



Trackers measure heart-rates quite accurately; good results esp. in natural settings. They do best at lower heart rates.

Validating heart-rate measures of two activity trackers in a laboratory and free-living setting

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INTRO

- The accuracy of heart-rate measures derived from trackers is not clear.
- We investigated the accuracy of heart-rate measures of a consumer-based and a low-cost tracker in a lab and free-living setting.

METHODS

- N = 55 adults
- Lab: progressive cycling protocol
- Free-living: ≥ 3 hrs, ≥ 10 min MVPA
- Polar A370 & Tempo HR vs Polar H10 (chest strap)

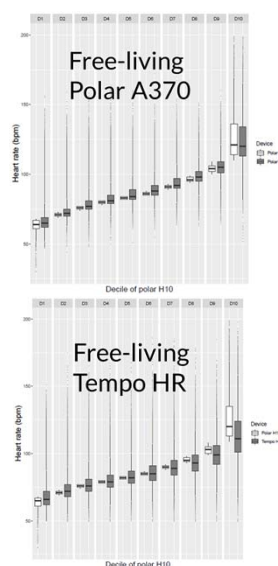
RESULTS

Tempo HRlab
ICC=0.51; MAPE 13%
Polar A370lab
ICC=0.73; MAPE 6.6%

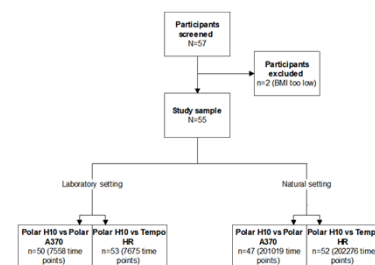
Tempo HRfree
ICC=0.71; MAPE 10.2%
Polar A370free
ICC=0.85; MAPE 7.1%

DISCUSSION

- More MVPA in lab might explain lab vs free-living differences
- Trackers differences due to material quality, different algorithms, different contact points with skin
- Trackers good for surveillance or behavior change?



MY AMMO BAR



| According to Polar H10 | | | | |
|-------------------------|----------------------|------------------------|-----------------------|----------------------|
| Laboratory phase | | | | |
| | $\geq 64\%HR_{max}$ | $< 64\%HR_{max}$ | $\geq 64\%HR_{max}$ | $< 64\%HR_{max}$ |
| According to Polar A370 | | | According to Tempo HR | |
| $\geq 64\%HR_{max}$ | 2273 (81.09%) | 118 (2.48%) | $\geq 64\%HR_{max}$ | 1872 (62.13%) |
| $< 64\%HR_{max}$ | 530 (18.91%) | 4637 (97.52%) | $< 64\%HR_{max}$ | 1141 (37.87%) |
| Total | 2803 (37.09%) | 4755 (62.91%) | Total | 3013 (39.26%) |
| Free-living phase | | | | |
| According to Polar A370 | | | According to Tempo HR | |
| $\geq 64\%HR_{max}$ | 9323 (83.55%) | 6236 (3.28%) | $\geq 64\%HR_{max}$ | 5717 (54.27%) |
| $< 64\%HR_{max}$ | 1835 (16.45%) | 183625 (96.72%) | $< 64\%HR_{max}$ | 4818 (45.73%) |
| Total | 11158 (5.55%) | 189861 (94.45%) | Total | 10535 (6.21%) |

Sensitivity analyses

Removed outliers and compared Polar H10 with two other trackers using remaining matched data points. Outliers: Pearson Correlation Coefficient of less than 0.3 between the Polar H10 and the test trackers in lab. In secondary analyses we only used data that was available from all three devices. These analyses did not change the results markedly. Reported results not influenced by extreme cases or outliers.



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