GNYACSM Abstract

Assessing the Validity and Efficacy of Wearable Devices Towards Equitable Data for All

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ABSTRACT

Wearable technology provides the ability to gather cutting-edge data in a practical manner and verify it against industry-leading technology. **PURPOSE**: This study compares heart rate (HR) data from off-the-shelf wearable technology; Polar H10, Whoop 4.0, and Garmin Fenix 7 to the standard used in hospitals; GE Dash 5000, across subjects of various skin tones, BMI, gender, and age. The wearable devices rely on one of two different technologies, including photoplethysmography (PPG) in the wrist-worn devices and electrocardiogram (ECG) in the devices applied to the participant's chest. **METHODS**: Data was collected on 28 Division 1 male soccer players from September 3rd, 2024 to October 2024, generating 3,696 data points. Data collection consisted of participants walking one minute on a treadmill at speeds of one, two, three, and four miles per hour for a total of four minutes. Data was collected using the VO2 Master Application and exported into CVS files. The files were then cleaned for missing data points and analyzed by using Bland Altman's plots, scatterplots, and combined scatter plots in Python and Microsoft Excel. **RESULTS**: The Polar H10 was the closest in accuracy to the gold standard of the GE Dash 5000 in measuring HR with an r^2 of 0.93 and a standard deviation of 6.21. The Whoop 4.0 was less accurate in measuring HR compared to the GE Dash 5000 yielding an r^2 of 0.77 with a standard deviation of 13.66. Results also showed that the GE Dash 5000 struggled to accurately record HR at levels higher than 150 beats per minute (BPM). **CONCLUSION**: These results and correlations show that the Polar H10 and ECG technology is more accurate than the Whoop and Garmin Fenix 7 with their PPG technology. This also tells us that the GE Dash 5000 which is considered the gold standard is not as effective when you stress test it to above 150 BPM. This provides evidence for future research regarding the validity of technology when testing it in high-intensity settings.