Repetition Count Concurrent Validity of Various Garmin Wrist Watches During Light Circuit Resistance Training

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ABSTRACT

Wearable technology and strength training with free weights are two of the top 5 fitness trends worldwide. However, minimal physiological research has been conducted on the two together and none have measured the accuracy of devices measuring repetition counts across exercises. **PURPOSE**: The purpose of this study was to determine the concurrent validity of four wrist-worn Garmin devices, Instinct (x2), Fenix 6 Pro, and Vivoactive 3, to record repetition counts while performing 4 different exercises during circuit resistance training. **METHODS**: Twenty participants (n=10 female, n=10 male; age: 23.2 $\pm$ 7.7 years) completed this study. Participants completed 4 circuits of 4 exercises (front squat, reverse lunge, push-ups, and shoulder press) using dumbbells at a light intensity with 1 set of 10 repetitions per exercise and 30 seconds rest between exercises and 1-1.5 min rest between circuits. Mean absolute percent error (MAPE, ≤10%) and Lin's Concordance Coefficient (CCC, $\rho \geq 0.7$) were used to validate the device's repetitions counts in all exercises compared to the criterion reference manual count. Dependent T-tests determined differences ($p \leq 0.05$). **RESULTS:** No devices were considered valid (meeting both the threshold for MAPE and CCC) for measuring repetition counts during front squats (MAPE range: 3.0-18.5% and CCC range: 0.27-0.68, p value range: 0.00-0.94), reverse lunge (MAPE range: 44.5-67.0% and CCC range: 0.19-0.31, p value range: 0.00-0.28), push-ups (MAPE range: 12.5-67.5% and CCC range: 0.10-0.34, p value range: 0.07-0.83), and shoulder press (MAPE range: 18.0-51.0% and CCC range: 0.11-0.43, p value range: 0.00-0.79) exercises. **CONCLUSION**: The wearable wrist-worn devices were not considered accurate for repetition counts and thus manual counting should be utilized. People who strength train using free weights will need to wait for either improved repetition counting algorithms or increased sensitivity of devices before this measure can be obtained with confidence.