

Run Economy of Trained Endurance Athletes on a Lower Body Positive Pressure Treadmill

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The use of Lower Body Positive Pressure (LBPP) treadmills has become an option in the rehabilitation and training for endurance athletes. Run Economy (RE) is important information for endurance athletes to recognize their efficiency of running. There is a lack of research on RE and LBPP notably with endurance-trained runners. It is also unclear if changes in VO_2 and RE would be proportional to the decrease in body weight on LBPP. **PURPOSE:** To measure VO_2 and RE during steady state running on a normal treadmill (100% body weight), and with LBPP (85% of body weight). **METHODS:** Fifteen trained endurance athletes, 7 males and 8 females, (AGE 21.7 ± 2.9 yrs, WEIGHT 61.9 ± 8.5 kg), who have participated in collegiate cross-country and can run a 7-min. per mile pace for 5 km, completed two sessions of exercise where they ran on (i) normal treadmill, and (ii) a LBPP treadmill and 15% of their body weight was supported (85% of normal body weight). During each session they ran at three steady state speeds (2.9, 3.4, and $3.8 \text{ m}\cdot\text{s}^{-1}$) for four minutes each. Oxygen consumption and CO_2 production was collected using open flow indirect calorimetry during the last minute of each steady state stage.

RESULTS: Volunteers' average (\pm SD) RE on normal treadmill at each speed was 183.7 ± 14.6 , 181.0 ± 12.5 , and $174.5 \pm 13.4 \text{ ml O}_2 \cdot \text{kg}^{-1} \cdot \text{km}^{-1}$, respectively. Average (\pm SD) RE on LBPP treadmill at each speed was 181.6 ± 21.6 , 172.0 ± 21.3 , and $169.1 \pm 19.7 \text{ ml O}_2 \cdot \text{kg}^{-1} \cdot \text{km}^{-1}$, respectively. Repeated measures ANOVA indicated no main effect of treadmill condition and RE; $F(1, 14) = 1.289$, $p = .275$, partial $\eta^2 = .084$. Running Economy was significantly impacted by treadmill speed $F(1,14) = 29.104$, $p < .0001$, partial $\eta^2 = .675$. There was no significant interaction between treadmill condition and speed on VO_2 , $F(1, 14) = 0.265$, $p = .614$, partial $\eta^2 = .019$. **CONCLUSION:** Endurance runners were more economical with a greater running speed independent of treadmill condition. There was no significant effect of treadmill condition (normal vs. LBPP) on RE at any speed, although absolute VO_2 was ~10% less with LBPP. Runners may be able to use a LBPP treadmill for training or rehabilitation at 15% less body weight without a change in RE. Future research will investigate the effects of a greater reduction in body weight on RE in endurance trained runners.

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