SWACSM Abstract

Predicting Maximal Oxygen Uptake Using the 3-Minute All-Out Test in High-Intensity Functional Training Athletes

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ABSTRACT

Maximal oxygen uptake (VO_{2max}) and critical speed (CS) are key fatigue-related measurements that demonstrate a relationship to one another and are indicative of athletic endurance performance. This is especially true for those that participate in competitive fitness events. However, the accessibility to a metabolic analyzer to accurately measure VO_{2max} is expensive and time intensive, whereas CS may be measured in the field using a 3 minute all-out test (3MT). **PURPOSE:** Therefore, the purpose of this study was to examine the relationship between VO_{2max} and CS in high-intensity functional training (HIFT) athletes. **METHODS**: Twenty-five male and female (age: 27.6 ± 4.5 years; height: 174.5 ± 18.3 cm; weight: 77.4 ± 14.8 kg; body fat: 15.7 ± 6.5%) HIFT athletes performed a 3MT as well as a graded exercise test with 48 h between measurements. True VO_{2max} was determined using a square-wave supramaximal verification phase and CS was measured as the average speed of the last 30 s of the 3MT. **RESULTS**: A statistically significant and positive correlation was observed between relative VO_{2max} and CS values ($r = 0.819$, $p < 0.001$). Based on the significant correlation, a linear regression analysis was completed, including sex, in order to develop a VO_{2max} prediction equation (VO_{2max} (mL/kg/min) = 8.449(CS) + 4.387(F = 0, M = 1) + 14.683; standard error of the estimate = 3.34 mL/kg/min). Observed (47.71 ± 6.54 mL/kg/min) and predicted (47.71 ± 5.7 mL/kg/min) VO_{2max} values were compared using a dependent t-test and no significant difference was displayed between the observed and predicted values ($p = 1.000$). The typical error, coefficient of variation, and intraclass correlation coefficient were 2.26 mL/kg/min, 4.90%, and 0.864, respectively. **CONCLUSION**: The positive and significant relationship between VO_{2max} and CS suggests that the 3MT may be a practical alternative to predicting maximal oxygen uptake when time and access to a metabolic analyzer is limited.