As the barefoot running trend grows ever more popular, experts argue the pros and cons of cushioning, muscle tuning and whether 'natural' really is better.

The natural way?

Last year, one of the most debated themes in the footwear industry was natural or barefoot running. The pros and cons of training either completely barefoot, or with trainers designed specifically to mimic barefoot movement, were widely talked about, with the two camps of thought becoming increasingly polarised. Those in favour of barefoot running say that it helps prevent injuries and is good for posture; those on the other side of the fence say that shoes have been designed as a tool to enhance our everyday performance in any number of activities, and therefore to not wear shoes is somehow backward and more of a hindrance than a help. Part of the problem of the barefoot debate is that there is no reliable data or study to prove the effects either way. There's no doubt that studies in the future will shed some light on the issue but, for now, the best information available is largely opinion-based and anecdotal.

At the recent British Association of Sport and Exercise Medicine (UKSEM) conference in London, a session titled "Natural Running – advantages and disadvantages. A Round Table Discussion" featured a high-profile array of biologists, biomechanists and clinicians who put forward their opinions for and against running without shoes. The panel comprised: Daniel Howell, an anatomy professor from Liberty (USA), known as the "barefoot professor"; Simon Barthold, who formerly worked as a podiatrist but who now works in biomechanics and is a global research consultant for sports brand Asics; Benno Nigg, a professor of biomechanics at the University of Calgary; Dr Mathias Marquard, a clinician and running coach and Daniel Lieberman, evolutionary biologist at Harvard University who recently published the nature studies looking at how habitually shod and barefoot runners differ, and who wrote a key paper on how humans are adapted (skeletally and physiologically) to run long distances.

At opposite ends of the spectrum were Mr Howell, who explained that he had been living barefoot for six years, spending 95% of his time without shoes, and Mr Barthold, who said that although he believes it is a personal choice, the protection and performance benefits of wearing footwear outweigh any potential benefits of barefoot running - an unsurprising stance given

In just a few years, barefoot running has gone from an alternative trend to a mainstream talking point.

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that his career is within the footwear industry. Mr Nigg, Mr Marquard and Mr Lieberman were more neutral. Mr Nigg said that he asks his students this question in exams: "Does barefoot running prevent injuries?", and the only answer he accepts for a good grade is: "I don't know because we don't know." As a clinician, Mr Marquard treats many people who have sustained an injury while running barefoot on a man-made surface such as concrete — but he thinks barefoot running on natural surfaces such as grass can help strengthen the feet and calves. The evolutionary biologist of the panel, Mr Lieberman, had a more unusual perspective. He said that humans had evolved to run, and have been running barefoot for millions of years, so to even have the debate in the first place shows "just how out of touch we are with our bodies". He went on to say that humans do "many things we didn't evolve to do, such as fly planes and take antibiotics" and that therefore whether to wear shoes or not comes down to personal choice.

Evidence

The lack of scientific evidence for or against barefoot running makes any debate on the subject more about subjective opinion than hard fact, which means there are varying scales across the spectrum. Mr Barthold pointed out that, from a footwear perspective, the question should be whether or not athletic shoes positively influence injury — to which he says the answer is "categorically no". A study into the correlation between footwear and injury could shed some light on this, but such a study would be difficult to get past any ethics committee.

The lack of scientific information for what causes running injuries further complicated the barefoot issue, although by studying the form of barefoot runners, Mr Lieberman suggested, we can start to get an idea of what factors may be relevant in injuries. "One of the reasons that barefoot runners tend not to land on the heel, particularly on hard surfaces, is that it hurts," he said. "Whether that is clearly a mechanism to protect against impact damage, nobody knows, although there are papers that show there is a correlation between the rate of loading and the magnitude of the impact, and running injuries. I think injuries come partly from impact, partly from running form and I think the reason barefoot runners tend not to land on the heel is that it's an adaptive signal from the body."

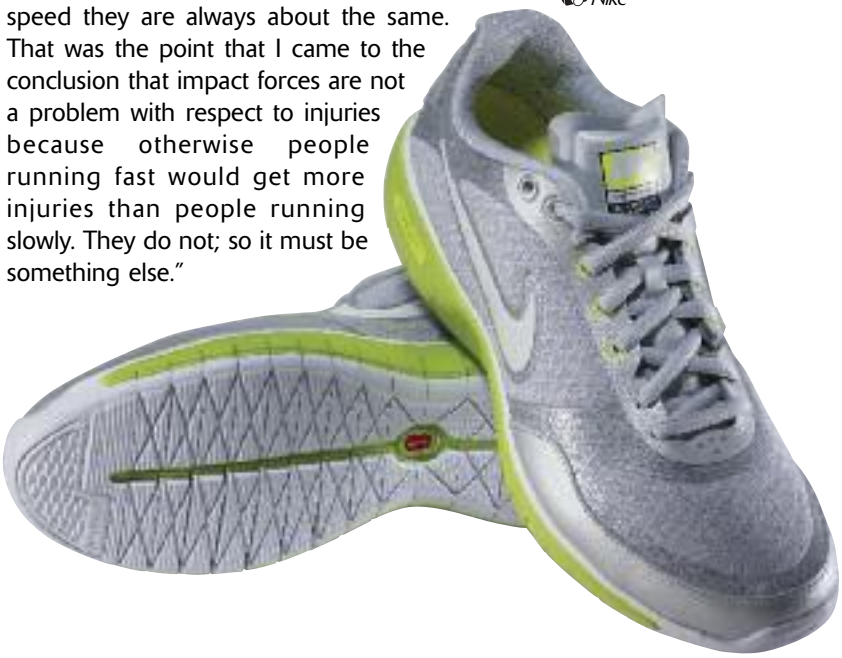
Running form is a key part of the barefoot debate, and when making the transition from running with trainers to running without, learning good barefoot running form is essential. "I worry about people who learn about barefoot running, and they read stories which don't really explain it very well," said Mr Lieberman. "So they switch to a barefoot style, and they forefoot strike because they've been told to do that, but they don't change any other aspects of their running. I suspect those people are getting injured by the droves. It's about how you use your body and that's where barefoot helps, because it gives us a set of hypotheses."

The professor went on to say that scientists today assume that wearing shoes should be the null hypothesis. "I would argue from an evolutionary standpoint that this is the wrong null hypothesis, just as a more natural diet, high in fibre, low in starches and sugars is more healthy, you might also apply the same logic to the way in which people evolved over millions of years," he said.

The causes of injury

On the subject of whether or not barefoot or shod running is better for preventing injuries, most of the experts agreed that rather than worrying about wearing shoes, avoiding repitition is the most important thing. Mr Barthold said: "From an injury preventative point of view, it's very important that you introduce things like trail running, some barefoot training, but wear shoes when appropriate. It's important to make sure you're not introducing the same repetitive pattern time after time because that's the reason that runners get injured."

It was generally agreed by the panel that cushioning in footwear, although a useful marketing tool, does not actually have any proven effect on injury prevention. Mr Nigg studied impact forces when he first started researching biomechanics, and found some interesting and surprising results. "When we run barefoot, shod, in soft shoes or in hard shoes, the impact force peaks are always about the same," he said. "Which is completely surprising. When we run fast, the impact forces increase. But when you run at a certain speed they are always about the same. That was the point that I came to the conclusion that impact forces are not a problem with respect to injuries because otherwise people running fast would get more injuries than people running slowly. They do not; so it must be something else."



The Nike Free trainers are designed to mimic barefoot running and, in doing so, strengthen the muscles in the foot.

Nike

The barefoot runner of the panel, Mr Howell, agreed with this. "Barefoot runners don't care how hard the ground is, they care how rough the ground is," he said. "One of the nicest surfaces to run barefoot on is smooth concrete asphalt."

Rather than cushioning in footwear being a helpful tool, it is in fact the pre-activation of muscles in the foot which helps reduce the potential for impact forces to cause injury. Mr Nigg's anecdote about working with Canadian entertainment company Cirque du Soleil illustrates this idea. "I was approached by Cirque du Soleil about 12 years ago because they had about 30% of their actors not participating at any time because of injuries. They asked me if I could help. As part of the show, they had a surface of beams about 30cm apart, and the beams were covered with a very compliant surface. So if you landed on the beam, the surface would be very hard. If you landed on the surface between the beams, the surface would lower by about 2cm. So they were changing the impact frequency from high to low. The actors who were running round, jumping, didn't know where they would land and because they didn't know, they couldn't pre-activate their muscles. When the muscles aren't pre-activated, they're not prepared to dampen potential high vibrations. So we changed the surface to a very hard surface, and three weeks later the injury rate was down to a normal 2 to 2.5%. That's muscle tuning."

Mr Nigg first published a paper regarding cushioning in 1981, which threw doubt on the benefit of cushioning in athletic footwear. Most footwear brands, however, still include substantial cushioning and use it as a marketing tool, as Mr Barthold pointed out. "I think one of the great things about this barefoot debate is that it has actually forced athletic footwear companies to be a little more self analytical," he said. "I think you can make footwear a whole lot more simple and a lot lighter, which would be an enormous benefit for the athlete. The role of the footwear industry is to try and make the lightest shoe possible, within a protective package; so I think a 'less is more' philosophy is actually a very positive thing for us to be aiming for.

"From a materials perspective, what was not possible a couple of years ago is very possible now. So we're in this brave new world where we are going to be able to build a much lighter, much more minimalist shoe that is far more functional, by my definition of that."

Another interesting point raised during the UKSEM debate was that of professional athletes. Being concerned about what elite athletes do is comparable to "worrying about what supermodels wear," Mr Lieberman said. "Does it really matter? We evolved to run at speeds that make animals gallop, no faster. Worrying about what elite athletes do is a problem for elite athletes, but it doesn't affect the vast majority of people."

Studies into barefoot running will hopefully reveal more hard evidence in the near future but, until we know more, it seems there are pretty strong arguments for both sides of the debate. Ross Tucker, the sports consultant who chaired the debate, summed up the pros and cons of barefoot running succinctly: "For some people, I do believe that barefoot running may be the answer to their injury problems," he said. "I think there is enough there to suggest that some individuals who struggle in shoes will fare much better without them. However, we don't fully know who they are, and more importantly, why they benefit.

"By extension then, there may well be people who simply cannot adapt to barefoot running. In fact, I'm certain this will be the case. And these individuals may never take fully to barefoot running."