

Are trends in foot health creating new markets?

PROF. CHRIS NESTER AND DR. CARINA PRICE

The simple answer to this headline question is yes. Changes in global foot health trends look set to underpin significant new opportunities for the 'healthy footwear' sector over the next few decades. Providing the right footwear to both retail and health service markets will have a critical role to play in maintaining good foot health globally. With the right input to innovation and design, footwear can help keep us fit and active and contribute to our overall wellbeing, creating exciting opportunities for the footwear market. There are three key issues driving this opportunity: the global increase in the number of people with diabetes, those who are obese and the fact we are all looking forward to living longer.

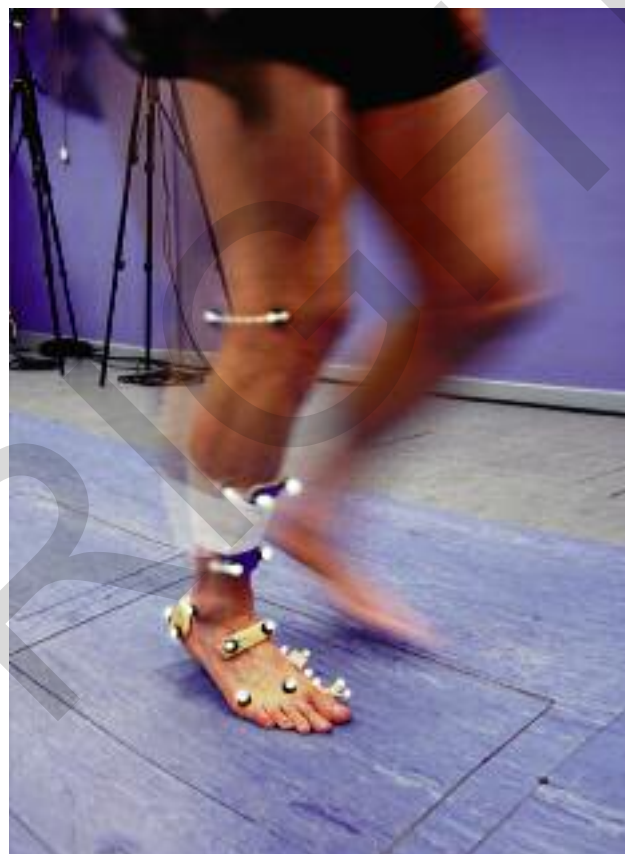
DIABETES

Diabetes has now reached epidemic levels, affecting almost 10% of adults globally. It affects how levels of glucose (sugar) in the blood are regulated and leads to very wide ranging changes throughout the body. Recent growth in numbers is due to excessive food consumption and a sedentary lifestyle. It is associated with increased mortality, too, accounting for some 3.4 million deaths and is the leading cause of lower limb amputations worldwide.

The poor control of blood glucose often goes undiagnosed for some time and so the complications of diabetes have often already started by the point of diagnosis. Without good control of blood glucose levels, the supply of blood to the foot can diminish and normal nerve function is lost, leading to numbness and dryer, more vulnerable skin. This can limit the ability to sense where pressure is placed under the foot, leading to foot calluses, which themselves create further pressure. In these cases appropriate footwear can have an immediate and life changing effect since, through appropriate materials and design choices, these pressures can be reduced and other areas of foot skin protected from damage.

The consequence of poor footwear in combination with changes in circulation and nerves is too often ulceration. Without appropriate wound care and pressure relief from appropriate footwear and orthotic inserts, ulcers can become infected and take months to heal. Even minor skin injuries such as blisters can lead to devastating ulceration if not properly treated. Remarkably, in many cases these lesions are not detected by the sufferer due to sensory loss and even significant ulcers can go unnoticed unless feet are regularly checked. These ulcers can be a precursor to foot or limb amputation if not properly managed by specialist health care professionals.

Footwear recommendations for people with diabetes are widely available and it is a rapidly growing consumer and



Understanding how feet move during the gait cycle can drive new innovation and development ideas better tailored to specific foot health problems.

CREDIT: SALFORD UNIVERSITY

health care market. A range of width fittings is certainly important, but it is not simply a case of scaling up the standard last shape, since the dimensional change is not uniform along the length of the foot. Adjustable fastening and width opening will encourage daily use of this specialised footwear and can be important if, due to obesity, reaching down to attach and fasten shoes is difficult.

The material and structure of the midsole should be able to withstand increased repeated loading and disperse increased shock/loading. However, stiffer curved soles (so called 'rocker' shoes) have also proved effective in reducing pressure under the ball of the foot. These are used in combination with soft yet supportive orthotic inserts. Made correctly these can offer very effective redistribution of pressure under the foot. Custom made inserts that create a specific fit to the shape of the foot can further optimise this relief of pressure. Nevertheless, in the absence of a foot deformity, many people will achieve sufficient benefit from an



Customised orthotic inserts can offer a bespoke fit to the foot and incorporate a combination of materials to support and cushion it.

CREDIT: SALFORD UNIVERSITY

appropriately designed mass produced product. Bridging health care and retail sectors is a particular opportunity here, especially if the advantages of mass and personalised production approaches can be blended to offer bespoke solutions at a viable retail price.

OBESITY

The prevalence of obesity in the world's population is increasing steadily and the latest estimate in the EU identifies 30-70% of adults as being overweight and 10-30% as being obese. Footwear sector strategies are needed to promote and maintain physical activity, prevent foot injuries and the risk of falls due to altered gait.

Changes in foot shape and the distribution of fat mean that obesity specific lasts are the foundation for appropriately fitting footwear. It is important to accommodate changes in width and, for boots, greater ankle and leg girth. The foot should also be supported and inserts might offer effective solutions in this respect and help to ensure the foot is stable inside the shoe. This can be especially useful since, as removable components, the design and features of the insert chosen can be varied even at the point of sale and so offer a means of fine tuning fit.

Materials and footwear components (particularly outsoles) should be designed for longevity and incorporate adjustable fastening to ensure quality of fit and an ability to alter fit when changes in foot shape occur as, for example, swelling in warm weather. Furthermore, since walking when obese

requires more energy, lower weight shoes could be an advantage. However, lighter materials are sometimes the least durable and least able to bear higher loads, presenting a useful materials science challenge to create lightweight, yet strong, flexible and durable footwear materials. Obese people also suffer more difficulties regulating their body temperature, so management of in shoe temperature and humidity can be important to avoid over hydrating the skin which, in turn, encourages bacterial growth and odour, and the risk of skin damage such as blisters.

Ease of putting footwear on and taking it off is critical to its regular use and also to ensuring a stable fit on the foot. It is common to see someone who is obese with unfastened shoes, since either their shape is incorrect or the fastenings no longer work effectively. In addition, as reaching down to the foot is more difficult, easy fastenings that remain in place for long periods are preferred. Boots could incorporate zips and also have tabs or loops at the back to help when pulling them on.

How we walk is also altered by obesity. Of relevance to footwear design are changes in the distance between feet when walking. Typically there is a wider base of support, perhaps due to excessive fat tissue at the top of the thighs preventing feet being placed close together or to improve general stability. This can pose different requirements for control of frictional forces on the sole, as the foot hits the ground at a different angle and trajectory compared to a normal person.

AGEING

It is news to no one that life expectancy has increased greatly and this is posing new health care challenges to better accommodate the inevitable effects that ageing brings. This is creating potential new markets in consumer sectors as the concept of health care and retail consumers becomes blended. Perhaps footwear is one of the best examples of where retail consumer products concerned largely with fashion will have a daily effect and impact on our health, mobility and sense of wellbeing.

The ageing foot experiences a wide range of changes with potentially important consequences for quality of life. Skin and other soft tissues such as ligaments, muscles and tendons that support the foot become stiffer with age. These changes can combine with simple foot deformities such as hammer toes or more significant ones such as changes in the arch that increase pressure at specific locations under and on top of the foot. Some reduction in walking speed, another consequence of ageing, can cancel out the greater pressures but, even so, painful feet are far more common among older people.

It doesn't stop there. Loss of muscle and bone mass, altered foot shape, lower flexibility, poorer co-ordination, lower physical activity levels, all interact to reinforce the gradual deterioration of the body and feet. When these are coupled with changes in vision or hearing, and perhaps loss of confidence to remain independently mobile, having healthy and pain free feet protected by suitable footwear can become central to a fulfilling life as an older adult. Perhaps the most critical consequence of getting footwear choices wrong is the greater risk of trips and falls since they are strongly associated with hospitalisation and mortality rates. It is well recognised that unsuitable or poorly fitting footwear is implicated in many instances.

Future footwear for older people needs to take greater consideration of the anthropometric measures of the ageing foot and profiling of physical activity and inactivity habits. This can create the right shoes for outside and inside the home and increase confidence to be more active. The correct shape and appropriate linings,



Old age brings with it a wide variety of foot problems, many of which can be alleviated by wearing suitably designed footwear.

CREDIT: SHUTTERSTOCK/RA3M

with well placed or absent seams, can avoid painful and often slow-to-heal skin lesions. Quality soles and insoles will offer pressure relief, an immediate sense of comfort and an orthotic insert shaped more closely to the varying arches of the foot can help stabilise it inside the shoe and further reduce pressures under the heel.

The soling is also critical in managing the risk of friction-related trips as well as general stability since over-complex curves, flares and too stiff soles can affect how the wearer transfers load forwards as they walk. Thermal and humidity regulation can also support improved comfort and avoid exacerbation of poor foot skin hygiene. Finally, fastenings and the dimensions of the throat and opening can mean the difference between wearing the shoes or not, especially if there is no help at hand.

SECTOR STRATEGIES

Convincing consumers to invest in footwear because of their foot health requires clear communication of the benefits the footwear can offer. The best platform for this is a 'health and benefits' driven approach to innovation and design, such that the benefits factor is in the finished product's actual DNA. This creates genuine messages for marketing to communicate and a blending of aesthetic and trend qualities with functional performance.

A benefits-driven approach relies upon an educated consumer base, built up through a foot health

education push from the health care sector and a complementary pull from the retail. This is a challenging area with so many public health messages now appearing for people to absorb and prioritise. However, acknowledging a foot health problem in the first place is an essential foundation for consumer intention to purchase and, if products more clearly deliver benefits that align with the consumers' perceived problems, then sales should be more achievable.

New models for accessing retail and foot health care consumers might also emerge as a consequence of national health care and government strategies to address the trends in foot health. Improved quality, benefits-driven and accessible footwear for specific populations would encourage physiotherapists, podiatrists and other health professionals to co-operate with retail stores in the provision of footwear and/or orthotic insoles. This might address some shortages in footwear provision by health services.

Health professionals are keen to ensure patients access the right care and footwear and yet there are often quite limited options for high quality healthy footwear designed with specific foot health issues in mind. Health professionals are also the guardians of foot health messages and aligning footwear product features with professional perspectives on foot health priorities will make for a more seamless understanding and of the purchasing behaviour for consumers.

A strategy to deliver 'shoes with

benefits' should integrate very well with the consumer trend of ever greater personalisation of products. However, to manage cost and price constraints, opportunities for integrating the advantages of mass production of some components with local and more personalised manufacture of the actual footwear might be required.

This would also lend itself to replaceable, maintenance or repair approaches which themselves offer better value and personalisation opportunities to consumers as is already the case with orthotic inserts. Indeed, it could also offer opportunities for collaboration between existing commercial operations as, for example, the often separate insert and footwear sectors. Combining product strategies and technologies might enable the best of both domains to be integrated in order to offer wearers products that become greater than the sum of their parts.

There is evidence of significant changes in foot health across the globe. Foot health problems are already well understood by professionals and are becoming increasingly better understood by consumers. The opportunities are therefore real but require the sector to align product innovation, development, and marketing to the right foot health issues and ensuring products deliver real benefits. The individual pieces of the jigsaw required for this are already in place. Collaboration between the various knowledge stakeholders, clinicians, designers, academics and production and sales specialists is now needed to create a coherent approach to providing real and commercially distinctive solutions to consumers with foot health needs. 🧠

Prof. Nester is Research Programme Leader, School of Health Sciences, University of Salford and Adjunct Professor at La Trobe University, Australia.

Dr. Price is Research Assistant, School of Health Sciences, with an interest in biomechanics.