Assessing the feasibility of a reduced exertion, low-volume, high-intensity interval training (HIT) protocol: a pilot study

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Divergence between the evolutionary design of our genome and lifestyle triggers cardiometabolic disease, including diabetes mellitus. Various iterations of low-volume, high-intensity interval training (HIT) can improve risk factors in a manner considered more time-efficient than traditional exercise guidelines. However, the intensity of HIT may present another barrier to participation. Reduced-exertion HIT has shown beneficial effects with relatively low ratings of perceived exertion (RPE) in healthy young participants (Metcalfe *et al*., 2011, *European Journal of Applied Physiology*, 112, 2767–2775). The aim of this study was to replicate this finding to assess feasibility for a larger trial using diabetic patients. With institutional ethics approval, 11 recreationally active participants (3 females, 8 males; age, 22.3 ± 7.3 years; stature, 1.73 ± 0.1 m; mass, 71.9 ± 13.6 kg, BMI, 23.8 ± 2.2 $kg \cdot m^2$) (mean ± SD) took part in a HIT intervention consisting 10 minutes of cycling at 60 W interspersed with 2 × 10–20 s cycling sprints against a braking force equal to 7.5% of body weight. The number of sprints increased over the course of the intervention (2 × 10 s in week 1; 2 × 15 s in weeks 2–3; and 2 × 20 s in week 4). A warm-up (3 min at 30–60 W) and cool down (3 min at 30 W) were also included. Participants performed this activity 2–3 times per week resulting in a total duration of exercise per week of 20–30 minutes. RPE was reported immediately after completion of each HIT session. Whole blood fasting glucose, peak oxygen uptake and body composition were also measured before and after the 4 week intervention. HIT resulted in higher average RPE values (17 ± 1) than those reported by Metcalfe *et al*. (~13 ± 1). VO_{2peak} was increased post-intervention (49.27 ± 9.17 $ml \cdot kg \cdot min^{-1}$ [95% CI 43.11–55.43]) compared to baseline (48.27 ± 9.23 $ml \cdot kg \cdot min^{-1}$ [95% CI 42.07–54.47]) (p = 0.02). However, fasting glucose and body composition were not different. The results suggest that short duration (4 weeks) reduced-exertion HIT can improve aerobic capacity. However, the intensity of the protocol might be intolerable for most people, presenting a significant barrier to exercise for less fit patients with conditions such as diabetes. The volume-intensity relationship of HIT could be considered *ad infinitum*; however, the acceptability of the activity to those for whom the intervention is intended needs consideration.