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MUSIC-BASED BIOFEEDBACK TO REDUCE TIBIAL SHOCKIN OVER-GROUND RUNNING

Abstract

This poster presents an interdisciplinary research project between sport science, musicology and engineering. The project is aimed at preventing injuries common for runners. The idea is to use **musical feedback** to guide runners to a more healthy running style.

We focus on lowering the **foot-fall impact** as high repeated impact is a potential source of shin splints: a common injury.

We developed a wearable device to measure impact and a piece of software to provide musical feedback based on measured impact. We validated the measurement device and validated the running-style retraining concept during an intervention study. The study showed a significant reduction of impact.

During an IOF-project, the prototypes used in the studies turned into a 'demonstrator' a product almost ready for end-users. Now an UGent spin-off is starting to bring it to market.

Concept

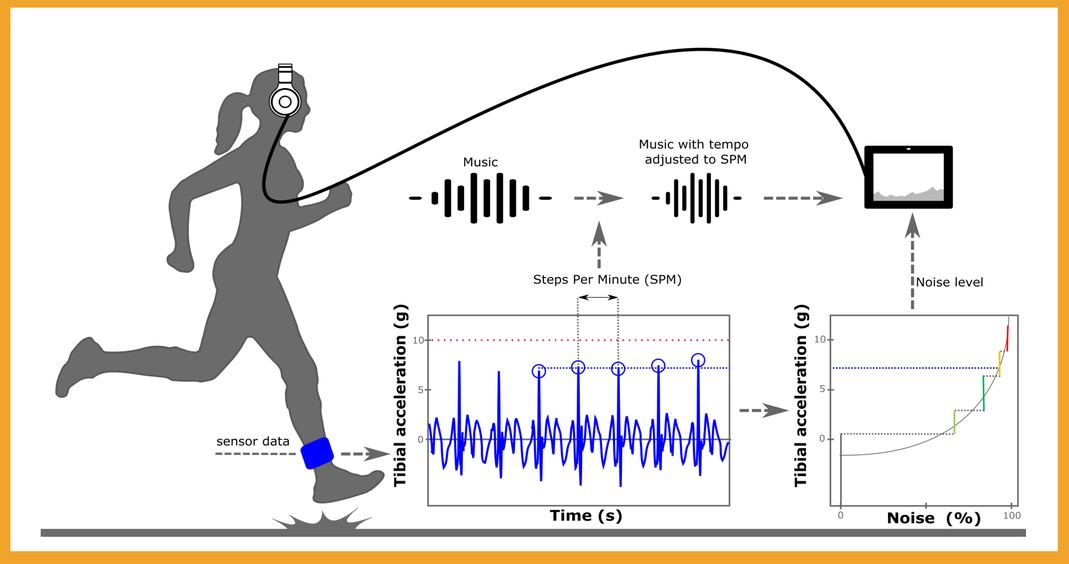


Fig: *Schematic representation of the biofeedback system's main components for continuous biofeedback on tibial shock (axial peak tibial acceleration). An interaction loop of the smart music player that provided the auditory biofeedback in real-time and that continuously accounted for (in)voluntary alterations in the running cadence by aligning the tempo (beats per minute) of the music to the cadence (steps per minute) of the runner… The five most recent values of tibial shock are averaged and mapped to a discretized level of noise loudness, which is added to the music playing. [1]*

Intervention study

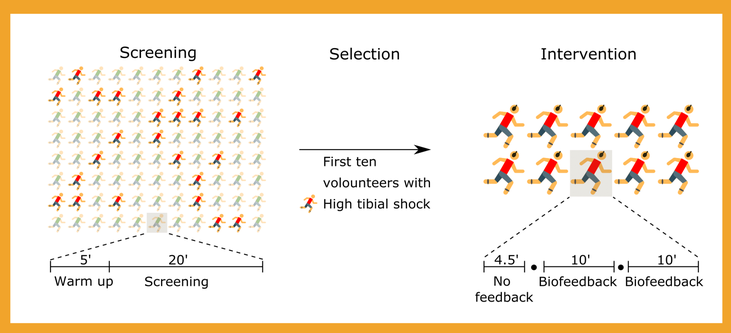


Fig: *Schematic overview of the experimental design involving two running sessions (screening and intervention). A red icon represents a distance runner with high tibial shock. A filled circle indicates a system check and self-selected rest. Tibial shocks were detected in both sessions. The music-based feedback module was activated in the biofeedback condition. [1]*

Results

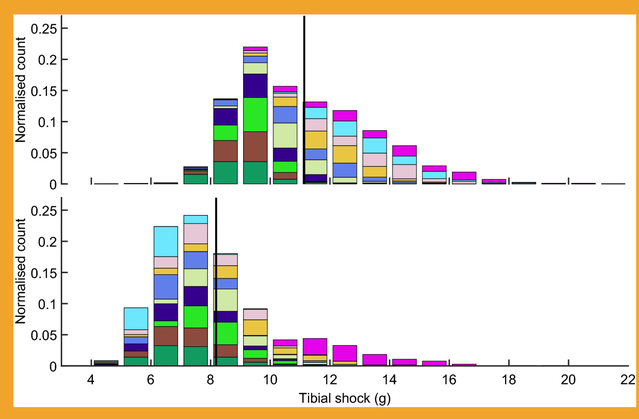
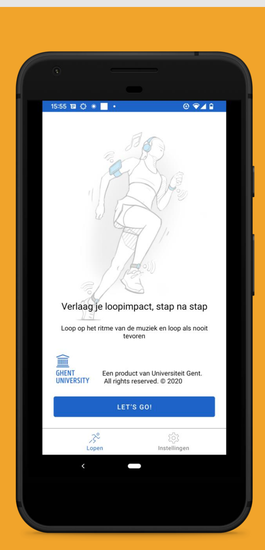


Fig: *Histogram of the tibial shock magnitudes in the analysis period for the [upper panel] no feedback condition and the [lower panel] biofeedback condition. Each color represents a participant (n = 10). The number of footfalls within a single bin has been normalized to the total number of detected footfalls in that condition. The solid vertical line indicates the tibial shock averaged for all footfalls in that condition. [1]*

Valorization trajectory

2016-2020	**Scientific** proof-of-concept shown to work
2018-2021	International **patent** applied for and granted as WO2020002275A1
2019-2022	IOF-Advanced grant to develop **'demonstrator'** 1. Smartphone application 2. Prototype of hardware component
2022- …	UGent **spin-off** (2022-…)



References

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