A practical guide to the art and science of barefoot and minimalist shoe running

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The journey started with a crushed dream. It was a hot, sticky day in late July, 2005. I was lying in a ditch surrounded by dried mud. Tiny gnats floated above my head and bristle-like grass poked at my skin. The sensation of lying there provided a brief reprieve from the pain shooting through my legs. Try as I might, I could not muster the strength to climb back to the road.

While lying there, blankly staring at the wispy clouds above, I was forced to accept the fact that my dream of running a 50-mile ultra-marathon was going to remain just that—a dream.

Five months earlier, while training for what would be the toughest physical goal I ever attempted, I was foolishly overconfident in my abilities. Why not? I had faced adversity before believing hard work coupled with unwavering determination would make it happen.

But I was wrong. My body simply could not take the beating. I had developed plantar fasciitis resulting in me hobbling out of bed each morning. Every step was met with a searing pain that took hours to extinguish. I had also developed shin splints which made me feel as if my lower legs would snap at any moment. To make matters even worse, I developed what felt like a fractured pelvis and my kneecaps hurt so much I had to walk backwards down stairs.

Through all of that I persevered and trained when I could, sometimes missing days at a time in a feeble attempt to heal my broken body. One day while attempting to keep to my training schedule of running 30 miles, I was at the 12-mile mark when two semis passed one another. In an attempt avoid them I accidentally stepped on loose gravel at the edge of a steep ditch. Most people would have simply adjusted their weight but in my broken-down state, the best I could muster was to frantically wave my arms. With my barely-functional legs I could not respond fast enough and ended up tumbling down the embankment.
Oddly, the fall did not hurt as much as the pain from running. At that moment I realized there was no way I would ever be an ultrarunner. The best I could hope for was suffering through a marathon.

After dragging myself out of that ditch I took a few days off before easing back into training. A month later I ran a marathon. But it wasn’t the fifty miler I had dreamed of because the race, while fun, felt more like failure than a victory.

Later that winter I began to research better training methods. I was looking for an answer, any answer, in order to finish that same 50-miler the following year. My research led me down many paths from low heart rate training to Gallowalking®. I researched low mileage and high mileage training, advances in shoe technologies, custom orthotics, and various braces and devices runners use to support their various ailments.

One day I stumbled across an obscure article in an academic journal where an author was making a case for barefoot running. The hypothesis was simple: running without shoes strengthens your feet and forces you to run with good form. It was an intriguing idea and ran polar opposite to every bit of information I had researched. For me, the selling point was simple—I used to run barefoot.

My first attempts at barefoot running occurred way back in 1992 while preparing for high school wrestling.

At the time I was running with a good friend of mine, Jason Saint Amour. We had the idea of running barefoot on asphalt to “toughen our feet.” And, in my first experience with minimalist shoes, we would routinely run in wrestling shoes. At the time our friends thought we were crazy. Who knew at the time we were just a couple of early adopters!

Over the next 13 years, I was a sporadic recreational runner. My goals were to keep fit while attempting to maintain a reasonable weight. All the while my waistline was slowly expanding due to my love of beer, bacon, and gas station hot dogs.
Then in 2004, I met my wife Shelly who introduced me to the concept of regular exercise including several weekly runs totaling 10–15 miles. Though I had always enjoyed running, it wasn’t until then that I began taking it seriously. During those runs I always wore shoes. It was early in our relationship and I didn’t want to reveal my past interest in barefoot running just yet.

Because I was now a semi-serious runner, I felt I needed formal running shoes. A local big-box sporting goods store advertised a major shoe sale. When I arrived, a teenage salesperson named “Duane” helped me by measuring my feet and giving me a few suggestions. I tried on a few pairs, parading back and forth in front of Shelly and Duane. Two pairs were especially comfortable; the padding in both made it feel as if I were walking on marshmallows. It seemed like a good decision. I had what I thought were comfortable running shoes and was now ready to run in a race.

That next year, in 2005, we decided to run a 15K road race. Even though running in shoes over longer distances felt strange, I adapted the same technique I saw other runners using. They would land on their heel and roll their foot forward. For me it still felt awkward, but seemed to work. Even though that particular race was fun and went well, I did lose several toe nails and did experience pain. Undeterred, the following day I committed to a 50-mile race.

The rest of that summer I obsessively worked toward my ultimate goal of successfully running a 50-miler. Unfortunately my body did not cooperate and injuries started piling up. As a result I started skipping one workout a week and relying on ice baths to ease the pain after every run.

As a quick sidebar—ice baths that involve submerging anything above the thighs should be classified as torture. There are certain parts of our anatomy that were not designed to be submerged in 40° water.

A friend who noticed the pain I was experiencing suggested I go to a local specialty running store for new shoes. Apparently
Duane, from the big box retail store, wasn’t the expert I assumed. At the running store the salesperson seemed to be more knowledgeable. He had me dip my feet in water and stand on a piece of paper to measure my arches. Apparently they were “normal.”

Then he had me walk on a treadmill (barefoot, mind you). He used a term I was vaguely familiar with: pronation. I was a mild overpronator. He gave me what he described as the perfect pair of shoes. When I explained my experience with Duane we shared a good chuckle about my naivety. Duane clearly did not have the shoe fitting expertise the running store could provide.

I went home and resumed training, confident my new professionally-fitted shoes would eliminate my debilitating injuries. I was wrong. The pain multiplied.

Everything culminated on that fateful day when I plunged into the ditch. It was my low point, both literally and figuratively. I never forgot the feeling of complete and total failure, the stabbing pain of defeat, the emptiness of hopelessness. I felt I wasn’t capable of anything. I had limitations.

The following spring, those feelings became the fuel that lead me to immerse myself in the world of barefoot running. There were few resources at the time. Ken Bob Saxton, Ted McDonald, and Rick Roeber had informative websites. Ken Bob ran a discussion group on Yahoo and there were a handful of academic papers. I drank in all I could. I experimented. I practiced. And I challenged myself.

While I would like to say those early days went well, they did not. Instead they were filled with every “rookie” mistake I could make. But I stuck with it and continued to learn and to refine.

That September I finished the 50-miler. I had accomplished the goal that had eluded me the previous year. Over the next few years, I continued to learn about barefoot running, slowly mastered the craft and started a website to share my experiences. I had no idea that simple, poorly-designed website would lead me to where it has.
In 2009, I was invited to join a barefoot running forum on the *Runners World* website. This led to many discussions with both novice and experienced barefoot runners. I came to the realization that I had a lot of information to share. Being a teacher by trade, I enjoy helping to spread knowledge, and started a series of barefoot running clinics. To supplement the clinics, I started writing brief essays on various topics related to barefoot running.

At some point, people started asking for copies which led to printing them in book form. Those were the humble beginnings to this book.

Starting in the fall of 2009, I began to revise and refine the content of that first book by adding information and honing concepts. This new edition of the book is the culmination of my own experiences, the input of hundreds of barefoot runners, a thorough examination of the current research and applications, along with a touch of my own special brand of teaching (i.e.—bad humor). I have even solicited the ideas of barefoot running skeptics. The resulting learning process includes easy-to-understand practical ideas that are free of the dogma that sometimes accompanies barefoot running discussions.

This book will teach you how to run barefoot in a way that is simple, direct, and easy to understand. I do not make wild claims that barefoot running will turn you into an Olympic-caliber athlete or that barefoot running is free from potential risks. The pages are not filled with needless fluff. Well, there’s some fluff—I included my 2009 Hallucination 100-mile race report. It was the first 100-miler I finished and the culmination of my barefoot running efforts which are a testament to the information contained in this book.

I am just an ordinary guy of questionable athletic ability. But if I can finish a 100-mile race, you can also accomplish your running ambitions.

My goal is to teach you in the safest, most efficient way, and hopefully inspire you to accomplish extraordinary things.
Acknowledgements

This project would not be possible without the unconditional support of my wife Shelly. Your encouragement and love has changed my life. I will be forever grateful. I would also like to thank my crew at the Hallucination 100-Mile Run: Jason Saint Amour, Mark Robillard, Michael Helton, and Stuart Peterson. You guys helped me reach the loftiest of my goals. I would like to thank Rich Elliott for always being one step ahead of me in the crazy department and Pete Kemme for motivating and educating me about the art and science of physical conditioning. Dirk Wierenga deserves credit for turning this project into something truly special. I would like to thank Tamara Gerken, Joel Wermiel, Todd Johnston, Richard Knobb, Sharon Bylsma, Shelley Viggiano, Ngoc Bui, and Joe Kurnik for their contributions to this project; it would never have gotten off the ground without you. I would like to thank Tim Looney, Jeremiah Cataldo, and Phil Stapert. Your bits of ultra advice got me to the finish line. I would like to thank Ken Bob Saxton, Rick Roeber, and Ted McDonald. You guys were the pioneers that taught me in the beginning. I would like to thank the contributors to the Runner’s World® Barefoot Running Forum. You guys have taught and inspired me. Many of the ideas presented in this book are the direct result of our many conversations. Finally, I would like to thank the Flying Spaghetti Monster. His Noodly Appendages guided me throughout the creation of this project.
Disclaimer

The material contained in this book is for informational purposes only. The author and anyone else affiliated with the creation or distribution of this information may not be held liable for damages or injuries of any kind allegedly caused or resulting from the use of this material.

Before beginning this or any type of exercise program, it is recommended that you consult with your physician for authorization and clearance.

Furthermore, if you have any medical condition that affects the tactile sensations or blood flow to your feet or legs (diabetes, neuropathy, etc.), you should not attempt barefoot running.

The information contained herein is not intended to, and never should, substitute for the necessity of seeking the advice of a qualified medical professional. It is my sincere desire to provide information that enhances your running experience and allows you to reach your potential. This will only happen if you stay healthy, injury free, and use common sense.
Why Barefoot Running?

People run barefoot for a variety of reasons. I started running barefoot because of injuries incurred while running a 15K, a trail marathon, and a road marathon in traditional running shoes. As I discussed in the preface, I suffered blackened toenails, plantar fasciitis, chronically sore knees and hips, a reoccurring lower back pain, and shin splints. It was if I had aged 20 years! After doing some research, I decided to try barefoot running once a week. Within a week I fell in love with it and abandoned my running shoes. Other people have different reasons for giving it a try, including:

• Don’t enjoy running—looking for something to make it fun
• Strengthen their feet
• Reduce injuries
• Inspired by books such as *Born to Run* by Christopher McDougall
• Reminiscent of childhood
• Don’t like the feeling of sweaty, smelly socks and shoes
• Long-time runners looking for a new challenge
• Want to run in a more natural way
• Simplifying their lives
• Rebel against society

Remember—you should be in good health before beginning barefoot running or any physical activity.
Interested in Barefoot Running?
Here are encouraging words from others who have switched.

From Barefoot Rick:

There are several reasons why I began running barefoot, and even more why I continue. When I began in October 2003, I was fascinated by the idea that one could run without shoes. I have always loved going barefoot, so this seemed very logical to me. I read up on barefoot running and discovered that barefoot runners experienced far fewer injuries because of the ball/heel foot strike. Shoe companies have always built the heels up too much on their products—even running shoes. The result is heel-striking which can cause knee and leg problems. Since I started running barefoot in October 2003, I have not experienced an injury to my knees or legs. That was not true when I wore shoes. I experienced a stress fracture in my tibial plateau of my left knee and severe clicking in my right knee. Since running barefoot, I have no re-occurrences of problems associated with former injuries.

Here are a few reasons why I continue to run barefoot:

1. Injury-free due to proper foot strike.
2. It feels great!
3. I no longer have to support the running shoe companies.
4. I always have my running “shoes” with me.
5. Creates new challenges when running marathons (after 18 shod marathons, I was looking for a new challenge).
6. I believe it is the way we were created to run.

Barefoot Rick Roeber
http://barefootrunner.org
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**From Ken Bob Saxton:**

When learning to run barefoot—go BARE foot, and listen to your bare soles, don’t do more than your soles are ready for. Don’t put strains or stresses on your feet that are uncomfortable or painful, either to the soles, or the foot. Don’t work too hard.

Running should be easy, it should be comfortable, especially while barefoot. Avoiding movements, pressures, etc., which cause pain, discomfort, or seem like work, will teach people to run gently, smoothly, efficiently, and have fun!

Ken Bob Saxton  
http://BarefootKenBob.com  
http://TheRunningBarefoot.com

**From Barefoot Ted McDonald:**

Our ancestors moved over the earth ... and found their way into nearly every nook and cranny of the planet ... with their bare or minimally clad feet. The foot has been the primary vehicle of our success as a species, allowing us to fulfill our desire to explore, discover, achieve and eat. Yet, most people these days have come to see their feet as broken appendages, unfit for the real world, sickly and weak, prone to injury, in need of support and padding, doomed to suffer. Why?

Good question. What did happen? What made our feet sick? Did we devolve? Perhaps it has something to do with the shoes we wear?

Well, arguably, we are the first generation of runners who have worked with the hypothesis that more cushioning and support equals safer running and reduced impact. We have concluded that modern surfaces, hard and unforgiving, require ever-thickening sole padding to help counter the shocks of landing, but is that true?
It is counter-intuitive, but the truth is, and studies back this up, that the more you block out the feeling of impact in your feet, the more impact you are likely to put into your body, at the wrong time in your stride, by moving and landing differently than you would if you actually felt what you were doing.

All those nerves on the bottom of your feet have a purpose after all. Dulling them from sensing seems to be a bad idea ... and the dulling seems to set in motion a series of unfortunate events that ultimately leads to movement patterns unknown to our preeminently capable ancestors ... patterns that seem to lead to inefficient movement and injury.

By taking off your shoes, you give your body a chance to reuse some amazingly useful, built-in systems that help you move in a way that need not be jarring nor pounding regardless of the hardness of the terrain. A way of movement that more effectively captures and re-releases stored energy through elasticity in our bodies: the splaying of our forefoot, the arch in our foot, tendons in the lower legs, calves and quads, and form—all positioned ideally to absorb and recoil the energy of movement, smoothly and efficiently, operating in real-time, on the move, a kind of primordial physical intelligence, a birthright of Homo sapiens. This built in recoil system puts to shame the claims of the marshmallow soft, spring-loaded shoes that capture the imagination of so many.

So, what went wrong?

My hunch is that we got unplugged ... detached ... from our own bodies, from our own feet. That disconnect has led to gait patterns and running styles that are unique to a generation of runners ... we the first cohort in the history of the world to run distance with cushioned, high-heeled shoes. I think it is a case of the cure becoming worse than the ailment, the ailment being hard surfaces and tired bodies, trying to continue moving when the safe form of moving has exhausted itself and the feet and legs would normally protest about continuing ... unless you could give it a little relief, i.e., block pain brought on by less-than-best landing patterns, but once it becomes a habit it ends up being a fundamental change in running form ... and in my opinion, a dying branch of cultural evolutionary experimentation.
Does it have to be this way?

Nope. Learning how to master the fundamental human capacity of running, sans shoes, is a lot easier than you think ... and does not require a purchase. Simply take off your shoes ... and start listening to your feet, listening to your body, moving without internal hard edges, with flow. Focus on incrementally redeveloping your feet and lower legs ... one step at a time, giving them a chance to feel the world and grow from interacting with it, learning from it. And become a student of your own body and of movement, share your experiences, learn and be inspired by others. Crack the nut of joyful movement in your own body, your own unique vehicle. The resources are available unlike at any other time for our generation. Google it.

The paradigm shift away from the over-engineered shoe is connected with other shifts in thinking about our bodies and being human. In your barefeet you are more connected to your body, better balanced, more aware, mindful, present. Those characteristics are good qualities to mimic in your mental life. There is a relationship between the two.

Becoming healthy in mind and body is an incredibly effective way to experience happiness it seems, and all my research into this topic leads me to feel confident that if you follow these insights to their logical conclusion, you too will become a happy, healthy and free thinking individual, comfortable and satisfied with the awesome inheritance your feet and body represent.

Barefoot Ted McDonald
http://barefootted.com
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Research Into the Relationship Between Athletic Shoes and Foot Injuries

Barefoot running has experienced resurgence in popularity over the last few years. Part of this resurgence is the result of interesting research about the nature of running injuries. Much of which is based on assumptions by runners in thinking the running shoes they use are designed to prevent injuries.

As researchers explore the relationship between injuries and footwear, some interesting relationships appear. In 1989 Dr. B. Marti published one of the first studies that seemed to link shoe properties with injuries. In his research, Marti tested over 5,000 runners that had finished a race. He found that runners that ran in expensive shoes (costing more than $95) were more than twice as likely to have been injured in the last year than runners that ran in cheaper shoes (costing less than $40). Who would ever think the plastic trainers from Walmart would be better than the latest $200 shoes on display in the window of their local running store?

Around the same time, in 1988, Hamill and Bates published a study that seemed to show that shoes improved as they wore out. Oddly, like a fine wine, they improved with age. This was because as the cushioning and motion-control aspects broke down, the foot was allowed to function more naturally. These two studies seemed to indicate the best shoes are old, worn-out, cheap shoes. It is no coincidence that the rate of running injuries was significantly lower prior to the advent of the modern running shoe (Froncioni, 2006). Imagine, running in thin-soled Converse All-Stars being healthier than today’s most technically advanced shoes!

Of particular interest to me is the Hamill and Bates study. This is because most shoe manufacturers recommend replacing shoes every 250–300 miles because the materials degrade with use. Perhaps a case of planned obsolescence? After all, products that are designed to wear out in a certain time require the consumer to buy a new version of the product.
Though some may be suspicious of the idea planned obsolescence, there exists significant research that supports the notion that running shoes can significantly increase the occurrence of injuries.

In 1949 Samuel Shulman, a pioneer in investigating the potential perils of shoes, found a dramatic decrease in foot deformities in children who did not wear shoes as small children. Then in 1972 Steele Stewart reiterated this claim by comparing shod and unshod populations. In addition, Steven Robbins and colleagues, in several studies conducted between 1987 and 1995, conducted a series of experiments to empirically measure various characteristics of running in shoes versus barefoot. Among their many findings is the discovery that wearing shoes decreases a runner’s ability to judge impact. As such, shod runners produce far greater impact forces when running. This is believed to be a major factor in the development of running injuries. If you doubt this concept, speak to runners using treadmills at your local gym.

Recently in 2008, Craig, Parker, and Callister conducted a thorough search of the existing literature to find any research supporting the prescribing of shoes with elevated, cushioned heels, and pronation control systems to runners. To their surprise there was no research supporting that claim. Let that sink in for a moment. Craig, Parker, and Callister did not find a single peer-reviewed study that supported the use of modern running shoes. None. Nada.

At the same time, barefoot running has an interesting perception within the medical community. Critics of barefoot running often point out that most podiatrists and other such doctors often recommend highly corrective shoes and orthotics as a means of preventing and treating running injuries. While I do not recommend ignoring the advice of your doctor, it is prudent to exercise some skepticism when dealing with common knowledge rather than solid research. There is a tendency to blindly trust medical professionals without considering the possibility that their opinions may be wrong.
During a recent conversation with orthopedic surgeon and blogger Dr. Joseph Froncioni, he compared the medical community’s belief in the medical necessity of shoes to the past belief that baby formula was superior to breast milk.

In an attempt to sell more baby formula, manufacturers aggressively marketed their product. They created a market for their formula by convincing the public that it was a necessity. To further validate their message they handed out samples through hospitals and doctor’s offices leading to the perception that formula use was supported by the medical community (Baer, 1982). This resulted in many within the medical community recommending baby formula. The result was a huge increase in formula sales and corresponding sharp decline in breastfeeding.

Subsequent research, conducted in the 1980s, proved the assumptions about baby formula were not only incorrect but potentially dangerous. Research now shows breast milk is vastly superior to baby formula. The proof is on the label of baby formula, which, by law requires formula manufacturers to make a statement about breast milk being recommended over formula.

How does this relate to running shoes? Through clever marketing, shoe manufacturers have convinced the general public that highly-cushioned, supportive shoes are necessary to allow humans to run. Just like the baby formula claims of the past, the medical community is allowing marketing to influence their opinions.

Does this mean shoe companies are evil entities bent on producing legions of injured runners? Absolutely not. Like all manufacturers, shoe companies produce shoes in order to make a profit while meeting consumer demand. For many years this meant producing shoes that sold well. Because there was high consumer demand for cushioned shoes with built-up heels, this is what they manufactured and sold. Today, due to new research, we are beginning to see a gradual shift in shoe design. As more convincing bio-mechanical research is conducted and
consumers begin demanding more minimal shoes, the shoe manufacturers will respond with more offerings.

Note, these current studies supporting barefoot running are of a bio-mechanical nature. Essentially, the studies make an assumption that the improved biomechanics of barefoot running will reduce injuries. While anecdotal evidence seems to support this, until research is conducted comparing shod running to barefoot running, those assumptions should be made with an understanding that actual injury rates have not been measured.

Researchers such as Dr. Daniel Lieberman of Harvard University and Dr. Irene Davis of the University of Delaware are investigating injury rates of barefoot versus shod runners. While this research is ongoing, the current peer-reviewed empirical research supports the adaptation of minimalist shoes and/or barefoot running to help improve form and reduce the incidence of injuries.

The following essay was written by orthopedic surgeon Dr. Joseph Froncioni, and reprinted with his permission. In my opinion, this is the single best summation of the rationale behind the barefoot and minimalist shoe running movement.

This essay can also be found online at:

Athletic Footwear and Running Injuries:
Essay on the harmful effects of modern running shoes.

Part 1—Introduction and History

Look, if anyone displayed brand-loyalty, it was me. I LOVED my NIKE AIR MAX Triax™ runners. I wouldn’t buy anything else. Why? Because they felt good. I liked the cushioning. I liked the ride. I also felt they protected me from the hard road by interposing a layer of air between the sole of my foot and the pavement. So why was I sidelined with a heel injury for over two months? I listened to the manufacturer and changed my runners every 400 miles. Come to think of it, why do I see so many runners with lower extremity injuries in my office? The traditional answer to these questions has always been overuse often compounded by an underlying mechanical abnormality such as over-pronation or flat-feet.

The treatment, along with modification of training, physiotherapy, stretching etc. has always included a close look at the runner’s footwear, often with recommendations about motion control, stability, cushioning, orthotics or custom molded insoles. A growing body of literature in the field of sports medicine, however, is causing a bit of a stir … no, call it PANIC in the running world. Everything you and I always believed about running shoes and running injuries may be wrong! Here’s the scoop: The modern running shoe itself may be the major cause of running injuries! Stated another way, the modern running shoe, presently thought of a protective device, should be reclassified as a “health hazard.” (NIKE, please tell me it ain’t so!!)

Now relax, get back on your chair and take a deep breath. We’ll take this one step at a time and since we’re going to be talking about shoes and feet, I may as well start at the beginning … the very beginning. Until quite recently in our history, most humans lived out their lives unshod. S.F. Stewart in his “Footgear—Its History, Uses and Abuses” states that “
... all writers who have reported their observations of barefoot peoples agree that the untrammeled feet of natural men are free from the disabilities commonly noted among shod people—hallux valgus, bunions, hammer toe and painful feet.”

So why was footgear developed? One of the earliest examples of footgear known to us takes the form of sagebrush bark sandals found in caves and rock shelters near Fort Rock, Oregon under a layer of volcanic ash dating back 10,000 years. The foot surface is smooth and they were held on by bast straps over the instep. Similar sandals were used throughout the volcanic cordilleras of Meso and South America and the volcanic islands of the South Pacific. The early Polynesians used sandals to cross old lava flows and when fishing on the razor-sharp coral. It seems, therefore, that the prime function of the earliest sandals was protection of the sole.

Although the early Pharaohs are all represented as barefoot, by the first millennium BC sandals in Egypt were common in court and were worn by soldiers. In Mesopotamian kingdoms sandals were evidently a status symbol with the king known to have worn a wedged sandal in contrast to his flat-soled courtiers. Very thick-soled low boots are known to have been worn by Greek tragedians to increase their height. Comedians wore socks or soccus—hence the expression “high tragedy and low comedy.” Thus, the secondary function of footgear appears to have been symbolic.

From the time of the Greeks, footgear gradually evolved to meet both symbolic and functional needs. For example, tradition tells us that about the beginning of the present millennium Count Fulk of Anjou introduced long, pointed toes to cover up some deformity of his feet, and courtiers quickly adopted the fashion. The Mongols, who on horseback ravaged the Middle East between Damascus and Moscow from the 12th to 14th centuries, are credited for the introduction of the block heel presumably developed to better grip the stirrup plate. But in the French court of Louis XIV, the rugged Mongolian heel underwent a radical cosmetic transformation
eventually leading to the ultimate idiotic expression of modern fashion—the stiletto heel.

European peasants wore clogs carved from a block of wood. Mass production seems to have begun prior to the 14th century, for Edward II in 1342 decreed that shoes should be sized. Their length was measured in barleycorns, three to an inch. This is still the basis of shoe measurements, one-third inch to a size in length. We start sizing from a baseline of three inches in children and seven inches in adults. Widths vary with length; in a given size the widths vary by one and a half inches. Unpaired shoes were introduced in England in the 15th century when gout became common and these shoes had broad square toes to relieve pressure. The most recent innovation seems to have been the hard box toe to preserve the appearance of the shoe.

Now, let’s focus in on the running shoe. It seems that the earliest sports shoes were developed in the 1830s by the Liverpool rubber company owned by John Boyd Dunlop. Although they were first called sand shoes because they were worn on the beach by the Victorian middle classes, they eventually became known as plimsolls because the lines formed by the rubber and canvas bond looked similar to the Plimsoll line on a ship’s hull. In 1933, Dunlop launched its Green Flash range of trainers. Adi Dassler (and his brother Rudolf) started making sports shoes in Herzogenaurach, Germany in 1920 and in 1936 Jesse Owens wore a pair of them when he won four Olympic gold medals in Berlin. ADIDAS (Adi Dassler) was formed in 1948 with the now famous three stripes logo developing from three support leather bands used to bolster the sides. By the 1956 Olympics, dozens of competitors were wearing ADIDAS shoes. Rudolf Dassler broke away to form PUMA. Amidst the first rumblings of the jogging boom, NIKE (after the Greek goddess of victory) was launched by American Phil Knight, a former track star at the University of Oregon, and his waffle-making coach Bill Bowerman in 1971 (Surely you remember the NIKE Waffle Trainer!). The NIKE ‘Swoosh’ is arguably the most successful logo in the world and was conceived for
Phil Knight by a local Oregon graphic design student, Carolyn Davidson, for a total fee of $35. (But don’t worry about the graphic designer. In September 1983, NIKE presented Carolyn Davidson with a rather substantial share package as a way of saying “Thank-you.”) ASICS (acronym for Animus Sanus In Corpore Sano, which is Latin for A Sound Mind In A Sound Body) first introduced its shoes in North America in 1977 while REEBOK (named after a species of an African gazelle) entered the U.S. Market in 1979 as the running shoe was slowly transforming into a fashion item. 1987 was declared the “Year of the Running Shoe” by the clothing industry, the same year NIKE launched the “cross-trainer” and its flagship running-shoe, the Air Max. After 16 years of research, NIKE introduced its SHOX line of runners in 2000, arguably the first athletic shoe on springs (foam)!

Part 2—Shoes and Injuries

For the last 15 years or so, buying a pair of runners has always been accompanied by a warm fuzzy feeling inside, a feeling that comes from the certain knowledge that you’re investing in a high-tech device purpose-designed to protect you from injury and improve your performance. You can just see all those smart dedicated NIKE mechanical engineers hard at work developing and testing newer and better space-age materials to shield you from the terrible pounding you submit yourself to in order to “Just do it!” Gel, air, channels, honeycomb, microspheres, super-light materials, foam springs and soon … yes, you guessed it, micro-chips in the soles of your shoes (better than diamonds, I suppose). New round laces and ribbon eyelets result in that custom-fitted feel supplemented by molded sorbothane insoles or special orthotics from your local prosthetist and you’re ready to tackle any distance.

Now here’s the catch. If all this high-tech stuff is supposed to be preventing running injuries by shielding us from impact, why is it that two out of every three runners are sidelined every
year because of a running injury? Why is it that since the great jogging boom of the mid-seventies, there has been no decrease in the incidence (some authors say there has been an increase) of running injuries in spite of yearly ‘improvements’ in running-shoe technology? Why is my office filled with runners who have injured knees (26% of running injuries), tibias (13%), Achilles tendons (6%) and plantar fascias (5%)? The cause of all these injuries is quite evident: cumulative micro-trauma caused by repetitive impact experienced during running. The heel of a runner upon striking the ground generates a force that can equal 2.5 times body weight at the foot and as much as 7 times body weight at the hip. Repeat this 1000 times per mile and it’s easy to appreciate the stress the old bones are under. Add to this the hardness of urban roadways compared to naturally deposited surfaces and eventually, something gives, inflammation sets in and pain results … and you end up working at the finish-line pulling bar-codes off finishers. Now, where’s our high-tech shoe in all this? With all the improvements in recent years, you’d think we’d be seeing a marked decrease in running injuries. Just keep reading.

It wasn’t till the mid-eighties that some researchers smelled something rotten in the athletic footwear world and it wasn’t just dirty socks. Footwear manufacturers were well aware that impact was the cause of running injuries and reasoned that the way to attenuate impact was to interpose a soft impact-absorbing midsole between the foot and the ground. The first major problem was the method used by essentially all the footwear development labs to test the impact absorption of footwear mid-soles. Dr. Benno Nigg from the University of Calgary showed that machine testing of these materials by dropping a 5-kg object onto the shoe-sole and measuring the impact on a pressure-plate did not accurately predict human impact with the same materials. In fact the correlation turned out to be inverse, that is when you drop a 5-kg ball on materials of increasing softness, you measure decreasing impact. However, when the impact from a running human is measured, the result
is the reverse, and the impact increases with softer materials! WHOOPS! (You’ll find out why later.)

Next problem. In 1989, Dr. B. Marti published a paper which still makes the throats of footwear executives go dry. He studied 5,038 runners who participated in a 16K race and had them fill out an extensive questionnaire about their running in the year preceding the race. Here’s what he found: The incidence of injuries in runners using shoes costing more than $95 was more than twice as great as in runners using shoes costing less than $40. (Note that this result includes correction for other influencing factors such as training mileage and history of previous injury.) In other words, the fancier (high-tech, advanced) the shoe, the more dangerous it is! Now a study of over 5,000 runners is not something to thumb your nose at and you would think the shoe manufacturers would have taken some notice. Not on your life. Yearly athletic shoe sales were in the billions of dollars and this was no time to fiddle with a successful product. In any case, it is felt by many observers that by the mid-eighties researchers, in-house or independent, had effectively been forced out of the loop of new product development and that research and development was now exclusively in the hands of the marketing people. Athletic shoes had become a fashion item and were designed as such, as they are to this day.

The big question: Why are super shock-absorbing athletic shoes causing more running injuries? Dr. Steven Robbins from the Centre for Studies in Aging at McGill University in Montreal is the man who came up with the answer. Dr. Robbins pointed out that the human lower extremity is not a delicate, rigid, passive structure requiring ‘packaging’ to protect it from impact. This becomes blatantly obvious when one observes the nearly complete absence of foot disorders in unshod populations. People who go around barefoot just don’t get plantar fasciitis or any of the other lower extremity injuries so common in shod populations. The lower extremity, he points out, is a rugged, flexible, active, well-designed (teleologically)
structure. Wire this structure to a spinal cord and a brain and what you’ve got is a system fully capable of handling the impacts of running. So, how does this system work exactly and why do modern running shoes screw it up?

Allow me for a moment to compare the human locomotor apparatus to a modern luxury car. The bones of the foot, leg, thigh and pelvis act as the frame, linked by joints and all held together by fairly inelastic ligaments and fascia. The bones and joints are surrounded by contracting muscles which act as the suspension system. This is especially evident in the arch of the foot which is formed by both the passive, rigid plantar fascia as well as the active, flexible intrinsic muscles. The bones and muscles are covered by fat and skin within which reside receptors or sensors that send information to both the peripheral computer (the spinal cord) and the central computer (the brain). The skin on the sole of the foot (glabrous skin) is very well suited to its function possessing about 600% of the toughness of hairy skin (the skin everywhere else on our bodies except our palms). The receptors in the foot are specially designed to sense both impact (vertical force) and shear (horizontal force). Add to this information streaming in from pain receptors as well as joint position receptors throughout the lower extremity and you’ve got a Hummer! (Got carried away a little … sorry.)

During barefoot running, the ball of the foot strikes the ground first and immediately starts sending signals to the spinal cord and brain about the magnitude of impact and shear, getting most of its clues about this from the skin contact with the surface irregularities of the ground. Take away this contact by adding a cushioned substance and you immediately fool the system into underestimating the impact. Add a raised heel and the shod runner is forced to land on it. Strap the cushioning on tightly with the aid of a sophisticated lacing system and you block out shear as well, throwing the shock-absorption system even further into the dark. The system responds by landing harder in an attempt to compress the cushion and ‘feel’ the ground. The weight is then transferred to the outside edge of
the foot, completely by-passing the skin of the arch. The heel then touches down and the weight is transferred to the ball again with final push-off through the toes. While the weight is being transferred, the arch carries out its function as the suspension system of the foot and flattens under the active control of the intrinsic muscles. The ankle, knee and hip joints flex to absorb impact in response to information flowing in from the foot. The cushioned midsole of the modern running shoe robs the system of important sensory information necessary for ankle, knee and hip response to impact. The arch support (or orthotic) in modern running shoes not only prevents the arch suspension system from absorbing energy by preventing flattening but eventually leads to intrinsic muscle atrophy and complete loss of active muscular control of the arch leaving only the inelastic plantar fascia as a checkrein to flattening. The barefoot runner’s ‘foot position awareness sense’ which relies heavily on sensory input from the sole of the foot minimizes his risk of sustaining an ankle sprain on uneven ground. The shod runner is at marked increased risk of ankle sprains because his ‘foot position awareness sense’ is handicapped by the paucity of sensations coming from his soles. The barefoot runner is constantly alert scanning the ground before him for irregularities and dangers that might cause him injury. The barefoot runner is a cautious runner and actively changes his landing strategy to prevent injury. He treads lightly. The shod runner is bombarded by convincing advertising stating or implying that the shoe he is wearing will protect him well over any terrain and he becomes a careless runner. He is heavy footed. Finally, certain diseases in humans can cause a gradual destruction of the sensory nerve endings in the foot (and elsewhere) resulting in a significant increase in lower extremity injuries. Diabetes and tertiary syphilis are two. Extremities so affected are termed ‘neuropathic’. The shod runner, because of his sensory deprivation and high risk of injury may be termed as having ‘pseudo-neuropathic’ feet, a term coined by Robbins.
The conclusion that shoes are the primary cause of running injuries is strongly supported by the scientific literature. I’ve already mentioned Marti’s work showing more than twice the incidence of running injuries with expensive shoes compared with cheap ones. Rao and Joseph (1992) examined 2300 Indian children between the ages of 4 and 13 and found that the incidence of flat feet was more than three times greater in those children who used footwear than in those who did not leading them to conclude that shoe-wearing in early childhood is detrimental to the development of a normal arch. In 1988, Hamill and Bates showed that as running shoes lose their cushioning through wear and tear, subjects improve foot control on testing and presumably decrease their risk of injury, i.e. shoes get better with age. Robbins and Gouw showed in 1991 that modern athletic footwear creates a perceptual illusion in subjects whereby they consistently underestimate impact. Simply adding surface irregularities on the insoles (to simulate barefoot like conditions) markedly improves subjects’ estimates of impact. Robbins and others (1994) studied the balance ability of men walking along a beam wearing shoes with soles of varying thickness and hardness. Results confirmed that the thinner and harder the soles, the better the balance. In one of their most elegant and widely publicized studies, Robbins and Waked (1997) examined the effect of advertising on landing impact. They asked subjects to step down barefoot ten times onto four pressure-measuring platforms, the first one being bare and the other three covered by identical shoe sole material made to look different by different colored cloth. The subjects were given different messages for each of the covered plates: the message for the first covered plate suggested superior impact absorption and protection (deceptive message), the second suggested poor impact absorption and high injury risk (warning message) and the third suggested unknown impact absorption and safety (neutral message). Results showed that subjects landed with the highest impact when given the deceptive and neutral messages and with the lowest impact
when given the warning message or with the bare plate. The authors conclude that running injury rates are greatest in users of the most expensive shoes because advertising has deceived these users into believing that the shoes provide a superior level of safety thereby inducing an attenuation of impact moderating behavior, increasing impact and injury. The authors add that deceptive advertising of protective devices is a public health hazard and should be addressed. Humans are less cautious even when they use truthfully advertised products because of excessively positive attitudes toward new products and wrong impressions of the standards of truth in advertising.

“So,” you think, “is this guy telling me that NIKE, REEBOK and all those big corporations just put this new stuff out on the market without any proof that its safe? Can’t be!” Well, that’s exactly what I’m telling you. I can be a real pain in the ass when I try, and some years back, I was in the mood. I got on the phone and tried to talk to the directors of research at all the big athletic footwear companies. I tell you, getting to talk to one of these guys is harder than talking to the Pope. I finally got to speak with Mr. Gordon Valiant, then director of research at the NIKE Sports Research Lab in Beaverton, Oregon.

JF: “Mr. Valiant. My name is Dr. Froncioni and I’m an orthopedic surgeon. I treat a lot of runners and I was just wondering what your thoughts were on the whole issue of running injuries possibly being caused by your running shoes.”

… long pause …

GV: “Umm … well … I’m afraid I’m not at liberty to discuss that matter.”

SAY WHAT!!!!??

JF: “Mr. Valiant, in case you missed it, I’m NOT a reporter. I’m just an orthopedic surgeon who’s looking for some answers for his patients. Let me rephrase. Surely you have data to support the injury protection claims you make about your running shoes … surely sir … ”
GV: “Well … I could refer you to our marketing people and I’m sure they could send you something.”

Nope. We’re not on the same wavelength at all. I’m sure the lawyers have given these guys a gag order.

JF: “Mr. Valiant, your marketing people send me stuff all the time; it’s all over the *Runner’s World* I get every month. Anyway, nice talking to you.”

I’ve also had a few chats with Dr. Steven Robbins. He feels very strongly that the athletic footwear manufacturers are painting themselves into a very tight corner by not acting on the available information. After all, it is within their power to effect changes in their shoe design based on the available data and in doing so decreasing the running injury rate by up to 55%. By not acting now, Dr. Robbins predicts the footwear manufacturers may end up in the same situation as the tobacco companies with massive class-action lawsuits brought against them.

**Part 3—New Directions**

So, what do we do now? For starters, NO, I do not recommend that you run your next half-marathon barefoot. But certainly, I predict that sooner or later, changes will come about in both shoe design and training. From the medical establishment’s point of view, the prevention and treatment of running injuries must change to incorporate the concepts outlined above. In fact I view the ideas I’ve presented here as a major paradigm shift in sports medicine, the likes of which I have not seen in the last fifteen years. Of course, the major shoe companies have to own up and start introducing better shoes into their lines. Why not do this gradually and introduce just one shoe that incorporates some of the recommended changes. Dr. Robbins is already testing shoes that use a thinner, less resilient midsole material that provides the comfort but not the impact absorption and of course has no arch support. I’m sure the marketing boys at NIKE could handle it.
Without being too radical, there are some changes that are worth introducing without further delay and they are as follows:

1. Young children should be encouraged to spend as much time as possible barefoot. We know that this is especially important for the proper formation of the foot arch in the first six years of life. So, moms, trash the WEEBOKS and let your kids develop strong healthy feet just as they were meant to.

2. Runners should consider incorporating sessions of barefoot running into their training. In an article in the October 1997 *Runner’s World*, Adam Bean gives the following advice: “Running barefoot a couple of times per week can decrease your risk of injury and boost your ‘push-off’ power.” You can run on any surface you like as long as you’re careful of sharp objects and pebbles. Soft sand is probably the least desirable surface because it is unstable and after your heel has dug-in, you will weight bear on your arch. Paved roads are fine and dangerous objects are easy to spot. But remember, your feet will need to toughen-up so start with small doses. Kick your shoes off as soon as you get home and spend your evenings and weekends barefoot.

Is it possible to rehabilitate the weakened muscles of a normally shod runner? It certainly is according to another excellent study by Dr. Robbins (1987). He asked 17 normally shod recreational runners to gradually increase barefoot activity both at home and outdoors over a period of several weeks and to maintain barefoot activity for about four months. The runners’ feet were examined, measured and x-rayed at regular intervals to detect changes. Results showed marked improvement in
the anatomy and function of the arch. The authors concluded that the normally shod foot is capable of rehabilitation of foot musculature. Very good news indeed for all of us.

3. Runners may want to consider switching to a lightweight shoe that provides less cushioning and no arch support. The only shoes on the market that come close to these characteristics are racing flats. I use the 6.5 oz. ASICS Gel-Magic Racer. For you diehard NIKE fans, consider the Air Streak II, Air Streak Spectrum Plus or the Air Streak Vapor IV. But most shoe manufacturers make a flat. A shoe that Nike has just introduced this year, the NIKE FREE also looks like a step in the right direction (I have not actually seen this shoe myself yet). Moreover, a look at the NIKE FREE web page gives me a bit of hope that this company may finally have seen the light. If you do change to flats, I recommend you wean into them slowly. Remember that you live in a developed country and that your feet have been shielded from natural stresses your entire life, i.e. you’ve got wimpy feet, buddy. The intrinsic muscles of your feet are asleep and need to wake up slowly. The first thing that will strike you in a racing flat is the lightness of the shoe (Most runners today run in shoes that weigh as much as 14 oz.) Then, you will quickly realize that for the first time, you start to feel the ground you are walking on. Oh—and one more thing: don’t listen to the guy at the running store. He’s there to sell shoes and is under the spell of the powerful shoe industry advertising machine. He has become well and truly brainwashed with the traditional concepts that we all need cushioning and arch support. He will try to dissuade you from buying a racing flat
and he may even go as far as telling you that they are for elite runners and are meant to be used for one marathon only. Don’t believe him. I keep my flats for at least 400–500 miles with no problem.

Finally, some radicals among you may wish to become full-time barefoot runners. Barefoot running clubs are springing-up all over America and Europe. Point your search engine to ‘barefoot running’ or go to www.runningbarefoot.org to get more information. I also welcome anyone who wishes more information on any of the quoted materials to contact me and it would be my pleasure to provide you with copies (josephfroncioni@logic.bm).

Joseph Froncioni
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Understanding Basic Barefoot Running Terminology

Just to make sure there is an understanding of the various terms used in this book, here are some helpful tips on basic barefoot running terminology.

The term barefoot running is sometimes misused. Within the barefoot running community, *barefoot running* refers to running without any sort of shoe, sock, tape, or other foot covering.

On the other hand, *minimalist shoe running* refers to running with a shoe that provides little or no support, a very thin extremely flexible heel, and more or less allows the foot to operate in a natural way.

*Reduced shoe running* refers to running in shoes that have some support, a thicker sole, and a heel that may be slightly higher than the midfoot area.

*Shod running* refers to running in traditional running shoes that contain thick soles, lots of cushioning, and may provide a good deal of support for the foot and ankle.

The Barefoot Running Movement

The barefoot and minimalist shoe movement can be divided into various categories or factions. These divisions are predominantly based on perspective and theoretical differences. It is common for barefoot and minimalist shoe runners to shift from one group to another based on their own experiences or conditions.

**The “barefoot purist” group:** This group of barefoot runners will run exclusively barefoot and will shun shoes whenever possible—even minimal shoes. The theory is based on the idea that any shoe will interfere with the body’s ability to run effectively.

**The “shoes as tools” group:** This group has the same theoretical perspective as the purists but will accept the use of minimalist shoes when conditions warrant—such as extreme weather or terrain.
The “minimalist shoe” group: This group generally agrees with the benefits of barefoot running but will rarely run barefoot, instead opting for minimalist shoes. In so doing they reject the importance of sensory feedback from the soles of the feet as a critical element of developing good running form.

Each of these groups will identify themselves as barefoot runners. Though the groups sometime disagree, all three groups share the common goal of helping people run in a more efficient manner with fewer injuries.

Is Barefoot Running a Fad?

A fad is defined as a temporary fashion, notion, or manner of conduct that is enthusiastically followed by a group. Until recently, barefoot running was an obscure practice followed by a tiny group of dedicated individuals—often labeled “crazy hippies” by our running brethren. This is now changing due to several events.

First, the peer-reviewed research began to make headlines as it became increasingly clear that the modern running shoe was not meeting the needs of all runners. Some advances in shoe technology may even have had a negative impact on the health of runners leading some members of the medical and running community to question the logic of the modern running shoe. So far this skepticism has had a relatively small impact on the running community.

The second major event was the release of the book *Born to Run* by Christopher McDougall. In his book, McDougall presents a convincing argument in support of minimalist shoes and barefoot running. The popularity of the book has spawned
an enthusiasm that creates the perception for some that this movement is a fad or temporary craze.

Personally, I do not believe it. Certainly not a fad like leg warmers or river-dancing. Neither of which were supported by research. That said, I do not think barefoot running will ever surpass the popularity of shod running. Rather, I believe the movement will pressure shoe manufacturers to examine the research and development of their current shoes more critically resulting in moving away from the supportive and cushioned technology so prevalent today.

While some will choose to run barefoot a majority of the time—the “fun factor” alone will assure that—instead I believe the majority of runners will opt for a more conservative approach and make the switch to more minimal shoes. Barefoot running is a movement that will eventually help all of us to become healthier runners.

There will always be skeptics that question the logic of the barefoot/minimalist movement and many runners that have no history of injury caused by using cushioned, supportive shoes. Those runners should continue running as they have previously with occasional barefoot running as a healthy supplement to their normal training routine.

Personally, I believe the true benefits of barefoot running are the result of a more conservative training plan coupled with improved form. When beginning barefoot running, most runners will start at very low mileage and gradually build to longer and faster distances. This helps prevent “too much too soon” or over-use injuries. Barefoot running requires good form. The better your form, the less stress on your body resulting in fewer injuries.

Fear not, unless you are interested in barefoot running for the enjoyment factor, there is no need to completely abandon your shoes. Runners will receive some benefits of barefoot running even from a single unshod mile each week. If you are one of these runners, this book will provide tools that will be useful to you, even if you decide to forego barefoot or minimalist shoe running.
Do I Have to Run Barefoot?

While I would recommend barefoot running for all runners, it is not necessary to run barefoot full-time. In fact, running in minimalist or even reduced running shoes will provide many of the same benefits of barefoot running. There is research being conducted to determine exactly what causes the benefits of barefoot running though many speculate the relaxed, midfoot gait is primarily responsible for its positive effects.

Based on anecdotal evidence, minimalist shoe running is a healthier alternative to traditional cushioned motion-control running shoes. In essence, minimalist shoes help the foot work as it was intended to work. The more minimalistic a shoe design is, the greater benefit to the runner.

I recommend all runners learn to run barefoot prior to adding minimalist shoes to their training routine. Learning to run barefoot first will allow you to learn good form and strengthen your feet, legs, and other anatomy to help prevent injuries. While it is possible to learn to run in minimalist shoes first, the lack of tactile sensation with the ground will interfere with the process. Being able to feel the ground is a valuable training tool.

There are other excellent methods to help you learn to run with efficiency. Good Form Running®, Evolution Running®, ChiRunning®, and Pose® are four such methods. All four use slightly different methods to teach similar skills. Once you have learned good form through barefoot running, it can be beneficial to study each of these four methods. Each contains drills and exercises that you can use for experimentation. My own running form is a hybrid of my own experimentation coupled with elements from each of those four methods.

Recently Dr. Scott Hadley, founder of TrekoClinics.com, summed up the reasons for and history behind barefoot/minimalist running in his article titled, “This is Your Body on Shock: stretch reflexes, shock absorption, and barefoot/minimalist running.” That article, used with his permission, follows:
In 1898, a neurophysiologist named William Sherrington published his findings on stretch reflexes. The basic idea of a stretch reflex is this: when a muscle is lengthened rapidly, a signal is sent to the central nervous system which triggers that muscle to contract. The “knee jerk” reflex is one example that you have probably seen when your doctor hits your knee with a little rubber hammer. The rapid stretch of the quads triggers a reflex that causes the muscle to contract—and the knee jerks.

In 1956, another neurophysiologist name J.C. Eccles reported that the stretch of one muscle not only causes reflex activation of that muscle, but other muscles are activated too. Eccles thus defined two types of stretch reflexes. A homonymous stretch reflex occurs when the stretch of a muscle causes that muscle to contract. A heteronymous stretch reflex occurs when the stretch of a muscle causes a different muscle to contract.

During the past 60 years, heteronymous stretch reflexes have been investigated extensively by neurophysiologists. Through surface EMG recordings in human subjects, dozens of heteronymous reflex patterns have been identified. It is thought that these reflexes allow the central nervous system to monitor and control gait and other complex human movements at an automatic, subconscious level.

Essentially, our body movements are in large part controlled by a series of stretch reflexes between muscles. When walking and running, the nervous system reads ‘stretch information’ from several key muscles and uses that information to activate or inactivate other muscles in a coordinated sequence. This is how we can walk, run, and perform other complex movements without thinking about it.

Let me give you a few examples of the role of stretch reflexes during running. When the foot hits the ground (initial contact), the first muscle to contract is the soleus of the calf—if you are landing properly without a heel strike. Forward momentum causes the soleus to stretch rapidly, and the soleus reflexively contracts to prevent the knee from buckling. While the soleus contracts, it also lengthens to allow the knee to advance over
the foot (this is called an eccentric muscle contraction for you physiology buffs). Stretch reflexes from the lengthening soleus act as a powerful neurological switch that activates the quadriceps and hip extensors to prevent the leg and trunk from collapsing under the forces of landing on one foot. In fact, if the soleus doesn’t stretch properly, the hip extensors can be up to 75% weaker due to a lack of heteronymous reflexive control.

The muscles in the bottom of the foot (the foot intrinsics) also play a role as body weight is accepted onto the foot. The foot intrinsics begin undergoing a lengthening (eccentric) contraction as the arch of the foot flattens slightly to absorb shock. The stretch reflexes initiated from the lengthening of the foot intrinsics produce an interesting mechanism of shock absorption at the knee and ankle by inhibiting the soleus and quadriceps—causing partial relaxation of these muscles—to allow the ankle and knee to give-way slightly as body weight is loaded onto the leg.

If the foot arch is over-supported by an orthotic or a motion-control shoe, the foot intrinsics are incapable of inhibiting the soleus and quadriceps. At a phase in the gait cycle where the soleus and quadriceps should be slightly more elastic to absorb shock, they remain more rigid, thus reducing shock absorption and causing excessive strain on the soleus, quadriceps, and joint structures. Over time, if the arch is over-supported, the foot intrinsics become weak and are no longer effective. The foot intrinsics become weak and tight, stretch reflexes become inhibited, muscles do not ‘turn on’ when they need to, and biomechanics break down. The end result is overuse injury—something most runners experience at some point.

But barefoot and minimalist running allows the foot arch to deform naturally, allowing the stretch reflexes from the foot intrinsics to activate a very effective shock absorption mechanism. It’s almost counterintuitive that running barefoot or in minimalist shoes produces less impact than running in supportive, padded running shoes. But research has shown
just that. And the stretch reflexes from muscles in the foot are partially responsible for this.

Since the foot intrinsics are used more in barefoot and minimalist running, we invariably go through a phase of muscle soreness and growth of the foot intrinsics and soleus during the transition out of standard running shoes and after a long run. But rejoice in your aching foot muscles! This is your body absorbing shock as nature intended.

Scott Hadley, Ph.D, DPT
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Can I Still Maintain My High Mileage and Learn to Run Barefoot on the Side?

The best way to learn barefoot running is to start from scratch. However, experienced runners often have difficulty stopping their high mileage training. This is understandable; we do have an addictive hobby! If you are currently training and are unwilling to restart from zero mileage, there is a solution. Note: this solution does present some potential risks and common problems.

If you do wish to continue your normal shod training, I would recommend adding all drills and running in place of some of your current cross training or running activities. For example, if you currently run 50 miles per week try running three miles barefoot and 47 miles shod. Then slowly, over time, replace your shod miles with barefoot miles. If running in minimalist shoes is your goal, it is best to learn barefoot running first and then switch to minimalist shoes. Once you learn proper barefoot form, you can exchange the barefoot mileage with minimalist shoe mileage.

The most common problem that arises with this plan occurs after you start to develop good barefoot form. Increasingly it will become difficult to run in traditional shoes. Your feet will begin to feel incredibly heavy and the rest of your body
will rebel against the pounding as you start to crave the gentle smoothness of barefoot or minimalist shoe running. This usually happens well before you are ready to convert all of your training mileage to barefoot or minimalist shoe mileage. The result is usually a temporary decrease in training mileage as you abandon your traditional shoes. You will quickly regain the mileage, but that reduction in training can be stressful for some. There are other activities that can be done as a substitute, such as weight training, swimming, or aerobics.

Minimalist Shoe Recommendations?

Sometimes people will ask for a minimalist shoe recommendation. It is difficult to recommend one particular shoe, because each individual will have particular tastes. Personally I have a strong preference for shoes that allow my feet to operate as if I were barefoot. For me, there are a few important qualities every minimalist shoe must have:

- **Flat, thin, flexible sole**—This is the most important aspect of any minimalist shoe. The heel must be the same thickness as the forefoot area. A raised heel will alter your gait making it nearly impossible to run as if you were barefoot while a thin sole allows for greater “ground feel,” or the ability of the tactile sensory cells in the sole of your feet to feel the terrain under foot. The flexible sole allows the foot to move more or less unencumbered.

- **Wide toe box**—This allows the toes to splay, or spread out, when your foot kisses the ground. This physical sensation is part of a complex neural reflex that seems to facilitate good running form. Research on this concept is in its infancy.

- **Lightweight, flexible upper**—Of the three qualities, this is least important. Oddly, most “traditional” shoe manufacturers seem to place more importance on the upper than the sole or toe box. Still, a lightweight flexible upper will allow the shoe to move with your foot.

The market for minimalist shoes is rapidly expanding as both new and older shoe manufacturers rush to meet the demands
of our growing ranks. The following companies produce shoes I would recommend:

- **Terra Plana VivoBarefoot***(www.terraplana.com)—In 2004, Terra Plana became pioneers of the barefoot movement by launching its first minimalist shoe collection with a mission to make footwear that offers all the health benefits of being barefoot with the protection of shoes. Today, as the research to support barefoot health grows, so does the collection. They now offer a total lifestyle solution for the whole family. Their goal is not only to spread the word and forward the barefoot movement, but also to educate how to transition properly. They understand that the body is a biomechanical masterpiece with the foot as its showpiece. No heel, no midsole, no arch support, no gimmicks, VivoBarefoot works with the body not against it—allowing the foot to be as millions of years of evolution intended ... barefoot. All VivoBarefoot products are eco-friendly and sustainable. They use recycled, locally-sourced materials in efficient production processes at independently monitored factories. Priding themselves on being good for the body and kind to the environment.

- **Vibram***(http://vibram.com)—Vibram’s Five Fingers line is the most popular minimalist shoe line. I used a “KSO” model when running a 100-miler. Their “Trek” model remains one of my favorites. Vibram also understands what constitutes good minimalist shoes. I would highly recommend any shoe from their line.

- **Feelmax***(http://feelmax.com)—Feelmax is a company based in Finland. I do not personally have a lot of experience with their shoes, but they are among the favorites of barefoot runners.

- **Soft Star***(www.softstarshoes.com)—Soft Star is a small company that produces moccasins. They recently developed a running moccasin called the “RunAmoc.” The concept behind the moccasin is precisely what I would define as the ideal minimalist shoe.

- **Kigo***(www.kigofootwear.com)—Kigo footwear is stylish,
eco-friendly minimalist footwear for barefoot athletics and everyday wear. The kigo team strives to provide comfortable shoes that are stylish enough for everyday wear, sturdy enough for athletics and constructed to be as good for the earth as for the body. Each kigo shoe is thoughtfully and responsibly constructed of lightweight eco-friendly materials, including removable EVA insoles, breathable, stain/water resistant uppers and flexible, high-density rubber outsoles.

- **Invisible Shoe** (www.invisibleshoe.com)—Invisible Shoe produces custom-made huarache running sandals. They also sell kits that allow you to make your own. Huaraches are one of my personal favorite minimalist running shoes. I use Invisible Shoe exclusively for huaraches.

- **Sockwa** (www.sockwa.com)—Sockwa began as a company that produced shoes for beach soccer. Their product line now includes shoes that are ideal for minimalist running.

- **Newton** (www.newtonrunning.com)—Newton does not produce minimalist shoes. Rather, they produce shoes with little or no heel-to-toe differential, but still maintain the qualities of a traditional running shoe. The major advantage to Newton shoes is they allow you to run with excellent form while still maintaining great protection and cushioning.

There are a few other small companies such as Sanuk that produce true minimalist shoes. Also, some of the major shoe manufacturers are beginning to produce more pseudo-minimalist shoes.

Among the “traditional” shoe manufacturers, Nike leads the way with their “Free” line. While I would classify the Free as a “reduced running shoe,” Nike is beginning to incorporate better technology that allows the foot to move independently within the shoe.

Other companies like GoLite, Saucony, Adidas, and Inov-8 are actively producing either reduced-running shoes or even true minimalist shoes.

Within the next couple years I predict the market will become flooded with a plethora of minimalist shoe options
from all major shoe manufacturers. This competition for the minimalist shoe market should produce some excellent shoes that compliment the current offerings.

Minimalist shoes can be purchased at many local running stores. Most minimalist shoe manufacturers have a “store locator” function on their website and many are also available online. Among my favorite stores are Zombie Runner in Palo Alto, California (http://www.zombierunner.com), Gazelle Sports in West Michigan (http://gazellesports.com), and Two Rivers Treads in Shepardstown, West Virginia (http://www.trtreads.org.)

#### Plasti-Socks: The minimalist shoe alternative

Disappointed that some “minimal” footwear seemed to be moving further away from providing ground feedback, I decided to try making my own. One day while looking for a way to reinforce the bottom of a sock, I found someone online who had done just that, with an aerosol spray can of a product called Plasti-Dip.

A trip to the hardware store, a little experimentation, and I easily made a nice pair of running socks with a thin rubberized sole. When the sole wears thin, they can easily be reinforced. Though I’ve been running mostly barefoot lately, I’m contemplating a winter barefoot solution. Perhaps wool plastisocks?

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#### My Guiding Principles

The following are the principles that guide my philosophy regarding barefoot running. These principles have been developed over time based on my personal experiences, studying the available research, observing other runners, and discussing barefoot running with peers.
Principle One: There is no single right answer.
Barefoot running is inherently a very individualistic activity. Each of us will develop our own style and form—there is no single “correct” way to run barefoot. Some pre-packaged techniques, such as ChiRunning, Good Form Running, Evolution Running, and the POSE method can be very effective methods to learn minimalist shoe or barefoot running. However, all methods take an “our way is the right way” approach which simply is not the case when running barefoot. None of them are the single best method for all runners. Therefore, my job as a teacher of barefoot running is to help you find your own style.

Principle Two: You must experiment and learn from your successes and failures.
George Sheehan famously said, “Each of us is an experiment of one-observer and subject-making choices, living with them, recording the effects.” In order to master the art of running barefoot, you must be willing to try new things—adopting the successes and discarding the failures. I’ve used this concept to develop some truly unorthodox running habits such as eating hot dogs, Ben and Jerry’s ice cream, and alcohol-based iskiate as race fuel, wearing cotton hoodies instead of the latest moisture-wicking fabrics, and actively seeking out rugged terrain to practice barefoot trail running skills.

Principle Three: Your body is your best teacher.
When following principle two, your best feedback will be your own body. Your brain has the amazing ability to receive feedback from your body, interpret that information, and adjust accordingly. Our own thought processes often create roadblocks for this process. We must learn to trust what our own body is telling us. Feel, don’t think. If we feel a shock with each step, we have to modify our form until the shock disappears. Your body is the most efficient running coach you can employ.
Principle Four: Patience is mandatory.
Learning to run barefoot takes time. Allowing your body to adapt to this new running style can be a slow journey. All too often we want to rush the process. This results in injury. You have likely spent a majority of your life wearing heavy shoes with raised heels. Like a broken arm that spends weeks in a cast, your feet will have grown weak. It takes time to build strength. You must be willing to start from nothing and rebuild yourself as a stronger runner.

Principle Five: Relaxation is the secret to great form.
Barefoot running requires relaxation of the skeletal muscles. Running free and easy is the secret to running injury-free. Your arms and legs should have about as much tension as a wet noodle. For “foodies,” think well-cooked pasta, not al dente.

Principle Six: You must enjoy the process.
Learning to run barefoot should be a process, not a destination. If you take the time to enjoy each stage of your development as a barefoot runner, you will be successful. This is a fun activity! Watch little children run around barefoot. They know something most of us have long-since forgotten. Embrace that joy! Smile and savor the process!

Factors that Affect Speed of Transition
When learning to run barefoot, several factors will affect the speed at which you can make the transition from traditional shoes to barefoot or minimalist shoes. The greatest factor seems to be prior barefoot experience. Runners that routinely do other activities barefoot will be able to advance at a faster rate. Their muscles, tendons, ligaments, bones, and plantar skin will be more adept at the stresses and rigors of barefoot running.

Runners that have adopted a midfoot strike will also be able to advance faster. This particular running style is nearly identical to barefoot form. Like individuals that spend time barefoot,
this group will have already pre-strengthened many of the anatomical features that are stressed when running barefoot.

Youth may play a role since younger runners are able to physically heal at a faster rate—thus progressing faster.

Prior injury history plays a role. Runners with few injuries may be able to advance at a faster rate.

A runner’s ability to listen to their body will also make a difference. A key to learning good form is the ability to monitor the state of your body.

Finally, trail runners may be able to transition faster due to their already-developed skills of running on uneven surfaces and monitoring the terrain they are running.

All these factors may play a role in the rate of progression.

Regardless of your own characteristics, it is important to exercise patience. You will learn to run barefoot significantly faster if you utilize a “slow and steady” approach.

### Listen To Your Body

It will tell you when you should slow down or when you’re ready to speed up. It will tell you when you need to step lighter or when you can plow through some terrain. It will tell you when you are ready to increase your cadence or when you need to slow it down. It will tell you when you can go out and run again or when you need a little more time to recover from the last run. Learning to listen to your body is crucial in barefoot/minimalist running and experience will help in interpreting the messages.

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**Explanation of Concepts, Issues, and Activities**

This book is organized using a progression of methods. It is important to master each stage before progressing to the next. The four stages are:
Pre-running: What to do before starting to run barefoot.
Starting to Run Barefoot: How to begin learning the fundamental skills needed to run barefoot.
Intermediate Barefoot Running: Increasing speed and/or distance; improving barefoot running skill.
Advanced Barefoot Running: Special issues such as racing, extreme weather, etc.

Each of the first three stages are comprised of:
Concepts, issues, and activities.

Concepts are the major theories that constitute good barefoot running. They may include elements like form, frame of mind, or other important elements of learning to run barefoot.

Issues are the problems or concerns that may arise when implementing the various activities that will teach you the skills of barefoot running.

Activities are the various physical tasks you will practice to learn to run barefoot. The next section introduces some sample schedules based on some fictional individuals of varying experience.

Sample Training Schedule

To aid your progress in transitioning to barefoot or minimalist shoe running, I’ve provided a handy schedule. This schedule has been subject to several important revisions. The original aptly-named “Lose the Shoes” plan I developed was widely spread via the Runner’s World Barefoot Running Forum and my own Barefoot Running University website. Many people successfully followed the plan. While effective, it was also very conservative. The rigid nature of the plan did not suit all runners’ unique situations. The modified plan presented in this book utilizes the same principles, but allows enough flexibility for all runners.

On the following page are two sample plans that use this concept. The first plan is designed for a novice runner or a
runner that would not be well-suited to quickly adapt to barefoot running. See “Factors that Affect Speed of Transition.”

In this case the novice is a middle-age man I’ll call Timmy, who has recently decided to start running. While in high school Timmy was an athlete but has since lapsed into a sedentary lifestyle. He wears shoes everywhere, as he has since childhood. It will be important for Timmy to start slow and spend extra time acclimating his feet to this foreign world without shoes.

**Stage One**—Pre-Running—2–3 weeks  
**Stage Two**—Starting to Run Barefoot—3–4 weeks  
**Stage Three**—Intermediate Barefoot Running—4–5 weeks  
**Stage Four**—Advanced Barefoot Running—After 9–12 weeks

Janice is an experienced marathon runner in her mid-twenties. She has qualified for the Boston Marathon multiple times. Janice routinely spends a lot of time walking around barefoot, whether it be at home or at the beach. Lately she has been training on trails in preparation for an ultra-marathon. Since Janice has a strong background in barefoot activities and is young, she will not require the conservative plan Timmy required. The following would be an appropriate schedule for an individual such as Janice.

**Stage One**—Pre-Running—One week (to learn form)  
**Stage Two**—Starting to Run Barefoot—2–3 weeks  
**Stage Three**—Intermediate Barefoot Running—3–4 weeks  
**Stage Four**—Advanced Barefoot Running—After 6–8 weeks

Regardless of the pace you set for yourself, it is important to follow the guidelines of only increasing distance by 10% per week or pace by 15 seconds per mile per week. This will prevent overuse injuries.
Pre-running

Before you run, you walk.

Learning to run barefoot or in minimalist shoes will put unusual stress on your body. After wearing traditional shoes for years, your lower anatomy is weak and unprepared to handle the workload of functioning in a way in which it was designed.

It is like wearing a cast for weeks or months. The underlying muscles atrophy and weaken. Because of this developed weakness, it takes some time to strengthen your body in preparation of running in a different way.

Also, other physiological adaptations must occur. The soles of your feet must adapt to the new-found freedom of feeling the ground under foot. Your brain has to reacquaint itself with interpreting the information being sent from sensory neurons in your feet. You have to develop some degree of foot-eye coordination and the habit of scanning the terrain you are walking or running through.

All too often, wearing shoes gives us a false sense of security. Thick shoes allow us to completely ignore everything surrounding our feet. It takes time to reawaken that spatial awareness. New barefoot runners often ask how to avoid stepping on broken beer bottles, hypodermic needles, or feces. Easy! You watch where you are going! This introductory stage will help accomplish these feats.

You may be tempted to jump into the actual running. Some people may be able to do just that. In the “Factors that Affect Speed of Transition” section, I discussed some of the factors that may allow some individuals to advance at a faster rate. Even if you believe you already have the skills and abilities necessary to skip this stage, I would highly recommend you spend at least a week or two contemplating the concepts and practicing the drills. It will better prepare you to progress through the more advanced stages.
You will be ready to advance to the next stage once you reach the following goals:

- Walk in place for five minutes without pain either during or after the activity.
- Feel comfortable with the feeling of lifting your feet off the ground versus “pushing off.”
- Feel comfortable with your ability to relax all tension in your arms and legs.

Concept—Feel Instead of Think

Barefoot running is inherently individualistic. It is impossible to give a detailed explanation of the perfect barefoot running form. Every barefoot runner will have a slightly different form that works best for their individual characteristics. Because of this, I will teach the basic components all barefoot runners have in common. It will be your responsibility to experiment to find out exactly what will work best for you.

Luckily, this is a relatively easy task. All you have to do is listen to your body. The soles of your feet are the best teachers
you have and will transfer critical information to your brain. In turn, your brain will send a signal to your muscles to provide the smoothest, most efficient gait possible.

It is important to be able to simply feel and react to what you are experiencing. Thinking about the tiny details of your form tends to short-circuit this process. Because of this, I prefer to avoid explaining many details that must be remembered and processed while running. Instead, I will give you one or two concepts at a time, then give you the drills to practice them. My goal is to teach you proper barefoot form that is tailored to your individual characteristics in the most time-efficient way possible.

**Concept—Importance of Patience**

Throughout the process of learning to run barefoot or in minimalist shoes, it is important to be patient. Your feet have likely spent many years encased in heavy, sweaty foot coffins (a term Barefoot Ted coined). Those shoes have weakened the muscles, tendons, ligaments, bones, and plantar skin of your feet and adjacent anatomy.

Because your feet have become used to shoes for so many years, I cannot emphasize enough the need for patience by slowly increasing your barefoot experiences.

In the beginning, you may be tempted to run farther than you should. In the barefoot running world, we refer to this as “too much too soon” (TMTS.) You will also reach various “break-through” points where everything seems to come together. Your form will finally click and everything will feel great. You will be tempted to try out your newly-perfected form. It will once again be important to exercise caution. Do not increase your mileage more than 10-15% per week or pace by more than 15 seconds per mile per week. By being cautious, your transition to barefoot running should be smooth and injury-free!
Starting Over

For regular, long-term shod runners, a big challenge is drastically dialing back the miles upon flipping to barefoot. A common strategy is to keep going with shoes in parallel and wean over to barefoot miles with time. However once you get going, you probably won’t feel like putting shoes back on. My advice is to embrace the chance to start over. It is the nature of the beast to plateau over time in any endeavor. Celebrate the opportunity to re-experience rapid change and progress. It’s exciting to double your mileage in the first week or two (albeit only from half mile runs up to full mile). Enjoy the sore calves and the re-strengthening of your neglected foot muscles. Savor the challenge of stretching shortened tendons. And, take the opportunity to augment your caloric burn with some cross training; yoga, for example, is wonderful in bare feet.

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Concept—Running Happy

“Fitness has to be fun. If it is not play, there will be no fitness. Play, you see, is the process. Fitness is merely the product.”
—George Sheehan

All too often, I see other runners with either a scowl or apparently wincing in pain. It is abundantly clear they are not enjoying themselves. Running should be enjoyable, especially when we ditch the shoes! Before you begin your journey into barefoot or minimalist shoe running, always keep the following ideas in mind:

• *Smile often.* First, it makes others smile. It is wonderful publicity for barefoot running. Second, barefoot running is enjoyable! It’s like being a kid again. Embrace your inner-child! Third, by smiling, you are providing feedback to your
brain that actually makes you feel happier (Kleinke, et. al., 1998) thus making the activity more fun!

• **Be nice.** If you encounter another runner, say “Hi.” Other people mirror our behaviors. If half of the runners on the road and trails were friendly and nice, they would convert the other “grumpy” half.

• **Thank volunteers at races.** They are taking valuable time out of their day to help YOU. Do not complain, scold, or belittle them. If they do not fill your water bottle to your satisfaction, thank them and do it yourself next time. If you follow the first two rules, this one should take care of itself.

### Issue—Minimalist Shoe or Barefoot?

It is common for new barefoot runners to have a desire to “ease into” barefoot running by using a minimalist shoe (Vibram FiveFingers®, Terra Plana’s EVO®, Feelmax® shoes, cross country racing flats, huarache sandals, etc). I have found it is better to learn the proper form of barefoot running first, and then use minimalist shoes as needed.

If you begin by wearing minimalist shoes, you may be insulating your best form of feedback—the soles of your feet. Learning to run barefoot first generally speeds the transition. Good form combined with properly strengthening your feet faster allow a barefoot runner to reach his or her goals faster.

To learn good form using my methods, it is critical that your brain receive accurate sensory feedback from the rest of your body. This is especially true of your feet. The soles of your feet will tell you if you are over-striding, running too fast, or creating too much friction. If you cover your feet even with a minimalist shoe such as the Vibrams, you will short-circuit that neural pathway.

Shoes have one more distinct disadvantage. The more we place between the soles of our feet and the ground, the more force we generate when our foot touches the ground.
Activity—Spend Time Barefoot

Spending your days barefoot is an excellent way to begin training your brain and the rest of your body. At home I rarely wear shoes, even in the winter. Outdoors, as well, I try to be barefoot as much as possible.

If your house contains a variety of different surfaces, this will help teach your brain to discriminate between small variations under foot. When moving around your house, pay close attention to the feeling of the different surfaces. Being aware of the tactile sensations being felt by your foot is critically important as you begin more rigorous activities.

My fellow Society for Barefoot Living (www.barefooters.org) members try to spend the vast majority of their time barefoot. This group advocates for the acceptance of a barefoot lifestyle by challenging business policies. Most people assume there are health department regulations that require shoes to be worn in businesses. Actually, there are no states that have such laws. A handful of municipalities have such laws, but they are very rare. It is also perfectly legal to drive barefoot (check your local laws in case of exceptions).