

Accuracy of Fitbit Charge 2 Worn At Different Wrist Locations During Exercise

VANESSA E. SALAZAR, NAOMI D. LUCIO, MERRILL D. FUNK

Human Performance Laboratory; Exercise Science; University of Texas Rio Grande Valley; Brownsville, TX

Category: Undergraduate

Advisor / Mentor: Funk, Merrill Merill.funk@utrgv.edu

ABSTRACT

Many newly released activity monitors use heart rate measured at the wrist to estimate exercise intensity, however, where the device is placed on the wrist may affect accuracy of the measurement. **PURPOSE:** To determine whether the Pure Pulse technology on the Fitbit Charge 2 will show different heart rate readings when placed on the recommended exercise position compared to the all-day wear position at various exercise intensities. **METHODS:** Thirty-five participants (MEAN \pm SD; 22.0 \pm 2.9yrs; 23.9 \pm 2.6kg/m²; 18 male) consented to participate in a single visit where two Fitbit Charge 2 devices were placed on the non-dominant wrist. Fitbit A was placed 2-3 fingers above the wrist bone. Fitbit B was placed directly above the wrist bone. The treadmill was set at 3 mph with 0% grade. Participants remained at this speed for 4 minutes. Heart rate measurements were taken at the last 10 seconds of each stage from both Fitbits and a polar heart rate monitor (chest strap). The same procedure was followed for 5 and 6 mph. Statistical analyses were performed using IBM SPSS 23.0. A Two-way (speed \times location) Repeated Measures ANOVA was used to examine mean differences. Pairwise comparisons with Bonferroni correction were used in post-hoc analysis. Pearson correlations and mean bias between polar heart rate monitor and activity monitors were also calculated for each speed. **RESULTS:** Repeated Measures ANOVA found significant differences between speeds ($p < 0.01$) and location ($p < 0.01$), but not for the interaction ($p = 0.234$). Pairwise comparisons indicated significant differences between each speed ($p < 0.01$) and between the polar monitor and Fitbit B ($p < 0.05$), but not between the polar monitor and Fitbit A ($p = 0.608$). Pearson correlations indicated strong correlations between each Fitbit and the polar monitor ($r = .58-.91$; all $p < 0.01$). Mean bias decreased as speed increased for Fitbit A (mean bias BPM \pm SD; -1.1 ± 5.4 ; -1.9 ± 9.5 ; -0.4 ± 6.9 ; -0.3 ± 7.3 for resting, 3mph, 5mph, 6mph respectively) while mean bias for Fitbit B increased as speed increased (-2.8 ± 8.8 ; -3.1 ± 11.1 ; -3.9 ± 14.6 ; -6.7 ± 14.3 for resting, 3mph, 5mph, 6mph respectively). **CONCLUSION:** Wrist-worn heart rate monitors appear to provide values adequate for recreational use, however, following recommended guidelines on wear-position may impact heart rate readings.