Technique change benefits limited to 'forefoot' runners

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Rear foot runners who changed to front foot technique encountered more problems than front foot runners who changed to rear. Credit: Chuddlesworth

Runners beware—changing your technique from landing heel first (rearfoot strike) to the ball of your foot first (forefoot strike) may have adverse repercussions, according to research from the University of WA's School of Sport Science, Exercise and Health.

Published in *Medicine and Science in Sport and Exercise*, the study found the technique change may not help avoid injury nor enhance performance as suggested by some elite athletes.

Biomechanics PhD candidate Sarah Stearne, one of the study authors, says when habitual rearfoot strike (RFS) runners ran with an imposed forefoot strike (FFS) technique, similar to habitual FFS runners, they absorbed more force at their ankle joint and less at their knee joint.

"But unlike habitual FFS runners, when habitual RFS runners used a FFS they did not lower their sideways knee force and the rotation force at the ankle increased," she says.

"The total positive lower limb mechanical work [sum of the ankle, knee and hip] increased by 17 per cent.

"This was caused by the muscles at the ankle and hip joints having to work harder to propel the runner off the ground and is likely the cause of the increase in energy cost."

But there was a difference when changing the technique the other way—when habitual FFS runners switched to an imposed RFS, they were able to almost exactly replicate the technique of a habitual RFS runner, meaning they absorbed more force at their knee joint and less at their ankle.

"The only aspect habitual FFS runners didn't replicate when using an imposed RFS were the high sideways knee forces that habitual rearfoot runners normally experience," Ms Stearne says.

"Additionally, when using an imposed RFS strike technique, runners had to produce 10.5 per cent less total positive lower limb propulsive work to maintain the same running speed."

Ms Stearne says it is unclear why changing one way (RFS to FFS) causes problems but the other way (FFS to RFS) creates an improvement.

"It could be because habitual FFS runners are more likely to use RFS occasionally, at really slow speeds and during walking, therefore their muscles are accustomed to this action so the change in technique is easier," she says.

"Or perhaps using a FFS technique enhances the spring-like function of the Achilles tendon due to the greater force absorption at the ankle and this is transferred across into RFS running."

"It should be noted the results of our study are only immediate changes—the athletes were given as long as they needed to get used to the imposed technique but it's possible some of the differences observed may dissipate with training."

The research was conducted using a force plate-instrumented treadmill and Vicon 3D motion analysis system. The impact forces collected from the treadmill were combined with 3D movement data to estimate the force acting at the ankle, knee and hip joints.

More information: "Joint Kinetics in Rearfoot versus Forefoot Running: Implications of Switching Technique." Stearne, Sarah M.; Alderson, Jacqueline A.; Green, Benjamin; Donnelly, Cyril J.; Rubenson, Jonas. *Medicine & Science in Sports & Exercise*: POST ACCEPTANCE, 4 February 2014. DOI: 10.1249/MSS.0000000000000254

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