

6. SWACSM Abstract

Assessing the Validity of Several Heart Rate Monitors in Wearable Technology While Mountain Biking

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ABSTRACT

The development of fitness trackers and other wearable technology designed for health and fitness purposes is growing in popularity and sophistication every day. These devices have the ability to measure or estimate a variety of physiological and physical variables, such as step count, energy expenditure, VO₂max, lactate threshold, heart rate, stride length, vertical oscillation, ground contact time, blood oxygen saturation (via pulse oximetry), and many others. **PURPOSE:** In order to properly use these devices, independent validation needs to take place to determine the device's accuracy and ability to properly measure or estimate each variable. Therefore, the purpose of this study was to determine the validity of several HR monitors while mountain biking outdoors. **METHODS:** Twenty apparently healthy participants (10 male, 10 female, 26.3 ± 6.6yrs, 171.8 ± 8.0cm, 73.9 ± 19.0kg) volunteered to mountain bike (MTB) while wearing 6 heart rate monitors (HRMs), (5 test devices, 1 criterion). Each participant completed 2 MTB trials while wearing the HRMs. Data was recorded on a second-by-second basis for all devices and compared against the criterion (Polar H7). Data analysis included determining the mean, standard deviation (SD), mean absolute percentage error (MAPE), Pearson's correlation coefficient (R), and Lin's Concordance Correlation Coefficient (CCC). Pre-determined validity thresholds are as follows: MAPE<10%, CCC>0.7. **RESULTS:** The validity measures for the criterion Polar H7 Chest HRM, and test devices Suunto Chest HRM, Schosche Rhythm+ HRM, Garmin fenix 5x watch, Polar A360 watch, and Jabra Sport Earbuds, respectively, are as follows: Mean±SD (bpm): 161.79±19.43, 162.11±19.51, 144.50±43.62, 143.94±37.00, 142.14±30.23, and 140.12±41.15. MAPE: 0.66%, 10.90%, 11.12% , 13.20%, 26.56%. R: 0.99, 0.29, 0.31, 0.41, -0.32. CCC: 0.99, 0.19, 0.22, 0.29, -0.20. **CONCLUSION:** There was only one device that met the pre-established validity criteria, which was the Suunto Spartan Sport Watch with Chest HRM. This device may be considered valid in producing measures of HR while mountain biking.