12. SWACSM Abstract

Validity of Garmin Devices while Ascending and Descending Flights of Stairs

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ABSTRACT

The use of wearable technology to track physical activity is popular among fitness enthusiasts and the general public. There are many brands that offer a variety of devices. One popular brand is Garmin. The validity of Garmin's wrist-worn devices in measuring step counts in various settings, such as walking up and down a staircase, is unclear. **PURPOSE:** The purpose of the present study was to determine if two devices, the Garmin fēnix 5 and Garmin vívosmart HR record valid measures of step count when ascending and descending flights of stairs at three different speeds. **METHODS:** Eight participants (n=8) were tested individually. The Garmin fēnix 5 and Garmin vívosmart HR were worn on separate wrists (placement was randomly selected). Participants climbed up then down one, two, and three flights of stairs (19, 39, and 59 steps, respectively [manual count]) at speeds of 50, 75, and 100, beats per minute (bpm) for a total of 18 trials. The step counts provided by both devices were recorded before and after each up and down trial. Each trial was separated by 2-3 minutes of rest. Mean absolute percent error (MAPE, ≤10%) and Lin's Concordance ($\rho_c \geq 0.7$) were used to validate the device step counts with the actual number of steps. Dependent T-tests determined differences ($p \leq 0.05$). **RESULTS:** The only condition that was considered valid was descending stairs at 100 bpm using the Garmin vívosmart (see table). **CONCLUSION**: Individuals who ascend and descend numerous stairs during their day may wish to consider the implications of these findings.

		Garmin fēnix 5		Garmin vívosmart HR	
		Up	Down	Up	Down
50 BPM	MAPE	50.90	73.13	84.77	62.13
	Lins	0.42	0.360	0.313	0.369
	P- Value	0.025	0.512	0.026	0.03
75 BPM	MAPE	77.07	110.09	64.86	89.38
	Lins	0.37	0.314	0.516	0.395
	P- Value	0.01	0.00001685	0.001	0.00009966
100 BPM	MAPE	16.77	11.97	24.66	9.62
	Lins	0.781	0.95	0.703	0.961
	P- Value	0.667	0.685	0.263	0.797