

Keep on running: Creating an impact by reducing it

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Abstract

Running is a widespread, popular leisure-time activity. Unfortunately, it is associated with a high burden of injuries¹. Running-related musculoskeletal injuries among military members negatively impact force readiness and result in 7 times more limited duty days compared to non-running injuries². Gait retraining (i.e., altering one's faulty gait biomechanics) has recently gained more attention as a potential tool to address certain risk factors of running injuries. The repetitive impact that a runner experiences during each footfall is a potential risk factor to be targeted during a gait retraining program³.

This impact has traditionally been measured using expensive instrumented treadmills or runways in specialized gait laboratories. However, wearable technology (so-called wearables) found its place in running practice. User-friendly, affordable technology enables modern biomechanists to leave their precious gait lab to conduct research and support runners in the field. This challenges the biomechanists to find valid and reliable proxies of relevant metrics and risk factors to implement into wearables and develop feedback methods to assist runners and/or their (para-)medic entourage during running sessions.

We, therefore, developed a stand-alone wearable music-based biofeedback system that provides real-time audible feedback⁴. The biofeedback comprised pink noise, whose volume was scaled to the real-time measured PTAA, distorting the music. Runners were instructed to run with the least amount of noise. We reduced the impact ($\Delta\bar{x} = -26.9\%$) with real-time music-based biofeedback and proved that the biofeedback encourages self-exploration since we found two dominant biomechanical strategies for lower impact running. The low-impact runner is a proper gait retraining tool for runners susceptible to (potential) impact-related problems during running which can be deployed outside the clinical environment.

References

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