INSTRUCTED GROUNDED RUNNING REDUCES MUSCULOSKELETAL LOADING

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INTRODUCTION: Distance running is one of the most popular moderate-to-vigorous intensity recreational activities, with health benefits given as one of the main reasons to go for a run. Whereas most biomechanical running studies focus on speeds around 3.2 $m.s^{-1}$, little attention is payed to running at slow(er) speeds. Recent observations have demonstrated that 25% of the running population runs below 2.6 $m.s^{-1}$ and does not always run with a flight phase, which seems confusing as this criterion is traditionally used to discern walking from running. This adopted locomotion pattern, i.e. grounded running, should therefore be classified as walking, but other criteria seem to concur with a spring-mass model, justifying its classification as a running gait. This study compared the key biomechanical and physiological characteristics between instructed grounded running (GR) and spontaneous slow aerial running (SAR) at the same slow running speed. **METHODS:** Thirty male subjects performed instructed GR and spontaneous SAR on treadmill at 2.10 $m.s^{-1}$. Ground reaction forces, tibial accelerations and metabolic rate were measured to estimate impact intensity (vertical instantaneous loading rate and tibial acceleration), general measures of musculoskeletal loading (maximal vertical ground reaction force and external work) and energy expenditure. Also, more explicit measures of muscular loading (muscle stresses and eccentric joint powers) were calculated based on a representative subsample of 10 subjects, in which detailed kinematics and kinetics were recorded on a separate occasion. **RESULTS:** All subjects successfully altered their running pattern towards a GR style upon the simple instruction: “run without a flight phase”. Impact intensity, general measures of musculoskeletal loading and the more explicit measures of muscular loading decreased by up to 35.0%, 20.3% and 34.0% respectively compared to SAR at the same slow running speed. Metabolic rate increased with 4.8% in GR. **CONCLUSION:** Changing running style from spontaneous SAR to an instructed GR pattern reduces impact loading and musculoskeletal loading without lowering the metabolic energy requirements. As such, GR might be beneficial for runners that do not aim for maximal performance but aim for a healthy lifestyle. Grounded running has thus the potential to reduce the risk of running related injuries while remaining a moderate-to-vigorous form of physical activity, contributing to fulfillment of the recommendations concerning physical activity and public health.