Previous works assessing the impact of high intensity interval training on VO2max have offered varying results

**PURPOSE:** To determine the meaningful effects of a short-term high-intensity interval training (HIIT) or continuous training (CET) intervention on O2max and the anaerobic capacity through quantification of both the respiratory and haemodynamic responses. **METHOD:** Following local institutional ethical approval, 37 physically active participants undertook 4-weeks of either cycling-based HIIT (age, 17.0 ± 0.5 yrs; height, 173.1 ± 9.2 cm; mass, 62.4 ± 6.9 kg). (8 x 20 s at 170% pO2max with 10 s recovery) or CET (age, 17.0 ± 0 yrs; height, 173.6 ± 8.7 cm; mass, 69.3 ± 17.0 kg) (30 min at 70% O2max) 3 times per week. O2max, anaerobic capacity as determined through the maximally accumulated oxygen deficit (MAOD), blood-based markers and haemodynamic responses were assessed pre and post the intervention period. O2max and MAOD were evaluated using breath-by-breath open circuit spirometry while haemodynamic responses were monitored using thoracic impedance cardiography. Analysis conducted using both inferential analysis as well as magnitude-based inferences (MBI) and effects sizes (ES). **RESULTS:** O2max exhibited a non-significant 4.1% increase (P> 0.05) (ES= 0.24) for HIIT with 7.0% p= 0.007 (ES= 0.40, MBI= likely trivial) increase for CET. Haemodynamic responses (max, SVmax) displayed non-significant responses for CET and HIIT (P> 0.05) while a-vO2dif-max increased from 15.8 ± 4.8 to 18.3 ± 2.9 ml.100 ml-1) (p= 0.02) (ES= 0.63, MBI= possibly beneficial) following HIIT. MAOD increased by 7.3 ml.kg-1 for HIIT (p= 0.001) (ES= 0.72, MBI= likely beneficial), with CET showing no change (p >0.05). **CONCLUSIONS:** O2max is a function of max and a-vO2dif-max, so for a meaningful change to occur in cardiorespiratory fitness there must be a concomitant increase in O2 delivery. This study demonstrates that a short-term HIIT intervention evokes peripherally mediated responses (a-vO2dif) and anaerobic substrate utilisation rather than O2 delivery components. The increase in O2max for CET in the absence of haemodynamic responses lends further support to the need for valid quantification of O2max.