

Effects of 3-Weeks of High-Intensity Interval Training on Running Economy and Endurance

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PURPOSE: This study compared the effects of 3-weeks of high-intensity interval training (HIIT) to traditional aerobic training (TT) on running economy and endurance. **METHODS:** Healthy, physically active women (n=10) and men (n=8) each performed a VO_{2max} test and a timed endurance run ≥ 48 hr apart. Each VO_{2max} test consisted of 4 x 3 min stages with each stage 0.5 mph faster than the previous. At 12 min, the speed remained constant and the incline increased 2% per min until voluntary exhaustion. A time to exhaustion run at the zero incline velocity associated with VO_{2max} assessed endurance. The matched participants were randomly assigned to HIIT or TT prior to exercising 4 days per wk for 3 wk. The HIIT protocol consisted of 3 min at 60-65% of maximal heart rate (HR_{max}) followed by 4 bouts alternating 4 min at 90-95% HR_{max} and 3 min at 60-65% HR_{max} ; the TT protocol consisted of 3 min at 60-65% HR_{max} , 27 min at 75-80% HR_{max} , and 2 min at 60-65% HR_{max} . Heart rate (HR) was measured continuously during the sessions and speeds were adjusted to keep HR within the desired range. The participants repeated all testing after 3 wk of training. Running economy, defined as VO_2 at a given speed, was compared at stages 1-4 of the VO_{2max} tests using repeated measures ANOVA. Endurance times were compared using paired and independent samples t-tests. **RESULTS:** All data are reported as mean \pm SE. Participants averaged 25 ± 2 yr, 77.7 ± 4.8 kg, and 1.7 ± 0.02 m. The average change in VO_2 during stages 1-4 of the VO_{2max} tests between pre- and post-tests were: -0.80 ± 1.03 and -2.36 ± 0.94 , -0.62 ± 1.32 and -2.3 ± 0.55 , -0.97 ± 1.42 and -2.01 ± 0.80 , -1.57 ± 2.05 and -2.32 ± 0.98 mL/kg/min for HIIT and TT, respectively. The changes in running economy were not significant ($p > 0.05$) in either group. Endurance run times significantly increased from 6.25 ± 1.02 to 9.19 ± 1.15 min and 7.56 ± 1.16 to 9.0 ± 1.26 min following HIIT ($p < 0.05$) and TT ($p < 0.05$), respectively. The difference between groups approached significance ($p = 0.06$). **CONCLUSION:** Three weeks of training did not yield significant changes in running economy in the HIIT or TT groups. HIIT and TT significantly improved endurance times, and the HIIT protocol seemed to have a greater, albeit non-statistically significant, improvement than TT.

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