait cycle," says Joe Puleo, the author of *Running Anatomy*.

In the recent years, an huge selection of running sneakers increases the possibility of finding just the right shoe for each set of feet, the large selection of models creates a greater confusion among the consumer.

Difference between a cross training sneaker and running sneaker

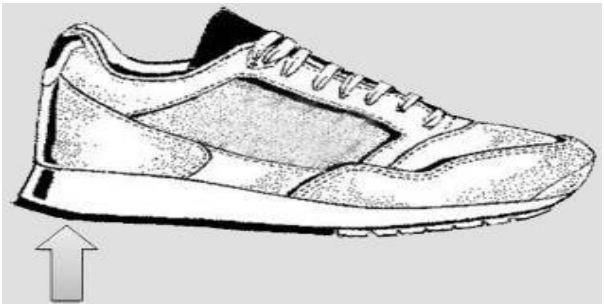
Running and walking sneakers differ from one another. Walking sneakers are more known for the cross training features of a stiffer heel to tolerate the heavier heel strike of a walker , whereas, runners land more on their forefoot and will have more cushioning on the forefoot of the sneaker and less stiffness in the heel.

Fitting for sneakers : Use a Brannock Device that we've all seen in shoe stores. Three measurements should be taken 1. Length, 2. Width, and 3. Arc length. (heel to ball of foot)

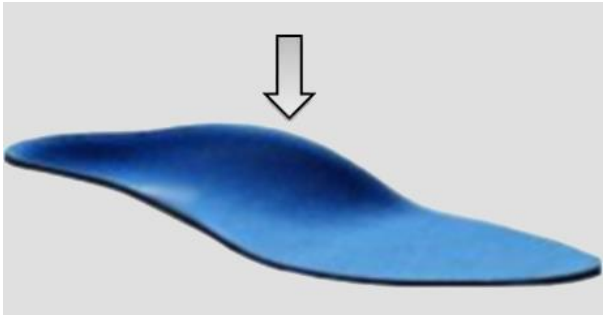
http://brannock.com/cgi-bin/start.cgi/brannock/instructions.html - how to measure using the brannock device.

Modern Running Shoes

Some key features of the typical **modern running shoe** are:



- **Large, flared, cushioned heel:**
  - Facilitates a **comfortable and stable landing on the heel**
  - **Cushions some of the impact force** caused by the foot's collision with the ground
  - **Distributes the impact force** over a larger area of the rearfoot



- **Arch support and stiffening elements (e.g. medial post):**
  - Many shoes **prevent overpronation,** which is the natural "rolling in" of the foot during stance (some shoes prevent oversupination (underpronation or "rolling-out")
  - **Reduces the flattening of the foot's arch**

Insoles follow the same principals as outersoles of a sneaker. The biggest mistake made, is ….

IF YOU REPLACE THE INSOLE OF A RUNNING SNEAKER AND IT DOESN'T MATCH UP WITH THE OUTERSOLES (OVERPRONATOR, NEUTRAL,

UNDERPRONATOR) YOU MAY LIKELY CAUSE FOOT, ANKLE, KNEE , HIP AND BACK PAIN.

Types of Running Shoes

Cushion Running Shoes

This style is the most flexible and encourages natural pronation. It also offers extra shock absorption and doesn't have stability or motion control features. Cushion running shoes are best for people with a high arch and also people with an average arch.

Stability Running Shoes

These have light support features on the medial side and well-cushioned midsoles to help guide mild-to-moderate overpronation. Stability running shoes are ideal for feet with a moderately flat arch.

Motion Control Running Shoes

This category incorporates extra stability features on the medial side to help control severe overpronation. Runners with very flat arches may need the extra support and stability of motion control shoes.

Minimalist Running Shoes

One of the newest categories of running shoes available on the market, minimalist footwear is designed for people who prefer a midfoot or forefoot running style, less cushioning and no stability or motion control features.

Figure 1 Sever overpronation sneaker

figure 2 underpronation sneaker

http://www.asics.co.uk/sports/running/preparation/understanding-pronation-find-the-right-shoes-for-you

Running, like walking, is considered a straight ahead sport since it involves no sudden stops, turns or other maneuvers. Most runners land on their heels and then propel off of their toes. This heel to toe cycle is repeated hundreds and thousands of times every running session. The major biomechanical differences between running and walking are that in running there is always one point during running when both feet are off the ground and also during running the impact forces which the foot absorbs are at least twice as great as that found in walking.

Most runners strike on the outside of the heel, rapidly pronate, stay pronated for a brief instant and then re-supinate as the heel leaves the ground during the push-off phase of running. [Pronation of the foot is a rolling inward of the ankle in which the arch flattens. Supination of the foot is a rolling outward of the ankle in which the arch increases in height.] Due to the large degree of variation within the population, there are a large number of runners who pronate excessively during running causing a multitude of running injuries such as posterior tibial tendinitis, plantar fasciitis and pes anserinus bursitis, to name a few.

Because of the increased impact forces and increased pronation seen in running, running shoes must be designed both to help reduce excessive shock to the body and also help reduce excessive pronation in the foot (Fig. 1). Unfortunately, the same shoe design characteristics that are best at helping to control pronation also tend to lessen the ability of the shoe to cushion the foot. And conversely, any shoe designed to maximize the cushioning of the foot during running will tend to have decreased ability in helping to control pronation.

To better understand how the characteristics of running shoe design affect foot function it is important to detail the structural components of the running shoe. Every shoe is made of two basic parts, the sole and the upper. The sole protects the foot from the ground and provides a layer of cushion for the foot. The upper covers the top and sides of the foot to provide a comfortable fit between the foot and the shoe and to improve stability of the foot on the shoe sole.

In the running shoe, the sole is made up of two distinct layers, the outersole and the midsole. The outersole is the part of the sole that contacts the ground. It is made of a thin layer of relatively hard, abrasion resistant material which functions to resist wear, provide traction and allow flexibility in the forefoot for propulsion.

Many running shoes use a rubber compound with a high carbon content in the heel and forefoot area, which is similar in composition to an automobile tire, so that the outersole will resist the abrasion that comes from the heel striking the ground. Running shoe outersoles also are constructed with studs or ridges in the midfoot and forefoot area to aid traction on soft or slippery surfaces, such as wet grass or slick pavement. In addition, most running shoe outersoles also incorporate some form of transverse grooves placed in the area of the forefoot so that the shoe will be more flexible in the forefoot once the heel leaves the ground during the push-off phase.

The midsole, however, is the part of the running shoe that either makes it work well or makes it work poorly. The midsole is sandwiched between the upper and the outersole. The upper is glued or bonded to the top surface of the midsole. The midsole is the most important part of the running shoe because its design and construction largely determine whether the running shoe will be a shoe which is good at providing cushioning, good at controlling pronation, good for heavy runners or good for nothing.

Running shoe midsoles are designed so that there is thick cushioning under both the heel and forefoot to help provide cushioning to the heel and forefoot. The total height of the midsole and outersole under the heel is generally about 1 inch and the total height of the midsole and

outersole under the forefoot is about 5/8"". The 3/8"" difference of sole thickness between the heel and forefoot in many running shoes tends to be preferred by most runners and also reduces the strain on the Achilles tendon, therefore, reducing the likelihood of Achilles tendinitis.

The midsole provides cushioning and pronation control. The two most common midsole materials are ethyl vinyl acetate (EVA) or polyurethane (PU).

EVA -lightweight and very cushiony.

PU is generally firmer and more resistant to compression than EVA.

Running shoe manufacturers use combinations of different densities of EVA and/or PU within the midsole of the shoe, along with gel packets, air bags, plastic plates and other exotic materials to provide what they believe is the proper amount of cushioning and pronation control for the shoe. Many running shoe midsoles have a firmer midsole material or a hard plate under the medial heel and a softer midsole material under the lateral heel so that the medial heel resists compression more than the lateral heel when the heel strikes the ground in running [Medial is toward the big toe, lateral is toward the little toe]. This ""dynamic varus wedge"" effect does effectively help control foot pronation to some extent. The softest midsole material is generally placed under the forefoot since most runners find that good forefoot cushioning is a very desirable feature when running on hard surfaces.

The upper of the running shoe is usually made of a combination of lightweight nylon and thin synthetic or natural leather to reduce the total weight of the shoe. Since running involves at least a thousand footstrikes per mile, a lightweight running shoe is critical to insure that the runner can move at a faster pace with less fatigue. One drawback to the lightweight materials used in running shoe uppers is that they all tend to suffer in side to side stability since the thin material in the upper is ineffective at resisting medial and lateral shifting of the foot on top of the sole of the shoe. So don't use your running sneakers to play basketball more likely to roll your ankle.

Within the interior of today's running shoes are removable insoles known as sockliners. Sockliners serve to cushion the foot and provide some arch support. Many sockliners in more expensive running shoes serve to support the arch of the foot more effectively than those seen in cheaper shoes. Nearly all sockliners can be removed easily from the shoes so that custom foot orthoses may be added to the shoe to replace the sockliner.

What Is Pronation?

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If you've never been fitted for running shoes before, it's very important that you get to know your arch type and degree of pronation. "We see a lot of injuries resulting from poor shoe choice," says Dr. Thomas Hecker, D.P.M. "Most people don't know what type of running shoe is best for their foot."

Pronation is the term used to describe the normal motion of the foot rolling slightly inward through the foot strike. Pronation is essential to shock absorption and forward propulsion. It's

when you overpronate or underpronate that you need to be particular about the running shoe you choose.

What Kind of Pronator Are You?

The arch of your foot plays a major role in pronation. The three different arch types (normal, flat, and high) correspond to the degree of pronation you're most likely to experience. You can get a good idea of your arch type by doing a Wet Foot Test. Just follow the simple steps below.

- Wet the bottom of your foot
- Step onto a piece of dark construction paper, untreated concrete or any surface that will show an imprint of your foot
- Match your imprint to one of the arch types below to determine your degree of pronation

Note: Another way to determine arch type is to look at the outsoles of your old running shoes, although this method is less reliable than the Wet Foot Test. If the sole is worn equally on both sides, you most likely have a normal arch. If you have a flat arch, the sole will show excessive wear on the inside. A high arch usually produces a sole with noticeable wear on the outside. Be sure to look at the wear pattern on the entire shoe, and not just the heel.

Normal Arch = Neutral Pronation

Notice the wear pattern is uniform and centered closer to the middle of the sole. The textured rubber is still present on both sides of the sole.

The most common arch type, the normal arch, leaves a wet print with a flare and a broad band connecting the heel and the forefoot. This foot type is a neutral pronator and rolls inward slightly to absorb shock. If you have a normal arch, you're considered bio-mechanically efficient and don't need motion control features. The best part about having a normal arch is that you have more freedom when picking a running shoe.

The Shoes for You

Cushion running shoes are the most flexible and encourage natural pronation, with added arch support and shock absorption. Alternatively, some neutral runners may prefer Stability Shoes with light support features on the medial side. If you run with a midfoot-strike style, you may prefer minimalist shoes. Avoid motion control shoes.

Flat Arch = Overpronation

Notice the increased wear and lack of texture on the medial side (inside) as compared to the lateral side (outside), which still has the texture intact.

If you make a complete or nearly complete foot imprint, you have a Flat Arch. This type of foot is commonly associated with overpronation, or an excessive inward roll after heel strike. The flatter the arch, the more support and motion control you need.

The Shoes for You

Ideal for low arches, Stability shoes have light support features and well-cushioned midsoles to help guide mild-to-moderate overpronation. If you have very flat feet, you'll be much better off with Motion Control shoes that incorporate extra stability features on the medial side to help control significant overpronation. Steer clear of cushion shoes and minimal shoes that lack stability features.

High Arch = Underpronation (Supination)

Notice the increased wear on the lateral side (outside) while the medial side (inside) is relatively untouched.

The least common arch type, the High Arch, will produce an imprint showing the heel and forefoot connected by only a thin band. This foot type usually doesn't absorb shock well because it rolls outward or underpronates (also known as supinating).

The Shoes for You

Cushion shoes are the most flexible and encourage pronation. They incorporate extra cushioning, arch support and shock absorption. For even more arch support, you may also consider buying a customized pair of insoles. If you try minimal shoes, be aware this style offers only limited cushioning and light arch support. Avoid Motion Control shoes and Stability shoes.

Running Shoe Tips

Sizing Up

Many runners find the best fit comes from going up at least half a size up for a little extra room in the toe box. If you normally wear a size 10 shoe, you may prefer a 10.5 or even an 11 for running. Another issue noted by Dr. Hecker is that many people already tend to wear shoes that are too small for their feet. Aim for a thumb's width between your longest toe and the end of the shoe. Also remember that your foot will expand when running. Sizing up will help you avoid black, and soon-to-be missing, toenails.

Retire Worn-Out Running Shoes

Unless you only run when the moon is full, your running shoes won't last as long as your everyday shoes. Wearing worn-out shoes is as bad as wearing shoes that don't fit. "Many injuries occur because a runner continued to wear a shoe after it had broken down", says Dr. Hecker. "Most injuries can be remedied with a simple change of shoe". On average, running shoes are only designed to handle about 500 miles. For example: If you put in five miles, five days a week, your shoes will probably be toast in less than six months. Also, according to Dr. Hecker, people with higher arches wear out their shoes faster.

Rotate Your Running Shoes

If you find a pair that you really like, we highly recommend getting a second or even a third pair. Many runners choose to rotate several pairs of running shoes at the same time, even if they're the same make and model. Once you get all your shoes broken in and start a rotation, you'll go much longer before buying and breaking in a new pair. Plus, if you can't find your favorite model in six months, you'll already have another pair ready to go, giving you ample time to shop around for another model that you'll like.

Get Running Socks

Owning several pairs of lightweight, moisture-wicking, breathable running socks is totally worth the small investment. Synthetic blends and merino wool blends are generally the best. Avoid cotton socks. They don’t wick moisture well and dry very slowly, which can contribute to abrasion, hot spots and blisters.

Don't Judge a Shoe by Its Cover

Never choose a pair of running shoes based on looks alone. You won't care what color they are if your feet hurt.

Go Mesh

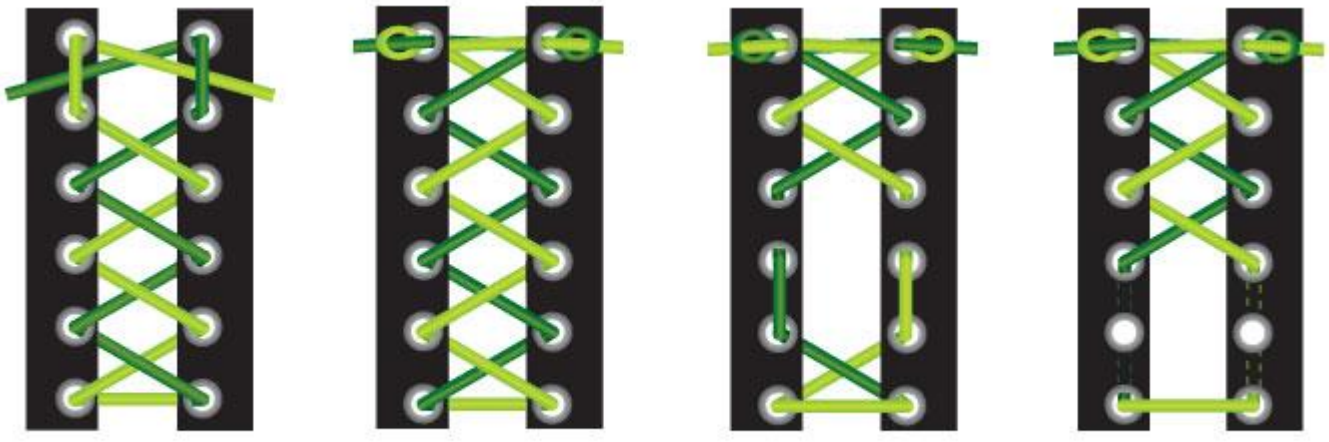
Most running shoes have mesh uppers, and this is a very important feature. Mesh breathes well and provides necessary ventilation. This will help keep your feet cooler and drier, which will minimize bacterial growth and odor.

Invest in Quality

A trip to the doctor or physical therapist will end up costing you a lot more (in money and discomfort) than you could ever save by purchasing cheap, off-brand shoes at the discount store. Consider putting your trust in a proven brand name like New Balance, Brooks, Asics, Saucony or Pearl Izumi.

Running Shoe Lacing Techniques

Many people underestimate the power of proper lacing. Instead of overtightening your shoes, try these simple techniques to ensure a secure fit. "Forefoot nerves are superficial and easily damaged by shoe laces that are tied too tight, "says Dr. Hecker. Use the extra eyelet at the top of the shoe to "lock" the laces in place.



Lock Lacing for Heel Slippage

If you experience heel slippage, lock lacing will help. Lace the shoe normally until the lace ends emerge from the second set of eyelets. Then feed the laces up each side and into the top eyelet towards the foot. Now cross laces over, and feed each under the vertical section of the other side. Pull and tie normally.

Loop-Lacing Lock

This method of lacing is great to ensure a secure fit for any running shoe. After lacing, put each lace end back through the last hole to create a small loop on the top side of the shoe. Thread each loose end through the loop on the opposite side, pull and tie to create a tight closure.

High-Instep Lacing

If you have a high instep, this lacing technique might make you more comfortable. Start with normal lacing at the bottom, then feed the laces up each side of the shoe and cease to criss-cross. Once at the top, continue the criss-cross technique and tie for a secure closure.

Wide Forefoot Lacing

If you have a wide forefoot, consider buying shoes especially designed for this issue. You can also try this simple technique. Begin by feeding the laces up each side of the shoe and only use the criss-crossing technique towards the top. Tie for a secure closure.

Minimalist Running Shoes

What Are Minimal Running Shoes?

Traditional running shoes place protective rubber soles and shock-absorbing midsoles under the foot, with slightly more material under the heel. This is because many athletes run in a heel-strike style, where the heel contacts the ground first, followed by the midfoot, followed by the forefoot push off. In running shoes, "offset" is the difference between the height of your heel and the height of your forefoot when your foot is inside the shoe and resting on a flat surface. Another way to describe offset is heel-to-toe drop. "Zero-drop" shoes, for example, keep the heel of the foot on the same plane as the toes, with zero offset. Traditional running shoes have more drop than minimalist shoes.

There are two main categories of minimalist running shoes:

- **Barefoot Running Shoes** fit like a glove and have the bare minimum of material underfoot, with very little cushioning and no offset between the heel and toe (zero drop). These shoes are designed to be worn without socks. Some models even have individual compartments for each toe, allowing the toes to flex and move individually. Barefoot running shoes take time to get used to, especially if you're accustomed to traditional shoes. They also provide the least amount of shock absorption.
- **Minimalist Running Shoes** occupy a middle ground between super-minimal barefoot shoes and traditional running shoes. This style offers a little more cushioning and a slight heel-to-toe drop, usually less than 8mm. Although they're lighter and less cushioned than traditional running shoes, minimal shoes still provide some shock absorption.

Should You Try Minimalist Running Shoes?

This largely depends on two factors: your running form and your feet. In order to run safely and efficiently in this kind of footwear, a midfoot strike running style is preferred. Running this way isn't simply a matter of switching shoes or changing how your feet contact the ground. It involves working on your entire running form. Correct posture, cadence and a slight forward lean will help keep your body properly aligned for an efficient midfoot running style. If you're used to running in a heel strike style, adapting to midfoot style will take practice, and it's important not to rush the transition. If you can comfortably run five miles in traditional shoes, start with only one or two miles in your new minimal shoes, adding more distance gradually over several months. Focus on your form, not your speed or distance. Of course, you can run using a midfoot strike style and still wear traditional running shoes. In fact, some runners prefer it. It's all a matter of what works best for you.

Your feet and body are another big consideration. Minimal shoes don't offer much arch support or cushioning. Barefoot shoes offer almost none. If you're prone to injury, such as plantar fasciitis or Achilles' tendinitis, you should pay extra attention to your form. Running with a midfoot strike in minimalist running shoes requires a consistant technique and strengthening different muscles.

Bottom Line: Finding shoes that work well with your running style and individual biomechanics is the most important thing. If you've been running for years with a heel-strike style and haven't had any issues, stick with what works. If you're considering going minimal to improve your form and reduce impact on your body, make the transition slowly. If you've never run before, figure out what form works best for you, then buy shoes to match.

http://www.sierratradingpost.com/lp2/running-shoe-guide/

Sources

- Dr. Hecker received his D.P.M in 1994 from Scholl College of Podiatric Medicine and currently practices at the Orthopaedic Center for the Rockies in Fort Collins, CO.
- Bill Michel is the Assistant Manager of the Runners Roost, Fort Collins, CO.

Support

By support, most people are referring to stopping the medial arch of the foot "collapsing," which brings us back to the whole supination/neutral/pronation paradigm used by most running shops to prescribe you a "suitable" trainer after watching you walk or run for a couple of minutes (or in some cases just *standing* you on a pressure pad, which in itself has no connection to how your foot acts whilst running). I am sure you are already familiar with the process:

- If the arch of your supporting foot drops "*too much*" you are labelled an "*overpronator*" and assigned a motion-control shoe that will in theory reduce the "overpronation".
- If your arch does not drop "*enough*", you are said to be an *underpronator* (or *supinator*), and assigned a flexible, cushioned shoe to absorb some of the shock that *underpronator* is said to cause.
- If you are somewhere in the middle, you are said to have *normal pronation* and are recommended a "neutral" shoe that in theory provides just the right amount of stability and cushioning.

this model is heavily flawed and unsupported to date by any evidence. It is important *not* to let fear of injury or promises of recovery persuade you to be herded into one of the three pens (motion control, stability or neutral) however persuasive the sales person may be!

Cushioning

If you regularly run on hard surfaces like pavements, tracks and treadmills, you would think cushioning makes sense. Running shops can be very quick to stress this point if they "see" you as a heel striker. And yet, studies show (Scott, 1990) that peak loads at typical sites of injury for runners (Achilles, knees, etc.) actually occur during midstance (when your bodyweight passes over the supporting leg) and toe off (when your back leg pushes away from the ground).

These studies suggest that impact force at heel contact has no effect on the peak force seen at typical injury sites.

There is also growing evidence that when faced with higher impact forces from a harder running surface, your body makes natural adjustments to deal with the change in impact force – changes in joint stiffness, changes in the way the foot strikes the ground, and also via a concept called "muscle tuning" (pre-activation of muscles prior to impact).

Based on information received visually and from the previous foot strike, the body adjusts how strongly the muscles in your leg contract before the foot hits the ground again. Imagine jumping on a trampoline – your legs naturally *stiffen* in preparation for the *soft* landing.

Now imagine yourself jumping onto concrete – your legs naturally become *less stiff* in preparation for the *hard* landing. This natural adjustment is the result of sensory feedback from not only the eyes but also from the feet. In other words, the theory is that sensory feedback from the feet following one foot strike helps prepares the body for the next foot strike. If this is indeed

the case, could excessive cushioning at the bottom of a trainer inhibit this natural sensory feedback?

Cushioning & injury prevention

The role that impact actually plays in running injuries is not at all clear. Studies by two highly respected biomechanics researchers, Dr. Irene Davis (Director of the Running Injury Lab, University of Delaware) and Dr. Benno Nigg (Co-Director of the Human Performance Laboratory, University of Calgary) have produced contrasting results.

Whilst Dr. Davis' research links high impact loading rates with plantar fasciitis and tibia stress fractures, Dr. Nigg has found that *overall* injury rates are slightly *lower* among runners with high impact loading rates.

One possible interpretation of the above is that *leg stiffness*, as we considered earlier, is an important factor with certain injuries. Dr. Davis' research linked runners who had suffered tibia stress fractures with *higher* impact forces and higher *leg stiffness*.

If tibia stress fractures are a consequence of high leg stiffness then *maybe* runners susceptible to them should try wearing a *less* cushioned shoe and run on *harder* surfaces.

Just as we saw in our "landing on concrete" example earlier, in preparation for the harder surface, the body will *reduce* leg stiffness, which if the theory is correct could reduce susceptibility to tibia stress fractures.

At this stage it is all theory, and I draw particular attention to the words "*maybe*" and "*try*". Always introduce changes slowly and gradually! Give your body a chance to tell you how it feels about the change before you do any harm to yourself!

Traditional running shoes have a heel-toe drop of about 12mm. Vibram Fivefingers have pretty much a drop of 0mm. Going straight from 12mm to 0mm is *not* taking things slowly or listening to your body! There are plenty of 6-10mm transitional trainers on the market which will allow you to experiment more gently.

BARE FOOT RUNNING FACTS

Barefoot running and running in minimalist shoes have received much attention in the scientific literature and media over the past few years. However, only 25%-30% of runners have reported using minimalist footwear on a regular basis [1, 2], and only 2% run barefoot on a regular basis [1]. In fact, only 20% have reported trying to run barefoot [2].

Impact has been associated with stress related injuries to the tibia. By changing the strike pattern, the impact is potentially removed from the lower leg, but those impact forces are likely moved to the foot as a result. In fact, foot stress fractures have been related to increased loads.

While midfoot or forefoot striking reduces the impact forces at the knee, it concurrently increases the demand on the ankle muscles. If the logic is that reducing load in 1 structure will decrease injury, then increasing load in another structure should increase risk of injury. It is yet to be determined if either of these is true.

Runners adopt more of a midfoot strike pattern as they run faster. In fact, 73% of competitive runners in the 800 m and 1500 m events have a midfoot or forefoot strike pattern [11]. However, during a marathon or half marathon, 88.9% of runners are rearfoot strikers [12].

Researchers reporting in the Jan. 28 issue of the journal *Nature* show that runners who run without shoes usually land on the balls of their feet, or sometimes flat-footed, compared to runners in shoes, who tend to land on their heels first.

The scientists, using motion and force analyses, showed that barefoot runners who strike on the fore-foot (land on the balls of their feet) generate smaller collision forces than shod rear-foot strikers.

By running on the balls of the feet or the middle of the foot, runners avoid more forceful impacts, equivalent to two to three times of body weight, that shod heel-strikers repeatedly experience.

Modern people have grown up wearing shoes, so running barefoot is something to be eased into, Lieberman says. He suggests runners who want to shed their shoes do so slowly, to build strength in the calf and foot muscles

Advocates claim that running barefoot improves foot biomechanics and reduces injury risk

Some experts agree with the shoeless runners; wearing shoes causes the small muscles in our feet to weaken and the tendons, ligaments and natural arches to stop doing their job. They believe that the result of supportive shoe inserts, orthotics and extra cushioning is poor foot biomechanics and increased risk of foot, leg and knee injuries.

benefits of bare foot or minimal wear runners

- You may develop a more natural gait and strengthen the muscles, tendons and ligaments of the foot.
- Removing the heel lift of most shoes helps the Achilles tendon and calf muscle stretch and lengthen and **may reduce injuries**, such as calf pulls or Achillies tendinitis caused by short, tight tissues.
- Runners will **learn to land on the forefoot** rather then the heel. The heel strike during running only came about because of the excessive padding of running shoes, but research shows this isn't the most effective natural running stride. Landing on the heel is

essentially putting on the breaks every step. The most efficient runners land on the midfoot and keep their strides smooth, light and flowing. Landing on the forefoot also allows your arches to act as natural shock absorbers.

- You may **improve balance and proprioception**. Without shoes, you activate the smaller muscles in your feet, ankles, legs, and hips that are responsible for better balance and coordination.
- You may **feel more grounded**. Being barefoot helps you improve balance, but it also helps you stay grounded and connected with your environment. You'll learn to spread your toes and expand your foot while it becomes a more solid and connected base that supports all your movements.

Cons of bare foot running

- **Why Fix What Isn't Broken?**
  If you have no problems and no pain, do you really need to change anything?
- **Little Foot Protection**
  Shoes offer a significant amount of protection from road debris such as glass, nails, rocks and thorns. They also offer insulation in cold weather and protect us from frostbite in ice and snow.
- **May Increase Achilles Tendinitis and Calf Strain**
  Most of us aren't used to going barefoot, so a minimalist shoe will be a shock to our feet and our muscles will initially feel overworked. In some people, this may even lead to injuries such as Achilles tendinitis or calf strain when the typical heel lift is removed from the shoes.
- **May Increase Plantar Pain**
  The bottom of the feet (plantar surface) for most people is soft and tender. Going without a stiff-soled shoe may initially cause plantar pain, or in those susceptible, increase the risk of plantar fasciitis.
- **Get Ready for Blisters**
  Almost everyone who switches to a minimal shoe or starts going shoeless will find themselves battling blisters for the first few weeks until calluses are formed.
- **You Will Look Strange**
  Face it: People will notice, and they may stare.
- The barefoot running trend has spread to the shoe manufacturers. And although it may sound like an oxymoron -- shoes for barefoot running, some of the larger shoe makers are embracing the semi-barefoot movement by making minimalist shoes that offer little more than a rubber sole for protection from the pavement. Nike Free, Terra Plana and, more recently Vibram FiveFingers (like little gloves for the feet) are gaining fans, and market share, quickly.
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- The key to successful barefoot running seems to be the ability to **use** the nerves in your feet, to Feel The World. Basically, if you try to run barefoot the same way you do when you're in shoes, IT HURTS
- no science that shows that running shoes are helpful.

- The three parts of our body that have the most nerve endings are our hands, our mouths and our feet. There's only one of those that we regularly cover and make numb to the world… does that seem right?

Thirty to 70 percent of runners suffer some kind of repetitive stress injury every year

Barefoot running is not about being lighter or faster without shoes its about connection and feeling the ground, better propioception and balance.

They're great, and unlike running shoes, they don't make you lean forward when you do squats.

Many people make the mistake of doing too much, too quickly, and that's a big mistake. It can lead to pain, injury, and discouragement. Remember, your feet, ankles and calves are weak from running or walking with shoes all the time. You will find a lot of soreness if you go too far or too fast. You need to build it up slowly, gently.

The Barefoot Running Form

Some notes on form:

- Land on your forefeet or midfeet (balls of your feet) instead of your heels. Too much on your forefeet can make your calves sore. If you feel yourself landing on your heels, shorten your stride.
- Strides should be short — don't extend your legs as far as you do with shoes. It should feel almost like you're running in place.
- Keep upright and balanced. Keep your feet under your hips and shoulders.
- Stay light. You should feel like you're light on your feet, not pounding at all. Barefoot runners tend to be a little more springy in their step.
- Run quietly. If you are making a lot of noise with your steps (as shoe-wearing runners do), you're pounding too hard. Try to run softly, quietly, like an animal.

2. Slowly lengthen the time you run barefoot (or with barefoot shoes). Just a minute or two longer, a few times a week. Go slowly — don't try to sprint or run hard. Continue to run lightly, working on not pounding. Try different surfaces — asphalt, concrete, grass, dirt. Let your body slowly adapt to this new running style, and your muscles slowly get stronger.

3. Eventually, you can do shorter runs completely with barefoot shoes. Shorter runs might mean 15-30 minutes if you're an experienced runner, or perhaps 10 minutes for a less experienced runner. For longer or harder runs, you might still wear shoes for now, because you're not ready for long or hard runs barefoot. Let this phase take several weeks.

4. Eventually you can stop using your running shoes. Especially if you have barefoot shoes and are used to running in them for longer runs. Your feet and legs should be stronger at this point. It might take a couple months to get to this point. I let my Asics sit in the closet for a month before I got rid of them.

Everything you want to know about Barefoot Running can be found on this website , the research of Dr. Lieberman at Harvard University

http://www.barefootrunning.fas.harvard.edu/

"Our research asked how and why humans can and did run comfortably without modern running shoes. We tested and confirmed what many people knew already: that most experienced, habitually barefoot runners tend to avoid landing on the heel and instead land with a forefoot or midfoot strike. The bulk of our published research explores the collisional mechanics of different kinds of foot strikes. We show that most forefoot and some midfoot strikes (shod or barefoot) do not generate the sudden, large impact transients that occur when you heel strike (shod or barefoot). Consequently, runners who forefoot or midfoot strike do not need shoes with elevated cushioned heels to cope with these sudden, high transient forces that occur when you land on the ground. Therefore, barefoot and minimally shod people can run easily on the hardest surfaces in the world without discomfort from landing. If impact transient forces contribute to some forms of injury, then this style of running (shod or barefoot) might have some benefits, but that hypothesis remains to be tested."

Heel strike and ground reaction video is great. The question remains, if we cause greater wear and tear on our knees and hips running in shoes. In **forefoot striking,** the collision of the forefoot with the ground generates a very minimal impact force with **no impact transient.** Running barefoot has been shown to use about 5% less energy than shod running

Disadvantages of Forefoot Striking Barefoot or in Minimal Footwear

- Thick-soled shoes are much more forgiving when running over glass, sharp objects, ice and so on.
- If you have been a heel striker, it takes some time and much work to train your body to forefoot or midfoot strike, especially because you need stronger feet and calf muscles. Runners may be at greater risk of developing Achilles tendonitis when they switch from heel striking to forefoot or midfoot striking.

Tips on Transitioning to Forefoot or Midfoot Striking

Forefoot striking barefoot or in minimal footwear requires you to **use muscles in your feet (mostly in the arch) that are probably very weak.** Running this way also requires much **more strength in your calf muscles** than heel striking because these muscles must contract eccentrically (while lengthening) to ease the heel onto the ground following the landing. Novice forefoot and midfoot strikers typically experience tired feet, and very stiff, sore calf muscles. In addition, the Achilles tendon often gets very stiff. This is normal and eventually goes away, but you can do several things to make the transition successfully:

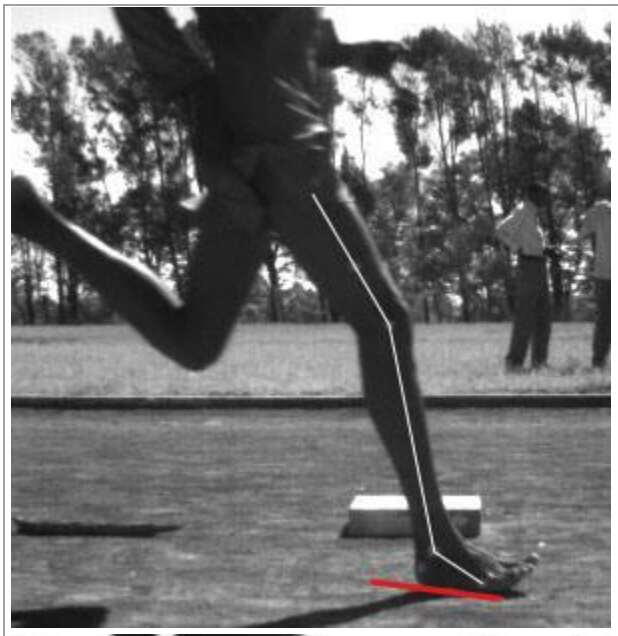
- **Build up slowly!** If you vigorously work out any weak muscles in your body, they will be sore and stiff. Your foot and calf muscles will be no exception. So please, don't overdo it because you will probably injure yourself if you do too much too soon.
    - Start by walking around barefoot frequently.
    - **First week:** no more than a **quarter mile to one mile** every other day.
    - **Increase your distance** by no more than **10% per week.** This is not a hard and fast rule, but a general guide. If your muscles remain sore, do not increase your training. Take an extra day off or maintain your distance for another week.
    - **Stop and let your body heal if you experience pain**. Sore, tired muscles are normal, but bone, joint, or soft-tissue pain is a signal of injury.
    - **Be patient and build gradually.** It takes months to make the transition.
- If you are currently running a lot, you don't need to drastically reduce your mileage. Instead, supplement forefoot or midfoot striking with running the way that you normally ran before beginning the transition. Over the course of several months, gradually increase the proportion of forefoot or midfoot striking and reduce the proportion of running in your old style. Use the same 10% per week guideline in increasing the amount of running you do forefoot striking.
- It is essential to **stretch your calves and hamstrings** carefully and regularly as you make the transition. **Massage your calf muscles and arches** frequently to break down scar tissue. This will help your muscles to heal and get stronger.
- Listen to your feet. **Stop if your arches are hurting, if the top of your foot is hurting, or if anything else hurts!** Sometimes arch and foot pain occurs from landing with your feet too far forward relative to your hips and having to point your toes too much. It can also occur from landing with too rigid a foot and not letting your heel drop gently.
- Many people who run very slowly find that forefoot striking actually makes them run a little faster.

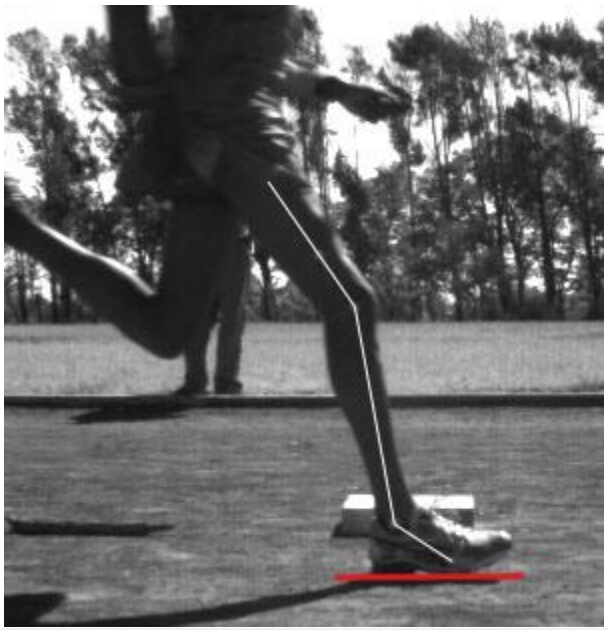
Is There Anything Wrong With Heel Striking in Running Shoes?

Not necessarily! Many people like to run this way and do so without injury. But some runners get repetitive stress injuries each year (estimates vary from 30-75%) and **one hypothesis is that heel striking contributes to some of these injuries. We emphasize though, that no study has shown that heel striking contributes more to injury than forefoot striking.** Read on to learn more about forefoot striking.

Elite Kenyan Runner
This individual grew up running barefoot, but now wears shoes

Running Barefoot	Running in Shoes





Click the images to watch the videos
Note that this runner's leg is positioned in the same way at foot strike whether running barefoot or in shoes. When running **barefoot** this runner **forefoot strikes.** When running in **shoes** he has a **midfoot strike.** Without any apparent changes in the positioning of the runner's leg or foot, the wedged shape midsole of the shoe affects how the runner's foot contacts the ground.

Do barefoot runners get injured less?
Barefoot runners often adopt forefoot or midfoot strike gaits and have a softer, more gentle landing, which may reduce their risk of injury. While there are anectodal reports of barefoot runners being injured less, there is very little scientific evidence to support this hypothesis at this time. Well-controlled studies are needed to determine whether barefoot running results in fewer injuries.

Is barefoot walking beneficial?
Probably. Even if you are not a runner, walking barefoot can help to strengthen the muscles of the foot and ankle. And if you are a runner, strengthening these muscles will allow you to run better barefoot.

Should I avoid a heel strike when walking barefoot?
This is not an issue we have studied yet much, but our observations are that its totally normal to heel strike when walking, even when barefoot. That said, barefoot walkers often walk with a less pronounced heel strike or more of a midfoot strike. One study has shown that heel strike walking is more efficient than forefoot strike walking

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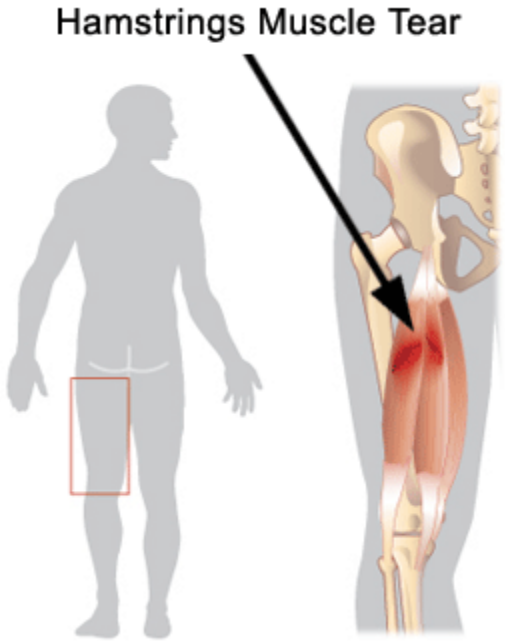
Hamstring Strains



A strain is a minor tear of a muscle. Quick acceleration while running or cutting is most often the cause of hamstrings strains. A minor pulling or a pop may be noted in the back of the thigh. Pain, swelling, and an inability to run result. Treatment includes rest, ice, compression, elevation, and physical therapy.