

Fit Feet: The Professional's Guide to Training South of the Ankles

What you need to know before joining the “barefoot” movement.

Footwear is as essential to fitness as a bottle of water. And like all sporting equipment, footwear is rapidly evolving as research progresses and understanding of human biomechanics improves. Popular books like *Born to Run* by Christopher McDougall (Vintage 2011) and extensive marketing campaigns for “fitness shoes” have made healthy footwear—and maybe even no footwear at all—a hot topic on the hiking trails and in the gym. Chances are you or your clients have seen Vibram's FiveFingers® shoes and have questions about starting a barefoot training program. As a movement professional, you need to fit yourself into the great foot conversation.

Footwear: What Is the Big Deal?

Scientific arguments from researchers in the barefoot and minimalist footwear movement are fairly straightforward. Footwear does not grow on trees; it is an unnatural, modern habit that is unnecessary for healthy human performance. The

human body does not require shoes to stabilize the joints and keep lower-leg tissues healthy (Rossi 1999, 2001; D'Août et al. 2009).

More important, footwear can limit the natural motion of each joint during a regular gait cycle (Bergman et al. 1995) and increase the incidence of knee osteoarthritis, back pain and hip degeneration. With this data in the literature, it is no wonder people want to ditch their footwear and take their daily 3-mile run sans shoes. But how exactly are shoes causing inappropriate wear of our human tissue?

Losing Our Nerve

The sole of the foot is the first interaction between man and ground. Sensory nerves collect data on temperature, pressure and terrain, staying finely tuned by constantly reading changing environments. Processing the same data every day for decades creates a physiological response that limits the nervous system's ability to process new data. This makes balance and

locomotion less natural and increases the risk of falls, ankle sprains or other lower-leg injuries (Nurse et al. 2005).

Limiting Full Joint Motion

Foot position is affected by two groups of musculature: extrinsic and intrinsic. **Extrinsic foot muscles** have one end in the foot and the other end somewhere up in the leg. These muscles always move the foot relative to the lower leg. The three muscles of the calves are all extrinsic.

Intrinsic foot muscles have both attachments entirely within the foot. Intrinsic motions move one portion of the foot relative to other foot joints. One example is the muscle that moves your pinkie toe out and away from the other toes (abductor digiti minimi).

Wearing shoes is like putting a limb in a cast after a bone break; muscular tissue rapidly atrophies without regular use. As the smaller, fine motor skills of the intrinsic muscles weaken, larger extrinsic muscles begin to compensate, developing inappropriate tensions.

Improper Geometry

The human skeleton is designed to bear weight on the vertical axis. Positive heels—any heel height above the ground—shift the skeletal position at all joints above the ankle (de Lateur et al. 1991). Although slight, the resulting increase in knee and hip flexion creates a gait pattern that causes friction and leads to joint inflammation.

It is also important to note that while footwear choices like high heels are obvious culprits, most shoes, including many athletic styles, have heels up to 2 inches high.

Fresh Feet and the Urban Jungle

Despite all the data supporting barefoot theory, the flip side of the *au naturel* coin



Training Feet

Leaping into minimalist shoes after a lifetime with traditional shoes can set you up for injury. With all evidence pointing to foot strength's key role in foot mechanics, professionals should consider offering a foot-specific training session designed to innervate intrinsic foot tissues and restore length to muscles in the lower leg. The muscle groups of the two feet make up 25% of the body's muscles; ignoring the strength and function of foot muscle is like eliminating upper-body exercises from your routine and calling it balanced.

Most of the population has worn shoes since birth, so foot exercises don't have to be limited to an advanced or athletic population. Everybody who wears shoes needs barefoot exercise,

regardless of whether they want to switch to minimalist footwear.

Unfortunately, the numerous skeletal muscles running between the 33 joints of each foot have always been seriously neglected—both in therapy and in fitness. The complex machinery of the feet plays a critical role, not only in the obvious realms of gait patterns and ankle stabilization, but also in whole-body balance, nerve conduction and cardiovascular circulation.

Setting Up Space

One of the main critiques of barefoot training is that the environment is unsafe. Sharp objects increase the risk of injury, and bacteria-covered mats expose the possibility of infection. Reduce these risks by creating a barefoot-

specific area. Post a "bare-foot training in progress" sign and keep the area free of weights and clutter. Install a small handheld vacuum and go over the site regularly. Use antibacterial wipes on mats and feet before and after each session.

Natural Motions of the Feet

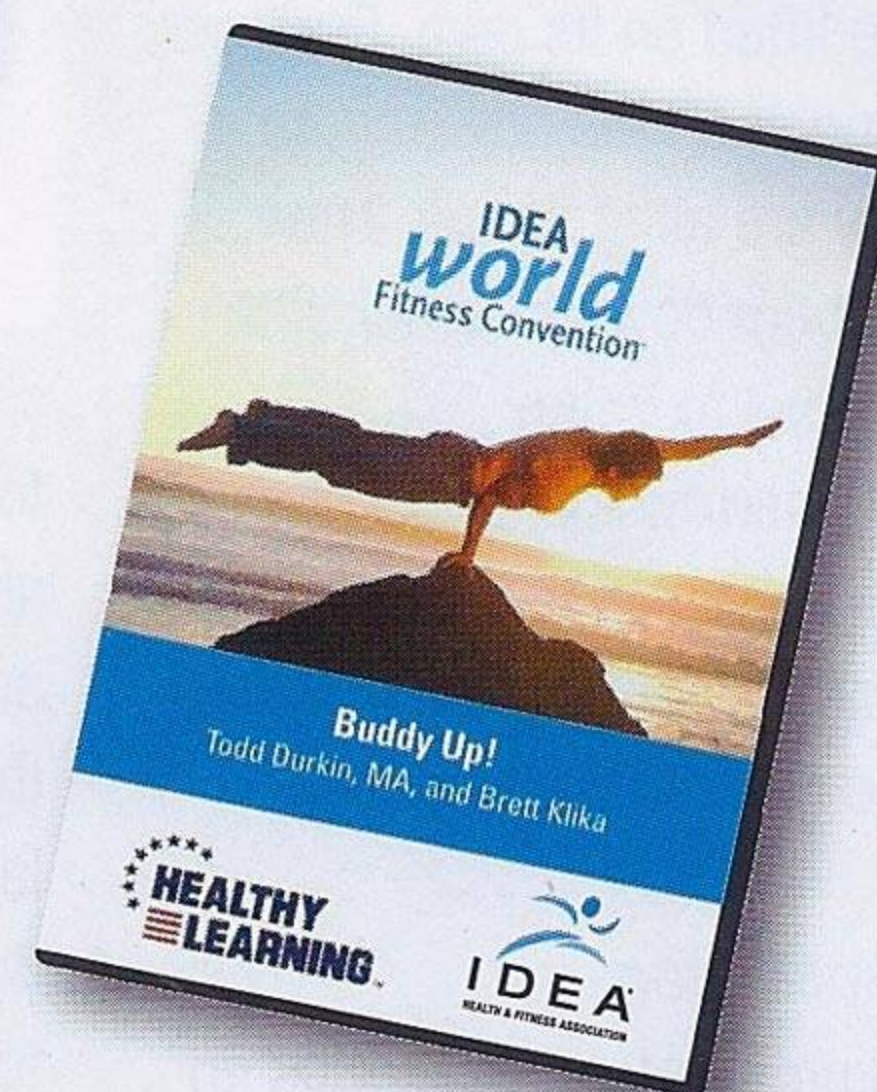
Toes are designed to have as much dexterity as fingers. Each toe joint can flex and extend, abduct and adduct. These seem like basic motions, but if you try it yourself, you will likely find that lifting one toe without the others is extremely difficult. Start a foot-strengthening program that assesses motor skills, and continue until movements are improved and fluid.

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is that most exercise surfaces are just as unnatural as our shoes. The hardness of concrete, while somewhat similar to the

firmly packed dirt of a trail, still exceeds the natural biological forces created by the interface of natural on natural. The

increase in impact, made worse by poor walking or running mechanics, can increase the risk of stress fractures

Sample Foot Exercises



Toe Lift

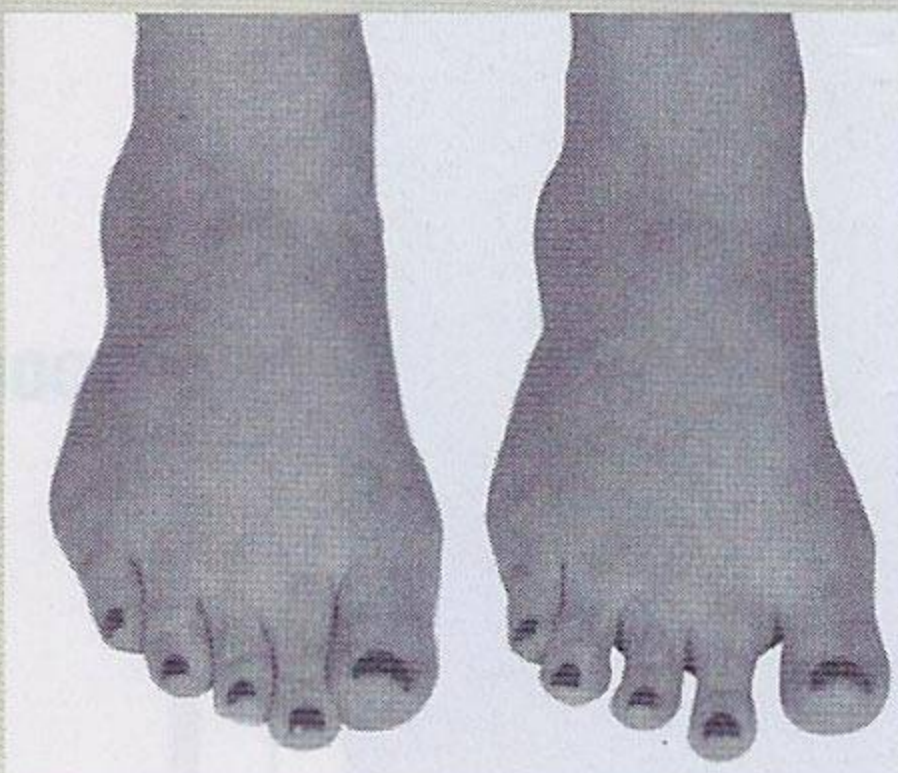
Check if the hallux (great toe) can be lifted on its own. Progress to lifting each toe one at a time till they are all in the air. Then, place them down in order, fifth metatarsal to hallux.

The narrow toe space in footwear creates weak toe abductors and tight adductors, preventing the natural spread of toes.

Toe Abduction

Standing barefoot, back hips up until weight is stacked over heels

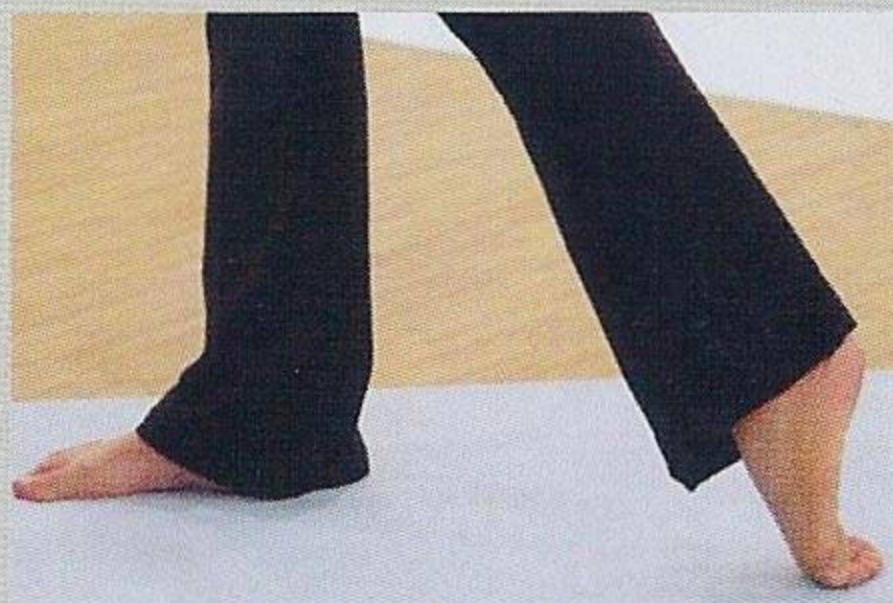
and toes are liftable. Work to spread toes away from each other, eliminating any toe joint extension.



Flip-flops, another common footwear choice, have been shown to increase gripping action, leading to buckling (hammer toes) of the foot phalanges. Chronic tension in the flexed position can reduce the foot's surface area, eventually leading to changes in balance.

Stretching the Toe Flexors

Standing, reach one leg behind you, placing the top of the foot on the ground. Slowly allow the ankle to plantar-flex. Toe cramping is normal—take a break



when necessary and work up to holding 1 minute on each side.

General Guidelines for Footwear Transition

When switching to barefoot or minimalist footwear, give underutilized muscle time to develop. Begin foot exercises before

switching, and continue the foot exercises while doing your whole-body training in less-supportive shoes.

Master shoeless walking before you try shoeless running. Running creates much greater forces in the joints of the foot, so walking is the more natural precursor to developing the appropriate strength for running.

If running, start with short distances first—on dirt or grass—before logging longer runs.

Seek out expert guidance on running form. Regular running shoes offer excessive cushioning to protect against high joint forces. The better you align your feet while exercising, the less you will overload them.

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(Warden, Burr & Brukner 2006).

The traction between skin and dirt or grass is also much less than that between skin and artificial surfaces like asphalt. The interface of bare feet on asphalt creates greater tension on the surface tissue, which can increase damage to the top layers of skin. Finally, modern-living terrains sometimes contain debris that can injure bare feet. For all these reasons, many foot specialists are not fond of shoe-free exercise.

Another issue is that many who start a barefoot or minimalist shoe exercise program ignore the basic exercise science laws of appropriate progression (see the sidebar "Training Feet"). Feet that have been bound for decades cannot bear the load of the human body without some sort of training. Just as you wouldn't hand a 150-pound weight to a client fresh out of an arm cast, you shouldn't send a shoeless client out unprepared. It is very likely that injuries sustained in a barefoot training program come from a combination of deep foot-muscle weakness and poor mechanics.

Is Barefoot the Answer?

Spanning over two decades, the research on footwear and its impact on total-body health is fairly extensive. Shoes have many detracting qualities, and data supports at least a change to more flexible, spacious and flat footwear. As for all-barefoot exercise, research is limited and new, but it is trending toward integrating this lost body part back into the foreground of exercise training (see the sidebar "Sample Foot Exercises" for some basics).

Many footwear companies have begun to create minimalist footwear—shoes that allow more natural biomechanics while still offering a bit of protection from modern surfaces. For most people, these options provide the best of both worlds, enhancing health and performance while minimizing risk of injury. ■

Katy Bowman, MS, is an internationally recognized biomechanical scientist and the director of the Restorative Exercise Institute. She is the author of Every Woman's Guide to Foot Pain Relief: The New Science of Healthy Feet (BenBella 2011) and the creator of the Aligned and Well DVD series. Read more at www.alignedandwell.com.



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