

Cross-instrument Validity, Reproducibility, and Feasibility of Ambulatory Heart Rate (Variability) Monitors

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Background: Ambulatory heart rate (variability) (HR(V)) monitors have enjoyed increased interest recently. However, doubts about their performance suggests that they could put users at risk for unwittingly crossing safe HR thresholds, while also decreasing their usefulness for obtaining valid scientific measurements. We will therefore compare HR(V) measurements from two recently released, ambulatory (HR(V)) monitors (Ithlete Finger Sensor, Cortrium C3) to those of the well validated and widely used VU-AMS monitor. Our goal is to test and compare the validity and reproducibility of data obtained with, and feasibility of, these newly developed monitors.

Methods: During two standardised laboratory sessions, 50 participants (age:18-35 years) will be monitored with the three monitors, in various postures and activities: supine, standing, sitting, paced-breathing, mental-stress, and walking, which all last five minutes. Laboratory sessions are separated by monitoring in naturalistic setting with the Ithlete and Cortrium monitors during two weeks, five times a day, for five minutes. Average HR (bpm) and Root Mean Square of the Successive differences (RMSSD; ms), and evaluation ratings of the monitors will be obtained.

Results: Data of five participants are currently available. Preliminary results indicate average HR and RMSSD values obtained with the VU-AMS during laboratory tasks to be in the physiological plausible range (e.g., sitting (HR: 68.50 ± 7.49 , RMSSD: 55.49 ± 27.44) and mental-stress (HR: 75.12 ± 9.34 , RMSSD: 46.64 ± 10.94)). Valid data from the Ithlete and Cortrium monitors were obtained but not analyzed yet.

Discussion: Preliminary results indicate that the research design is suited for reliable data acquisition needed to perform the ongoing study.

Conflict of Interest Statement: The authors declare that the presented research did not include any commercial or financial relationship that could be construed as a potential conflict of interest.