

The Caloric Cost of Self-Paced Exercise in Full Body Tabata, Treadmill Running Tabata, and Continuous Running

AUSTIN DUNN & JAMES ROWE

Human Performance Lab; Kinesiology & Health Science; Stephen F. Austin State University; Nacogdoches, TX

Category: Masters

Advisor / Mentor: Rowe, James (rowej@sfasu.edu)

ABSTRACT

Weight management via exercise is critical in both athletic and general populations. It is unclear what modality of exercise elicits the greatest caloric efficiency. **PURPOSE:** To compare the energy expenditure of three different exercise regimens when performed at a self-selected pace. **METHODS:** Recreationally active men (n=3) and women (n=4) performed 3 separate exercise bouts at a self-selected pace: total body Tabata (TBT), treadmill running Tabata (TRT), and continuous running (CONT) in a counterbalanced manner with at least 48h between bouts. Trials consisted of a 10-minute rest period, 5-minute warmup, 25-minute exercise bout, and a 25-minute recovery period. TBT consisted of repeated cycles of body calisthenics for 20 seconds with 10-seconds rest in between. TRT consisted of repeated sprints on a treadmill in the same manner as TBT. CONT was a continuous exercise bout on a treadmill. In TRT and CONT trials, participants could manipulate treadmill speed in 5-minute increments. For each bout, participants wore a portable metabolic analyzer (CosMed K-5) during the rest, warmup, exercise, and recovery period to assess energy expenditure (EE), respiratory exchange ratio (RER), fat oxidation (FO), and excess post-exercise consumption (EPOC). Heart rate (HR) was recorded during exercise and recovery in 5-minute increments. Significant differences ($p < .05$) between bouts were determined using a one-way, repeated measures ANOVA and Bonferroni post-hoc test. **RESULTS:** There were no significant differences in average HR (bpm) during exercise (TBT = 174.9 ± 6.1 ; TRT = 182.1 ± 5.9 ; CONT = 181.4 ± 8.4) or during recovery. EE during exercise was significantly higher in CONT (356.7 ± 82.9 kcals) than TRT (312.8 ± 70.0 kcals; $p = 0.007$, $ES = .56$) and TBT (266.3 ± 63.9 kcals; $p = 0.001$, $ES = 1.2$). Additionally, EE during exercise was significantly higher in TRT than TBT ($p = .005$, $ES = .59$). During minutes 0-25 of recovery, no significant differences were found in EE or fat oxidation. However, in minutes 10-25 of recovery, TBT (31.7 ± 8.7 kcals) was significantly higher in EE than CONT (26.0 ± 7.0 kcals; $p = 0.009$, $ES = .69$) and had a higher rate of FO (0.19 ± 0.07 g·min⁻¹) than TRT (0.12 ± 0.06 g·min⁻¹; $p = 0.013$, $ES = 1.03$) and CONT (0.13 ± 0.05 g·min⁻¹; $p = 0.036$, $ES = .87$). During exercise, RER was significantly higher in TBT (1.00 ± 0.04) than TRT (0.94 ± 0.03 ; $p = 0.019$, $ES = 1.28$), but there were no differences during recovery. EPOC at minutes 0-25 of recovery was significantly higher in TBT (3.7 ± 1.8 L·min⁻¹) than TRT (2.0 ± 1.2 L·min⁻¹; $p = 0.039$). **CONCLUSION:** At a self-selected pace, intensity was similar across trials. When compared to TBT and TRT, CONT burned more calories during exercise, implying that CONT burns more calories when matched for time and intensity. However, TBT elicited higher EE and FO while recovering, possibly due to TBT relying more on carbohydrates as evidenced by the higher exercise RER. The increased use of fat during recovery helps replenish glycogen stores and facilitates the body's full recovery to pre-exercise levels. Future studies should examine the metabolic responses that take place during the performance of other self-paced exercise modalities to determine the most calorically efficient exercise.