

## **Predictors of Performance during a 161 km Mountain Footrace**

OMAR B. EL-KURD<sup>1</sup>, PATRICK BIALY<sup>1</sup>, SOOLIM JEONG<sup>2</sup>, BRAXTON A. LINDER<sup>2</sup>, NINA L. STUTE<sup>2</sup>, JOSEPH D. VONDRASEK<sup>3</sup>, C. MATTHEW LEE, FACSM<sup>1</sup>, KENT A. LORENZ<sup>1</sup>, AUSTIN T. ROBINSON<sup>2</sup>, JOSEPH C. WATSO<sup>3</sup>, MATTHEW C. BABCOCK<sup>4</sup>, JAMES R. BAGLEY<sup>1</sup>, & GREGORY J. GROSICKI<sup>5</sup>

<sup>1</sup>Muscle Physiology Lab; Department of Kinesiology; San Francisco State University; San Francisco, CA

<sup>2</sup>Neurovascular Physiology Lab; School of Kinesiology; Auburn University; Auburn, AL

<sup>3</sup>Cardiovascular & Applied Physiology Lab; Department of Nutrition and Integrative Physiology; Florida State University; Tallahassee, FL

<sup>4</sup>Division of Geriatric Medicine; School of Medicine; University of Colorado–Anschutz Medical Campus; Aurora, CO

<sup>5</sup>Biodynamics and Human Performance Center; Department of Health Sciences and Kinesiology; Georgia Southern University, Armstrong Campus; Savannah, GA

---

*Category: Masters*

*Advisor / Mentor: Bagley, James (jrbagley@sfsu.edu)*

### **ABSTRACT**

Training volume and cardiovascular dynamics influence endurance performance. However, there is limited information on the interplay between training volume, cardiovascular dynamics, and performance in ultra-marathon athletes. **PURPOSE:** We aimed to determine predictors of performance in finishers of the 2023 Western States Endurance Run (WSER). **METHODS:** Sixty participants who finished the race (49 males/11 females; mean age:  $44.7 \pm 9.6$  y, range: 26–66 y; BMI:  $22.7 \pm 2.2$  kg/m<sup>2</sup>) completed pre-race surveys including average training volume (AV) and peak training volume (PV), as well as resting cardiovascular measures including resting heart rate (RHR) and augmentation index (Alx), a measure of wave reflection characteristics. Based on WSER completion time, we calculated average running velocity (RV). We assessed associations among 22 variables using bivariate correlation analysis (Pearson's Correlation for normally distributed data and Spearman's Rank Correlation if normality was not met). Within our listed variables, normality was met in age and AV. Additionally, we completed multiple regression analyses for predictors. We present descriptive data as mean  $\pm$  SD. **RESULTS:** Participants had an average RV of  $6.33 \pm 0.97$  km/h ( $3.93 \pm 0.6$  mph), and reported an AV of  $91.9 \pm 24.5$  km/wk ( $57.1 \pm 15.2$  miles/wk) and a PV of  $141.0 \pm 47.2$  km/wk ( $87.6 \pm 29.3$  miles/wk). We observed significant associations between RV and age ( $r_{(58)} = -0.57, p < .001$ ); AV ( $r_{(58)} = 0.41, p < .001$ ); and PV ( $r_{(58)} = 0.34, p < .001$ ). Our regression model inclusive of age, AV, and PV was associated with RV ( $R^2 = 0.37; F_{(3,56)} = 12.4, p < .001$ ). Moreover, AV was a significant unique predictor in the model ( $b_1 = 0.013; t_{(56)} = 2.57, p = 0.013$ ), resulting in a 0.33 km/h increase in RV for every 25-km increase in AV. Last, significant relations existed between RV and Alx ( $r_{(58)} = -0.30, p = 0.022$ ); and RHR ( $r_{(58)} = -0.26, p = 0.046$ ). **CONCLUSION:** We found that (1) average weekly training volume is a significant predictor of performance in elite ultra-marathon athletes and (2) race performance was inversely associated with resting arterial wave reflection characteristics and heart rate.