Validity of Optical Blood Flow Heart Rate Monitors

Nicholas Dinan  
*University of Nebraska at Omaha*, ndinan@unomaha.edu

Hyun-Sung An  
*University of Nebraska at Omaha*, han@unomaha.edu

Matthew Bubak  
*University of Nebraska at Omaha*, mpbubak@unomaha.edu

Danae M. Dinkel  
*University of Nebraska at Omaha*, dmdinkel@unomaha.edu

Jung-Min Lee  
*University of Nebraska at Omaha*, jungminlee@unomaha.edu

Follow this and additional works at: https://digitalcommons.unomaha.edu/pahppresentations

Part of the Health and Physical Education Commons

Please take our feedback survey at: https://unomaha.az1.qualtrics.com/jfe/form/SV_8cchtFmpDyGfBLE

Recommended Citation


https://digitalcommons.unomaha.edu/pahppresentations/18
Validity of Optical Blood Flow Heart Rate Monitors
Nicholas Dinan, Hyunsung An, Matthew Bubak, Danae M. Dinkel, Jung-Min Lee
School of Health, Physical Education and Recreation, University of Nebraska at Omaha, Omaha, NE

ABSTRACT
PURPOSE: Validate the Schoche (SC) (RhythmTM), Basis B1 Band (BB) (BASIS Science, Inc.,) and Mio Alpha (MA) (Physical Enterprises, Inc.) wireless heart rate monitors. METHODS: Fifteen college students (males, n=11, ages27±5ys; females, n=4, ages27±6ys) participated. All participants simultaneously wore the SC on left forearm, the BB on the right wrist, the MA on the left wrist, and Polar HR strap on their chest. Participants’ resting heart rate was measured twice prior to exercise. The exercise protocol consisted of one 30-minute bout of continuous walking and running in which the treadmill speed increased every 5 minutes. The treadmill started at 2 mph and completed at 6 mph, followed by 3 minutes of cool down. HR was recorded every minute from each monitor including the Polar HR monitor as a criterion measure. RESULTS: Average HRs (means ± SD) for Polar HR, SC, MA, and BB were 113±32, 110±34, 117±32, and 111±27. A strong pearson’s correlation coefficient was observed with the SC (r = .88) and the MA (r = .75), but a weak correlation coefficient was found with the BB (r = .41), p<0.01. Corresponding absolute error rates were 6.0±12.5%, 11.7±24.2%, and 18.2±21.3%. ANOVA and post hoc analyses with Bonferroni revealed non-significant differences between the SC, MA, and BB (p < .05) compared to the Polar HR. CONCLUSION: The results demonstrate that the wireless wrist-oriented heart rate monitors provide an accurate measurement of HR during exercise. However, further research is needed to validate these monitors with a larger sample in different environments.

INTRODUCTION
• Heart rate (HR) monitors are a valuable device for individuals who are interested in improving and/or tracking fitness.
• These devices can be worn on the wrist or forearm and detects HR by use of an optical blood flow sensor without a chest strap. However, little is known about the validity of these commercially available HR monitors.
• The purpose of this study was to validate the Schoche (SC) (RhythmTM), Basis B1 Band (BB) (BASIS Science, Inc.,) and Mio Alpha (MA) (Physical Enterprises, Inc.) wireless heart rate monitors.

METHODS
• Fifteen college students participated in this study.

RESULTS

Figure 1. Mean Absolute Percentage Error for Heart Rate Monitors

Figure 2. Bland-Altman Plots for Heart Rate Monitors

Table 1. Correlation Matrix for Heart Rate Monitors

Table 2. Mean Heart Rate During Exercise Protocol for Heart Rate Monitors

CONCLUSIONS
• The results demonstrate that the wireless wrist-oriented heart rate monitors provide an accurate measurement of HR during exercise.
• However, further research is needed to validate these monitors with a larger sample in different environments.