

Are running shoes stopping the spring in your step?

January 20 2016, by David Stacey



Researchers from The University of Western Australia's School of Sport Science, Exercise and Health have helped uncover how arch support in footwear affects the spring in your step - literally.

The findings, published in *Scientific Reports*, strengthen the view that our arches evolved, in part, to allow for efficient endurance running. They also have implications for arch support used in some footwear and corrective orthotic insoles.

When your foot contacts the ground during running, the arch compresses, causing its tendons and ligaments to stretch and store elastic strain energy, like a spring. When you push off, the arch recoils and

returns this energy, which assists to propel you forward.

Researchers found that the majority of arch elastic energy is stored in the final stages of arch compression, and therefore restricting arch compression by as little as 20 per cent can influence [energy cost](#). If your footwear has substantial arch support, whether this is taking the 'spring out of your step' is an important consideration.

Researchers discovered that when the arch spring was restricted using a custom orthotic insole, the runner's energy cost increased by as much 6 per cent. This is an amount equivalent to running up a modest incline. Without the 'free' elastic energy from the arch, leg muscles have to work harder to propel the runner forward, which is more metabolically costly. The contribution of the arch is possibly even greater at faster running speeds.

However the lead author of the study, Dr Sarah Stearne, warned that you shouldn't throw away your orthotics.

"Orthotics are often designed to correct abnormal biomechanics, which in turn can make running more efficient, so if you are after running performance improvements talk to your podiatrist and/or physiotherapist about whether they are needed all the time, or if you can supplement your orthotics with some foot/ankle strengthening," Dr Stearne said.

Interestingly, the study found that restricting arch compression during walking had no effect on energy cost.

"This is great news for people who suffer from plantar fasciitis and are on their feet all day, for example nurses," Dr Stearne said.

"Wearing arch supporting insoles will help to reduce the load on their plantar fascia without being detrimental to their energy cost."

The research also found that restricting the arch spring during incline running had little metabolic consequence, and rearfoot strike and forefoot strike runners were equally affected.

The study *The Foot's Arch and the Energetics of Human Locomotion* provides the first direct evidence that the arch spring contributes to significantly lowering the [energy](#) cost of [running](#).

More information: Sarah M. Stearne et al. *The Foot's Arch and the Energetics of Human Locomotion*, *Scientific Reports* (2016). [DOI: 10.1038/srep19403](#)

Provided by University of Western Australia

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