ABSTRACT

Background: Running cadence, or step rate, is often measured in running gait analysis and manipulated in gait retraining. A lower body positive pressure treadmill, or anti-gravity treadmill, allows users to walk/run in a reduced gravity environment.

Purpose: The primary purpose of this study was to determine how natural running cadence is affected by running on an anti-gravity treadmill compared to a standard treadmill in a healthy, active population. The secondary purpose was to determine if natural and increased cadence is affected by amount of body weight support.

Study Design: Cross-sectional study (convenience sample).

Methods: Thirty participants were recruited to run on an anti-gravity treadmill (AlterG Anti-Gravity Treadmill™ M320) at their pre-determined, self-selected, comfortable treadmill speed. Cadence was recorded at nine randomized bodyweight conditions, ranging from 100% of body weight to 20% of body weight, in 10% increments. An additional nine participants were recruited to try to replicate their natural, standard treadmill cadence, as well as increase it by 5% and 10%, while on an anti-gravity treadmill with the same randomized body weight conditions.

Results: Thirty participants, 19 females and 11 males, mean age 27.3 years (range, 22-45), completed Part 1 of the study protocol, while nine additional participants (2 females and 7 males) with a mean age of 29.6 years old (range, 25-40 years) completed Part 2 of the protocol. There was a significant effect of natural running cadence on the anti-gravity treadmill at reduced body weight percentages (p<.01). Post-hoc t-tests revealed that every 10% bodyweight interval was significantly lower than the previous 10% interval (p<.01) on the anti-gravity treadmill, with cadence decreases ranging from 1.5%-3.5% between intervals. Seven of the nine (77.8%) participants in Part 2 were able to replicate and increase their cadence at all body weight levels on the anti-gravity treadmill.

Conclusions: Decreasing bodyweight level on an anti-gravity treadmill yields a significant and linear decrease in running cadence when performed at a self-selected, moderate intensity pace. Further, the vast majority of participants were able to successfully replicate and increase cadence at all levels of bodyweight percentage.

Key Words: Anti-gravity treadmill, Cadence, Running

CORRESPONDING AUTHOR
M. Russell Giveans, PhD
6545 France Ave. S #450
Edina, MN 55435
952-920-8525
russell.giveans@gmail.com

1 Fairview Health Services, Institute for Athletic Medicine, Minneapolis, MN, USA

The protocol for this study was approved by the Institutional Review Board of the University of Minnesota.
The authors report no conflicts of interest.