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Introduction
Race walking (RW) requires athletes to walk as fast as possible following two main rules:
- keep the knee of the supporting leg locked “from the moment of first contact with the ground until the vertical upright position”;
- generate a progression of steps with no visible flight phase.
The use of conventional analytical tools (kinematic, kinetic and physiological measures) has not been very successful in:
- discriminating between different skill levels;
- identifying the factors for excellent performance.\(^{(1)}\)
Improved experimental protocols and finer analytical tools are needed to unveil the subtle differences existing between athletes of different competitive standard.\(^{(1)}\)

Aim
To compare coordination and coordination variability in RW, and highlight differences between elite-, national- and regional-standard athletes.

Methods
- 15 competitive male race walkers.
- Cross-sectional design: changes in coordination variability as a factor of skill level (Elite, National or Regional).
- Race-walk on treadmill at 15 km/h, 40 gait cycles/participant.
- 3D pelvis and lower limb kinematics to study coordination variability through a dynamical system approach\(^{(2)}\) (Figure 1).
- Multiple joint couplings (e.g. hip-knee, knee-ankle) and movement phases (early/late stance and swing) considered.

Results & Discussion
- Coordination variability appeared to increase during transition phases (e.g. heel-strike and toe-off) (Figure 2).
- Less skilled athletes tended to produce larger coordination variability: higher deviation phase during early-stance phase of hip-knee (P=0.20), and pelvis-hip (P=0.09) couplings.
- Coordinative patterns showed potential for characterizing individual peculiarities and to improve the understanding of technical skills, although more work is needed to relate coordinative measures with features of the neuro-muscular-skeletal system organization.

References