

## TACSM Abstract

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### Utility of Two iPhone Device Apps in Assessing Heart Rate at Rest and During Activity

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#### ABSTRACT

Heart rate (HR) is a critical physiological variable used for prescribing exercise, assessing fitness level and tracking fitness improvements. Electrocardiography (ECG) stands as the criterion measure of HR. While recent development of HR-detecting mobile device applications (apps) has made evaluating HR more convenient; their degree of accuracy is unknown. Therefore, the purpose of this current study was to examine the accuracy and reliability of two-iPhone applications to detect HR at rest and during low-intensity exercise conditions. Eighteen female and 22 male subjects (26 + 9.5 yrs) were prepped for simultaneous detection of HR via three methods: ECG and two HR-detecting apps. App 1, a camera-based app called Azumio Instant Heart Rate (CAM), was used by placement of a finger over the camera lens of the mobile device. App 2, a microphone-based app called Heart Monitor by Bluespark, was employed via placement of an external microphone over the radial pulse. The participants underwent a series of 5-minute stages: seated rest followed by cycle then treadmill walking at low intensities. HR was recorded concurrently, at several time intervals from the three methods once a steady-state HR was reached. The means of the three devices were compared via ANOVA with the significance level set, *a priori*, at 0.05. Correlation analysis was employed to investigate relationships between the apps and ECG. No statistical difference was found between the CAM and ECG HR ( $p > 0.05$ ) during the resting and cycle stages. However, during the treadmill phase, there was a significant difference ( $p = 0.018$ ) between CAM and ECG. Nevertheless, there was a significant ( $p < 0.05$ ), positive correlation between CAM and ECG under the resting, cycle and treadmill conditions ( $r = .966$ ,  $r = .984$ ,  $r = .877$ , respectively). Significant differences ( $p < 0.05$ ) were found for each condition when comparing ECG and MIC HR. Data also revealed poor correlations ( $p > 0.05$ ;  $r$  between  $-.004$  and  $-.136$ ) between MIC and ECG. The utility of CAM and MIC-based apps to detect HR remains in question as evidence appears to indicate exercise mode and app specificity. Caution should be shown when using these devices. The CAM-based app may accurately detect HR during resting and seated cycling but not during treadmill activity. The MIC-based app is not recommended for use in any condition. Of note, statistical significance may not mitigate usefulness when considering the accuracy of palpation. Additional research is necessary.