

REARFOOT RUNNING IN ATHLETIC FOOTWEAR:

(A) TYPICAL REARFOOT AND RESULTANT PEAK TIBIAL ACCELERATION

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INTRODUCTION: Shod rearfoot striking can be subdivided into typical and atypical using plantar pressure measurements. This atypical rearfoot strike pattern was present in 24% of the runners wearing customized shoes at 3.2 m/s [1]. Moreover atypical rearfoot strikers experienced a greater peak vertical loading rate than typical rearfoot strikers [1]. This impact measure has been associated with tibial stress injury and has more recently been correlated with the resultant peak tibial acceleration [2, 3]. However, to exclude a potential shoe-induced effect, the runners should be evaluated in their own training footwear.

AIM: This study examined to what extent the atypical rearfoot strike pattern occurs when running over-ground in own athletic footwear and if the atypical rearfoot strikers also experience greater resultant peak tibial acceleration than typical rearfoot strikers.

METHODS: 104 distance runners (length: 1.73 ± 0.08 m, mass: 68.8 ± 11.7 kg, age: 36.5 ± 9.5 years, mean \pm SD) were bilaterally instrumented with a lightweight accelerometer strapped to the shin [2]. The subjects ran at ~ 3.2 m/s across a 30-m runway to collect dynamically calibrated plantar pressures (2-m Footscan, RSscan International; 500 Hz). The footstrike pattern of a right and a left footfall was identified using Breine *et al.*'s [1] refined strike index method. The peak value of the footfall's resultant tibial acceleration was calculated. Subjects with at least one atypical rearfoot strike contact were classified as atypical rearfoot striker. In case of bilaterally similar rearfoot strikes, the side with the greatest resultant tibial shock was chosen for comparison by independent t-test ($\alpha=0.05$).

RESULTS: The atypical rearfoot strike pattern was present in 26 % of the population in self-selected athletic footwear. The atypical rearfoot strikers experienced a greater resultant peak tibial acceleration ($\Delta \bar{x} = +5.6$ g, $p < 0.001$) compared to the typical rearfoot strikers..

CONCLUSION: The atypical rearfoot strike pattern also occurs in runners wearing self-selected athletic footwear and is characterized by a greater tibial shock. Given the substantial difference in impact loading, this strike pattern should only be adopted with caution.

References: [1] Breine *et al.* *MSSE.*, 46, 1595–1603, 2014; [2] van der Worp *et al.* *BJSM.* 50, 450–7, 2016; [3] Van den Berghe *et al.* *J. Biomech.* 86, 238–242, 2019.