

## **Effect of Minimalist Footwear on Landing Kinematics of the Knee in Physically Active Adults**

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A current fitness trend is the use of minimalist footwear (MF), which is defined as footwear providing minimal interference with the natural movement of the foot. Research has shown the effect MF has on running stride kinematics, but there has been little research investigating the effect of MF on landing kinematics. Research indicates that increased knee valgus angles during landing may be related to knee injury. If a difference in landing kinematics between MF and non-minimalist (NM) users can be seen, future research can be carried out investigating its effects. **PURPOSE:** To examine the role of MF on knee kinematics during a jump landing task. **METHODS:** Healthy physically active individuals ( $n = 50$ ) who regularly participate in high intensity interval training participated in the study. The MF group ( $27.8 \pm 5.5$  yrs,  $168.5 \pm 11.0$  cm,  $73.1 \pm 13.8$  kg) consisted of 15 females and 10 males who are habitual users of MF. The NM group ( $22.9 \pm 4.9$  yrs,  $170.0 \pm 9.9$  cm,  $67.7 \pm 12.1$  kg) consisted of 14 females and 11 males with no history of MF use. Subjects performed a jump landing task, which required subjects to jump off two feet from 40% of their height onto a force plate, landing on their dominant foot. Upon landing, subjects maintained balance for five seconds. A camera-based motion analysis system using reflective markers was implemented to assess joint angles during the task. Average knee angle kinematics across five trials were used for analysis. Independent samples t-tests were used to compare average kinematics between the groups for hypothesis testing at  $p < 0.05$ . Mann-Whitney U was used for data that was not normally distributed. **RESULTS:** Knee valgus/varus angle at initial contact was significantly more neutral ( $p = 0.019$ ) in the MF group ( $-0.60^\circ \pm 4.26^\circ$ ) compared to NM ( $2.89^\circ \pm 4.25^\circ$ ). Peak varus angles were also significantly closer to neutral ( $p = 0.046$ ) for the MF group ( $5.70^\circ \pm 9.73^\circ$ ) compared to NM ( $12.33^\circ \pm 11.63^\circ$ ). Peak valgus angles, however, were significantly higher ( $p = 0.043$ ) in MF ( $-7.50^\circ \pm 8.34^\circ$ ) than NM ( $-3.37^\circ \pm 7.27^\circ$ ). **CONCLUSION:** Kinematic data suggests significantly more neutral knee angles at initial contact and smaller peak varus angles with MF, which could be considered protective. However, the greater peak valgus angles might indicate greater knee excursion in MF.

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