

Accepted Manuscript

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PII: S0966-6362(16)30695-6
DOI: <http://dx.doi.org/doi:10.1016/j.gaitpost.2016.12.008>
Reference: GAIPOS 5257

To appear in: *Gait & Posture*

Received date: 14-6-2016
Revised date: 30-9-2016
Accepted date: 5-12-2016

Please cite this article as: Reddy Prabhav Nadipi, Cooper Glen, Weightman Andrew, Hodson-Tole Emma, Reeves Neil D. Walking cadence affects rate of plantar foot temperature change but not final temperature in younger and older adults. *Gait and Posture* <http://dx.doi.org/10.1016/j.gaitpost.2016.12.008>

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Walking cadence affects rate of plantar foot temperature change but not final temperature in younger and older adults

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Highlights:

- Cadence affects rate of foot temperature change but not final foot temperatures
- Foot temperatures are observed to plateau during prolonged walking
- Foot temperature changes inversely correlated with initial temperature of the foot
- This correlation is stronger in older participants than younger participants

Abstract

This study examined the relationship between (1) foot temperature in healthy individuals and walking cadence, (2) temperature change at different locations of the foot, and (3) temperature change and its relationship with vertical pressures exerted on the foot. Eighteen healthy adult volunteers (10 between 30-40 years – Age: 33.4 ± 2.4 years; 8 above 40 years – Age: 54.1 ± 7.7 years) were recruited. A custom-made insole with temperature sensors was placed directly onto the plantar surface of the foot and held in position using a sock. The foot was placed on a pressure sensor and the whole system placed in a canvas shoe. Participants visited the lab on three separate occasions when foot temperature and pressure data were recorded during walking on a treadmill at one of three cadences (80, 100, 120 steps/min). The plantar foot temperature increased during walking in both age groups 30-40 years : $4.62 \pm 2.00^\circ\text{C}$, >40 years: $5.49 \pm 2.30^\circ\text{C}$, with the rise inversely proportional to initial foot temperature (30-40 years: $R^2 = -0.669$, >40 years: $R^2 = -0.816$). Foot

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