SWACSM Abstract

Impact of Load Carriage on Metabolic Efficiency

TYSON NGATIKAURA, SHANE DRAPER, LILY POULTON, ALLY SIPPLE, TYLER STANDIFIRD, & ANDREW CREER

Applied Human Performance Laboratory; Department of Exercise Science and Outdoor Recreation; Utah Valley University; Orem, UT

Category: Undergraduate

Advisor / Mentor: Draper, Shane (ShaneD@uvu.edu)

ABSTRACT

Load carriage is a crucial detail of long-distance running, especially when it comes to ultra-marathon distances (>26.2 miles). Longer distances require larger loads to carry fluids and nutrition to maintain performance during these events. Running packs fitted close to the torso are the most popular methods for carrying 1-3 L of fluid, additional food, and gear; however, little is known to what extent load mass may impact running performance. **PURPOSE:** To identify at which point relative load mass (% of body mass) begins to negatively impact submaximal metabolic efficiency. **METHODS:** To date, 7 active runners (≥3 days/week, ≥16.09 km/week for the last six months) have participated in this study. Participants (27.9±6.5 yrs; 179.2±4.4cm; 74.68±15.5kg) include males (n=5) and females (n=2) that have undergone four, four-minute intervals on the treadmill at a self-selected pace with relative loads of 0%, 3%, 6%, and 9% of their total body mass using a weighted Salomon running pack. VO_2 (ml/kg/min) was measured (Parvo Medics TrueOne Metabolic Measurement System, Sandy, UT) during the last minute of each interval and then averaged for analysis. A repeated measures ANOVA was performed comparing the relative load of 0% to running pack loads equating to 3%, 6%, and 9% of total body mass. **RESULTS:** There was a strong, positive correlation (R^2 = 0.83) between pack load and VO_2, although significant differences in VO_2 were only observed between the relative loads of 0% and 9% (p = 0.013). **CONCLUSION:** These data suggest that although a linear increase in VO_2 in relation to pack load was observed, pack loads at 9% resulted in a significant increase in VO_2, indicating a decrease in running economy. Identifying the relationship between relative load mass and metabolic efficiency may allow runners to better prepare and manage their loads to reduce fatigue during ultra-marathon type competitions.