

## **The Validity and Reliability of the Garmin Instinct in Measuring Heart Rate, Energy Expenditure, and Steps During Skipping**

NICOLE R. VARGAS, BRYSON CARRIER, DUSTIN W. DAVIS, JORGE N. PERDOMO RODRIGUEZ, ELIAS M. MALEK, BIANCA WEYERS, KATHERINE CARLOS, & JAMES W. NAVALTA, FACSM

Exercise Physiology Laboratory; Department of Kinesiology and Nutrition Sciences; University of Nevada, Las Vegas; Las Vegas, NV

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*Category: Masters*

*Advisor / Mentor: Navalta, James W. (james.navalta@unlv.edu)*

### **ABSTRACT**

As the use of wearable technology to monitor physical activity increases, assessment of the validity and reliability of these devices are needed. A popular device brand is Garmin. Although not a common physical activity, skipping can be included in dynamic warm-ups. **PURPOSE:** Therefore, the purpose of this study was to determine the validity and reliability of the Garmin Instinct in measuring caloric energy expenditure (EE), average heart rate (HR), and steps while skipping. **METHODS:** Ten participants (5 female, age: 27±9 years) skipped at a self-selected pace for five minutes. During that time, HR, EE, and steps were measured by the Polar H10, Cosmed K5, and manual counting, respectively. Two Garmin Instincts simultaneously tracked all three variables. A step was defined as any time the foot leaves and hits the ground (stride x 4). Data was input into Google Sheets and summary statistics, t-test with Bonferonni corrections, and mean absolute percentage error (MAPE) were calculated. Additional validity and reliability tests were run in jamovi, including Lin's concordance correlation coefficient (CCC), TOST tests, Bland-Altman bias, coefficient of variation (CV), and intraclass correlation coefficient (ICC). The pre-established validity criteria are as follows: CCC > 0.7 and MAPE < 10%. The pre-established reliability criteria are as follows: CV < 10% and ICC > 0.7. **RESULTS:** The Garmin Instinct had a MAPE of 19.2%, 28.5%, and 53.2% for HR, EE, and steps, respectively. It had a CCC of .06, .21, and .01 for HR, EE, and steps, respectively. The 2-tailed paired t-tests with corrections for multiple comparisons was significant for HR and steps. The TOST tests were violated for all 3 measurements (HR, EE, and steps). Bland-Altman analysis produced a bias estimate of 34.0, 0.6, and 1100 for HR, EE, and steps, respectively. The Garmin produced a CV of 11.2%, 14.8%, and 6.6% for HR, EE, and steps, respectively. It produced an ICC of .51, .64, and .81 for HR, EE, and steps, respectively. **CONCLUSION:** The Garmin Instinct did not meet the pre-established validity criteria for any measure (HR, EE, or steps). However, it did meet the pre-established reliability criteria for steps but not for HR or EE. Therefore, the Garmin Instinct cannot be expected to produce accurate estimates of HR, EE, or steps during skipping.