14. SWACSM Abstract

Validity of Average Heart Rate and Energy Expenditure in Polar Armband Devices While Self-Paced Biking

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ABSTRACT

Wearable technology has become an increasingly utilized tool to track various aspects of physical activity amongst fitness enthusiasts and the general public. Polar is a common brand that is utilized, and many use the devices for a variety of modalities, like walking, running, or biking. However, the validity of Polar's armband optical devices in estimating average heart rate (HR) and energy expenditure (EE) while biking is unknown. **PURPOSE**: The purpose of this study was to determine if two devices, the Polar OH1 and Polar Verity Sense, record valid measures of average HR and EE while self-paced biking. **METHODS**: Twenty participants (n=10 female, n=10 male; 23.5 ± _6.48 years) were tested individually. The Polar OH1 and Polar Verity Sense were worn around separate biceps (placement was randomly selected). Following a ~5 min. self-paced walking warm-up outdoors, participants were fitted to a road bicycle and asked to perform a ~5 min. self-paced bike ride on a flat paved surface outdoors. Mean absolute percent error (MAPE, ≤10%) and Lin's Concordance ($\rho \geq 0.7$) were used to validate the device's average HR (in bpm) and estimated EE (in kcals) compared to criterion reference devices of the Polar H10 heart rate strap and Cosmed K5 portable metabolic unit, respectively. Dependent T-tests determined differences ($p \leq 0.05$). **RESULTS:** Average HR was considered valid for both devices, but estimated EE was not valid while self-paced biking using the Polar OH1 or Polar Verity Smart (see table below). **CONCLUSION:** Individuals who bike ride and use these devices should consider the implications of these findings.

	Criterion Reference	Devices Being Tested	
Average HR (bpm)	Polar H10	Polar Verity Sense	Polar OH1
Mean ± SD (bpm)	110 ± 16.83	113.74 ± 17.61	112.35 ± 18.85
MAPE		4.68%	4.12%
Lin's Concordance		0.83	0.88
t-test		0.15	0.42
Estimated EE (kcal)	Cosmed K5	Polar Verity Sense	Polar OH1
Mean ± SD (kcal)	37.16 ± 8.72	40.95 ± 18.85	39.59 ± 19.31
MAPE		30.76%	30.93%
Lin's Concordance		0.52	0.53
t-test		0.26	0.49