

Footwear finds new fitness fad

by Mel Cheksin

In days gone by, footwear was made to protect the feet from the burning sands of hot climates as well as from ice and snow in colder regions. Over the ages, the range of benefits offered by shoes have expanded to offer increased height and comfort, to help accessorise fashion outfits, to absorb shock, to improve athletic performance, to correct gait and even to allow rolling around or skating. The latest fads in footwear, however, offer even greater benefits: the current trend is to go beyond the feet, to promote shoes for 'total body health'.

One could legitimately argue that improving traction under the foot improves total body performance, but the latest shoe trends claim such advances as helping to remove cellulite from the legs and gluteus muscles, improving the body's caloric burn, promoting better breathing, altering body posture, toning and strengthening muscles in the lower anatomy, lowering high blood pressure, preventing foot odour and even treating depression.

The brand leading this 'revolution' in footwear, at least in terms of marketing awareness, is MBT, the Swiss brand that advertises itself as a 'physiological footwear' provider. Before discussing any shoe company's biomechanically tested claims and data, either statically (laboratory machine testing) or dynamically (motion gait analysis), it is important to discard the obvious. Cleverly worded marketing claims are not a substitute for scientific accuracy, and can be misleading at best. For example, claiming that the wearer of a certain shoe will be guaranteed to lose weight by walking ten miles every day in the shoe is probably



Sports brands are now promoting shoes for their 'total body health' benefits.

accurate for 99% of users. That is, the 99% of users who don't walk very much at all before purchasing their new shoes. 'Psychological footwear' is probably a better term in these instances.

One of the simplest shoe concepts that needs little explanation is that of adding weight to the shoe in order to burn more calories during exercise. The weighted shoe (or insole) concept has been around for many years and it makes sense. Any weight added to the furthest distal proximity of the body, namely the feet, takes more muscle mass and energy to lift the extra weight. Two physiological benefits have been used by shoe companies employing this concept over the years. One is to tone and build muscle strength and mass in the legs by increasing the load as a form of resistance training. The other advertised benefit is in the form of increased heart and oxygen consumption rates, thus improving the cardiovascular workout as well as helping to burn more calories during exercise. Amongst the shoe brands advertising these benefits are Nikken (CardioStrides), MetaTrex, Active-Forever and Winning Edge weighted insoles.

With an FDA (reg: 3004512354) approval statement that "weighted shoes are proven to burn up to 300 calories in just 30 minutes of brisk walking", it is only a small leap for a shoe company to make the claim that: "Our shoes help to control weight and lower the risk of becoming obese by 50%". This is one of the claims made by Power Diet Shoes, which come with two sets of interchangeable weighted insoles. By tacking on statements from normally credible sources, such as *Time* magazine and The World Health Organization, in support of walking (in general), Diet Power Shoes is able to include the following to advertise its footwear:

- Helps to lower the onset of heart disease, diabetes, and osteoporosis and can help with arthritis, hypertension and depression (from a Time Magazine Report)

The list below is from a World Health



MBT's unstable sole is designed to create a natural balancing effect, connecting postural muscles. CREDIT: MBT

Organization statement advocating benefits that can be achieved from 30 minutes of moderate physical activity daily. It includes:

- Reducing the risk of heart disease and stroke
- Reducing the risk of Type II Diabetes by 50%
- Preventing or reduce hypertension
- Preventing or reduce osteoporosis
- Reducing the risk of developing back pain
- Reducing the risk of colon cancer by 50%
- Promoting well-being and reducing stress and feelings of depression
- Building and maintaining healthy bones, muscles and joints and improving stamina
- Managing conditions such as back and knee pain

Far be it from any physician or healthcare professional to negate the well-established health benefits that can be gained from regular walking. However, it is easy to confuse or misrepresent the claims of certain shoe brands or concepts with the activities performed in them. After all, wearing a laden rucksack over both shoulders or carrying hand weights will also increase the physical demands of your walks.

Further words of caution: weighted shoes vary in weight from an extra half kilogram (1.1lbs) to 1.5 kilograms (2-3lbs). Many walking experts disapprove of weighted shoes, citing

the incidence of muscle strain and injury. With no studies available on the optimal loading weight for an individual, weighted shoes are not recommended for children, the elderly, handicapped, pregnant women, people with heart conditions or for those with joint problems without a doctor's supervision. One shoe brand warns that: "If the wearer experiences discomfort or dizziness during or after wearing weighted shoes, stop wearing them immediately". Weighted shoes should be restricted to walking activities and health club training in order to avoid muscle strain and injuries.

Since arriving in America at the early part of the century, the MBT Swiss Masai shoe concept has created both a following and a controversy amongst podiatrists, pedorthists, biomechanists and health enthusiasts. Basically, the MBT concept is a new version of an old idea. Designed and advertised as 'enabling the body to stand and walk the way nature intended', MBT's midsole design has a 20+ degree semi-rigid rocker sole. This (midfoot) rocker-sole concept is designed to accelerate propulsion while reducing the dorsiflexion pressure on the MPJs (meta-tarsophalangeal joints). The distally pitched heel wedge reduces impact forces and delays heel contact, inducing midfoot rather than heel strike—thus transferring the body's

centre of gravity and weight forward. The soft heel sensor is made from 40° Shore C durometer polyurethane, which creates frontal plane instability. This purposeful feature is designed to engage the intrinsic muscles of the foot and proximal leg muscles to reduce foot and ankle stress and to improve balance. The shoes come with an instructional booklet or DVD that advises the wearer on the correct and optimal use of the shoes in order to achieve favourable results.

The claims made by MBT are numerous and, in some instances, supported by third-party research at Edinburgh Royal Infirmary, Sheffield Hallam University and the University of Calgary under the direction of the renowned biomechanist Dr Benno Nigg. Among MBT's claims, altering the body's gait pattern and posture, can (a) 'lengthen' the body, (b) promote weight loss (c) reduce cellulite (d) reduce knee pain caused by arthritis, and (e) increase blood circulation.

Rather than attempting to support, critique or disseminate these effects upon the body, let's point out that MBT uses the rationale that their proprietary patented technology mimics the walking gait of the Masai people of Kenya (barefoot on naturally uneven, soft terrain). The key word in the above sentence is 'mimics'. The fact is, whether or not the Masai people benefit from their barefoot gait pattern, they are not actually wearing MBT shoes to achieve this. Picking up on another point of marketing logic, if the body is 'lengthened' by two inches by wearing MBT shoes because of their thick midsole formation, one would have to accept that claim as 'accurate'. Ladies' two-inch high heels offer the same benefit.

Typically in the shoe industry there are already MBT 'lookalikes' and similar concepts on the market. However, there are other shoe brands with completely different technologies and, subsequently, different claims of 'total body benefits'. On the topic of weight loss, the Gairun shoe from Korea does not offer to reduce the amount of body fat

or to increase the calorie count; it simply offers to calculate the Body Mass Index (BMI) and percentage of body fat. This is achieved using an onboard LCD microprocessor with an integrated electro-mechanical stride sensor that acts as a fitness controller or 'personal fitness coach'. After inputting personal data, such as height, weight, age, and gender, the shoe's device calculates and displays both the BMI and percentage of body fat on the LCD screen. This information is used to determine the wearer's optimal exercise goal (calorie burn) and can be re-inputted at any time to measure progress.

Can a shoe actually improve your health and fitness? Earth Footwear, the original negative heel concept, introduced by Danish born Anne Kalsø in the 1970s, has always claimed so. Certified and approved by the American Podiatric Medical Association, Earth lists among its benefits that: "Walking in Earth negative-heel shoes burns more calories and amplifies the effects of exercise to help lose weight and

reduce cellulite" and that "By correcting your posture, Earth shoes can bring immediate relief from chronic back pain, muscular aches and joint problems". Built on a 3.7° incline to dorsiflex the feet, Earth shoes was the first company to promote overall health benefits such as improved breathing and wellbeing by promoting the 'natural walking motion' inspired by its Minus Heel concept. Earth Footwear has an extensive range of casual and fashion shoes but, to date, has been reluctant to enter into the performance arena. It is well established that the negative heel concept promotes a 'vaulting action' during propulsion, placing excessive strain on the Achilles tendon and plantar fascia.

Emphasising its DORSI Technology, SpringBoost, a Switzerland-based shoe company now marketing its shoes in North America, goes one step further down the negative slope of dorsiflexion with a series of interchangeable inserts to a maximum of a 4° incline. SpringBoost, with an extensive list of scientific studies to



AQX's Aquatic Training Shoe uses three strategically placed medial and lateral plastic gills to enhance muscle usage.

CREDIT: AQX

back up its claims, is out to retrain the world with a list of health benefits that include:

- Improved posture
- Better blood circulation
- Greater ankle stability

In terms of performance enhancements, dorsiflexion technology can offer several potential mechanisms:

- More efficient neuromuscular activity (i.e. increased muscle fibre recruitment)
- Greater range of motion (ROM) at the ankle. Furthermore, the extra 10° of ROM (5° of dorsiflexion to 5° of plantar flexion) is employed when the moment arm is at its peak, producing greater plantar flexion torque about the ankle
- Stretching the triceps surae complex alters the pennation angle of the muscles, putting them in a more efficient force-producing position
- Dorsiflexion pre-stretches the muscles, storing and releasing elastic energy
- Optimal configuration of the sarcomeres

Promoting its shoe concept for competition as well as for use as a training aid, SpringBoost is the brainchild of Swiss biomechanist Dr Jörg Fuschslocher.

Aquatic fitness

Based on the principle of water-resistance training, AQx Sports has designed shoes with strategically-placed hydrodynamic fins on each side of the shoe to add 20-30% more resistance to any aquatic exercise. By using resistance and decreased gravitational force, AQx is able to claim the use of its shoes as a training aid to improve overall core strengthening and lessen the impact force on joints in deep water, as well as advocating its shoes for shallow water drills and plyometrics to help build speed, agility and quickness.

Springs for pain relief

Spring-soled shoes also promote themselves by offering a variety of bodily health benefits. Amongst the



Kenyan athlete David Cheruiyot takes first place in the 2007 Ottawa Marathon. Wearing Stinger shoes from Spira, he achieved a course record time, and personal best, of 2:10:35. CREDIT: ING OTTAWA MARATHON

most popular spring brands is the performance-oriented Spira, with single heel, dual heel/forepart and Tri WaveSpring models. By offering a shoe with an energy return factor of up to 96%, Spira's main health claim is that the shoe makes it easier for the wearer to stand, walk, run and compete without the stress associated with traditional shoe midsole materials.

Z-Coil's massive conical steel spring under the heel has been shown both in third-party laboratory testing by Los Alamos National Laboratories and Sandia National Laboratories to reduce body impact rate by up to 50%, giving credence to the statement that Z-Coil shoes are "all about pain relief". It is true that both Spira and Z-Coil have armies of dedicated testimonial providers and that their shoes are highly recommended by many orthopedic surgeons for relieving stress and strain on lower extremity joints following knee surgery.

No such scientifically supported claims are made by other makers of shoes with various formations of springs in the soles and heels, which,

incidentally, have been around as an invention since 1939. Other shoe brands with springs include J. Rubio from Spain, Monster Spring Shoes in California and Gravity Defyer, a nationally advertised brand offering the one thing you have always wanted to recommend in footwear—everything. This includes a feeling of flying, weight loss, higher energy levels, appearing two inches taller and easing joint pain and pressure on the spinal column. And yes, these shoes also contain magnets to increase blood circulation.

There is little doubt in all its myriad forms that footwear, as the foundation of the body's posture and interface with the ground, can do a lot to improve the patient's or athlete's gait pattern. However, beyond the proven performance results produced by third-party scientific testing in a biomechanics or human physiology laboratory, marketing claims may, at best, be exaggerated and, at worst, be harmful. Remember that, despite all the claims of 'physiological' benefits made by shoe companies, they are, after all, just foot coverings for the feet. 🦶