Changes in Vertical Reaction Force During Treadmill High-Intensity Interval Training

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ABSTRACT

High-intensity interval training (HIIT) has become a popular form of exercise due to its low time burden and easily customized protocols. To date, there has been no investigation into how lower extremity loading (ie. GRF) changes over time during a HIIT protocol. Examining this load variability can help inform protocol development for different populations. **PURPOSE:** The purpose of this pilot study was to examine how the vertical reaction force (vRF) changes during a HIIT running protocol in order to elucidate how working at high intensity for 4min periods can influence subsequent lower extremity loading. **METHODS:** Three participants (26±3y) performed a 4x4 HIIT protocol on a treadmill with four 4min high-intensity active periods at 85-95% heart rate maximum (HRmax), each followed by 3min active recovery at 60-70% HRmax. HRmax was determined using an incremental protocol on a treadmill and used to determine treadmill speeds to elicit the required HR zones. The treadmill speeds obtained from the HRmax test were used to create customized, individual HIIT protocols. vRF was measured using Moticon shoe insoles sampled at 50Hz and normalized to body weight. Results are presented as mean±SD. **RESULTS:** vRF increased with each consecutive active period from 2.3±0.2 to 2.6±0.2 [BW] per step in the final active period. There were no adverse events. **CONCLUSION:** Lower extremity loading in the vertical direction increased as the HIIT protocol progressed. This has implications when deciding on the length of active high-intensity periods during HIIT protocol development. A future aim of this project is to include kinematic measures to assess changes in joint angles that occur with these increases in vRF. A limitation of this study is that the shoe insoles only measure vRF. Future studies should consider an instrumented treadmill to measure anterior-posterior and mediolateral reaction forces.