

# Cushioned heel running shoes may alter adolescent biomechanics, performance

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Many of today's running shoes feature a heavy cushioned heel. New research presented today at the 2013 Annual Meeting of the American Academy of Orthopaedic Surgeons (AAOS) found that these shoes may alter an adolescent runner's biomechanics (the forces exerted by muscles and gravity on the skeletal structure) and diminish performance.

Researchers recruited 12 adolescent competitive athletes from local track teams, and asked them to run on a treadmill in large heel trainers, track flats and without any [shoes](#) (barefoot) at four different speeds. Biomechanics – stride length, heel height during posterior swing phase and foot/ground contact – were measured with a [motion capture system](#).

"[Running](#) barefoot or running in less of a running shoe (toe shoes, for example) is a newer trend," said Scott Mullen, MD, an [orthopaedic surgeon](#) at The University of Kansas Hospital. "What we were trying to evaluate is whether or not the foot strike would change in an adolescent – who doesn't yet have a permanently established gait – when they changed their shoe or running speed."

The researchers found that shoe type "dramatically" altered running biomechanics in the adolescent runners. When wearing cushioned heel trainers, the athletes landed on their heel 69.8 percent of the time at all speeds. With the track flats, the heel was the first point of contact less than 35 percent of the time; and when barefoot, less than 30 percent of the time. Shoes with cushioned heels promote a heel-strike running pattern, whereas runners with track flats and barefoot had a forefoot or

mid-foot strike pattern.

"What we found is that simply by changing their footwear, the runners' foot strike would change," said Dr. Mullen. "When they ran in the cushioned heel or an average running shoe — even when running a 5-minute mile — the athletes landed on their heel first."

Many adolescent runners train in cushioned heels and compete in track spikes, "which may give them less of a (performance) advantage" in competition, said Dr. Mullen.

As a 2010 study found that [heel](#) strike running distributes more energy to hips and knees, running in flat- soled shoes that promote a forefoot strike may "present a healthier foot strike for runners over a lifetime, possibly resulting in fewer hip and knee problems," said Dr. Mullen. More research is needed to determine the effects of shoes on foot strike.

Provided by American Academy of Orthopaedic Surgeons

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