

# Effects of high-intensity interval training on cardiometabolic health: a systematic review and meta-analysis of intervention studies

Romeo B Batacan Jr,<sup>1,2</sup> Mitch J Duncan,<sup>3</sup> Vincent J Dalbo,<sup>1,4</sup> Patrick S Tucker,<sup>1,4</sup> Andrew S Fenning<sup>1,2</sup>

## ABSTRACT

The current review clarifies the cardiometabolic health effects of high-intensity interval training (HIIT) in adults. A systematic search (PubMed) examining HIIT and cardiometabolic health markers was completed on 15 October 2015. Sixty-five intervention studies were included for review and the methodological quality of included studies was assessed using the Downs and Black score. Studies were classified by intervention duration and body mass index classification. Outcomes with at least 5 effect sizes were synthesised using a random-effects meta-analysis of the standardised mean difference (SMD) in cardiometabolic health markers (baseline to postintervention) using Review Manager 5.3. Short-term (ST) HIIT (<12 weeks) significantly improved maximal oxygen uptake ( $VO_2$  max; SMD 0.74, 95% CI 0.36 to 1.12;  $p<0.001$ ), diastolic blood pressure (DBP; SMD  $-0.52$ , 95% CI  $-0.89$  to  $-0.16$ ;  $p<0.01$ ) and fasting glucose (SMD  $-0.35$ , 95% CI  $-0.62$  to  $-0.09$ ;  $p<0.01$ ) in overweight/obese populations. Long-term (LT) HIIT ( $\geq 12$  weeks) significantly improved waist circumference (SMD  $-0.20$ , 95% CI  $-0.38$  to  $-0.01$ ;  $p<0.05$ ), % body fat (SMD  $-0.40$ , 95% CI  $-0.74$  to  $-0.06$ ;  $p<0.05$ ),  $VO_2$  max (SMD 1.20, 95% CI 0.57 to 1.83;  $p<0.001$ ), resting heart rate (SMD  $-0.33$ , 95% CI  $-0.56$  to  $-0.09$ ;  $p<0.01$ ), systolic blood pressure (SMD  $-0.35$ , 95% CI  $-0.60$  to  $-0.09$ ;  $p<0.01$ ) and DBP (SMD  $-0.38$ , 95% CI  $-0.65$  to  $-0.10$ ;  $p<0.01$ ) in overweight/obese populations. HIIT demonstrated no effect on insulin, lipid profile, C reactive protein or interleukin 6 in overweight/obese populations. In normal weight populations, ST-HIIT and LT-HIIT significantly improved  $VO_2$  max, but no other significant effects were observed. Current evidence suggests that ST-HIIT and LT-HIIT can increase  $VO_2$  max and improve some cardiometabolic risk factors in overweight/obese populations.

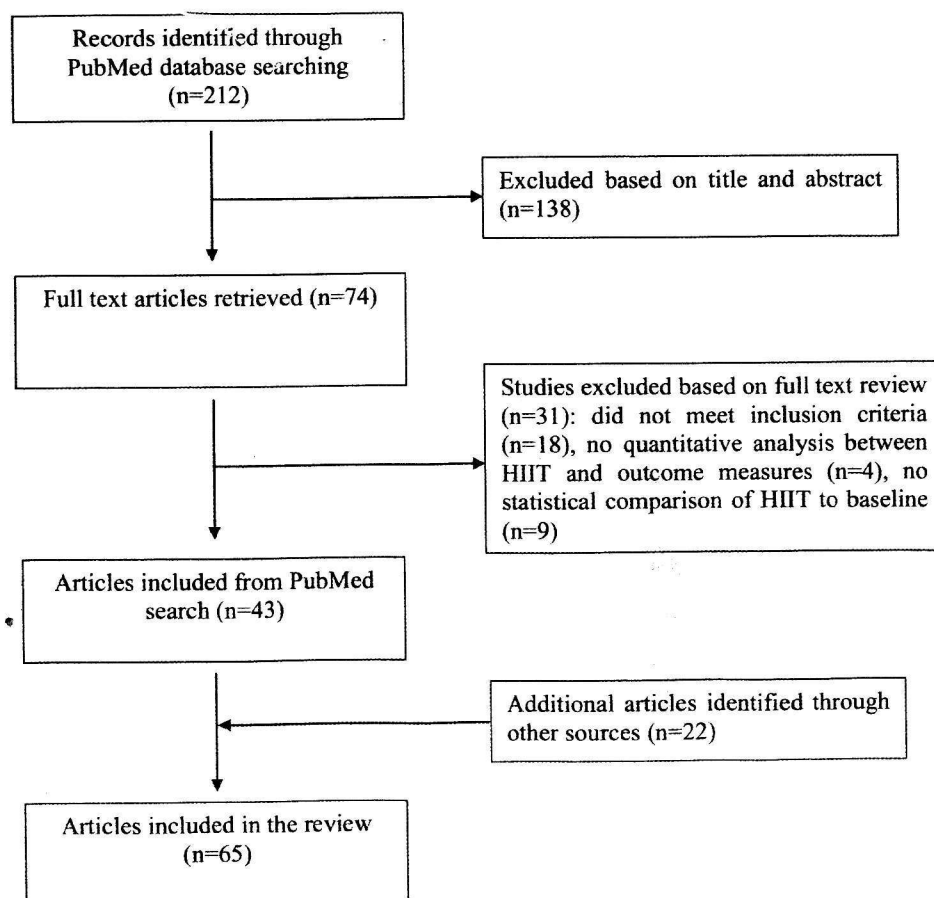


Figure 1 Flow diagram of study selection. HIIT, high-intensity interval training.