Running is a popular activity but the risk of running related injuries (RRI) caused by overuse is high. The majority of RRI affects the lower extremities. Increased experimental step rate (cadence) manipulation in laboratory settings reduces vertical ground reaction force (VGRF), but the long-term effect on self-selected cadence and lower extremity load is unknown.

To study the long-term effect of increased running cadence training on lower extremity muscle activity and maximal vertical ground reaction force (MVGRF) during running.

**Hypotheses**

Minimum 2 weekly running sessions with 10% increased cadence during 4 weeks results in decreased MVGRF, alters the late swing phase muscle activity in selected lower extremity muscles and increases the self-selected cadence.

**Methods - procedure**

Tibialis anterior (TA), Gastrocnemius lateralis (GL) and Gluteus Maximus (GM) muscle activity and VGRF in 16 (Fig. 1) injury free participants (age 24-3 years, height 174.3±6.7 cm, BMI 24.3±3.5) were measured before and after 4 weeks targeted running training with 10% increased step rate, supported by Setio® accelerometer-based sensors and mobile application.

**Results - resumed**

At re-test significant difference was observed in MVGRF, self-selected cadence and late swing phase RMS-EMG:
- † Self-selected cadence (Fig. 2, P<0.01)
- ‡ MVGRF (Fig. 3, P<0.01)

Muscle activity (Fig. 4) during late swing phase:
- † M. Tibialis anterior (TA): P<0.05
- † M. Gastrocnemius lateralis (GL): (P<0.05)
- † M. Gluteus Maximus: (P<0.05)

**Conclusion and discussion**

Four weeks targeted step rate training supported by a sensor and mobile application system effectively and significantly:
- Increased self-selected cadence and reduced MVGRF
- Increased Gastrocnemius lateralis and Gluteus Maximus and decreased Tibialis Anterior muscle activity during the late swing phase.

The observed changes confirmed a sustained change in running biomechanics after four weeks of targeted training. These changes altered the lower extremity load and may be a potential strategy to decrease the risk of running-related injuries in some runners. More research in the underlying biomechanics is required and the long-term effect needs to be explored in prospective intervention studies.

**Acknowledgement**

The study was supported by the Department of Physiotherapy, UCN Aalborg, Denmark.