

## 47. SWACSM Abstract

### Validity of Fitbit Devices while Ascending and Descending Flights of Stairs

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#### ABSTRACT

With wearable technology becoming increasingly popular, devices that provide valid step counts during physical activities are important for people trying to accumulate a certain number of steps, as is a common goal when trying to become more active. One of the most popular manufacturers of wearable devices in the world is Fitbit. It is not clear if wrist-worn Fitbit devices provide valid step counts while ascending and descending flights of stairs at different speeds. **PURPOSE:** The purpose of this study was to determine the validity of step counts by the wrist-worn Fitbit Charge and Fitbit Versa 2 while walking up and down flights of stairs. **METHODS:** Eight participants (6M, 2F, 29 ± 8 yrs, 178 ± 8 cm, 79 ± 15 kg) walked up and then down one, two and three flights of stairs to a metronome set at 50, 75, and 100 beats per minute (BPM). A Fitbit device was randomly chosen for each arm. Steps were recorded at the bottom and top of each flight. The step data were analyzed using mean absolute percent error (MAPE), Lin's concordance, and dependent *t*-tests. The criterion measure of steps was the actual number of steps through one flight (19 steps), two flights (39 steps = 19 steps in flight two + one step on the landing between flights one and two), and three flights (59 steps = 19 steps in flight three + one step on the landing between flights two and three). Prior to testing, the benchmark for validity was established as having both of the following: a MAPE < 10%, and a Lin's concordance ≥ 0.7. Significance on the dependent *t*-tests were accepted at the *p* < 0.05. **RESULTS:** Neither of the devices were considered valid measures of step count when ascending or descending stairs when the walking speed was 50, 75, or 100 BPM (see table).

		Fitbit Charge		Fitbit Versa 2	
		Up	Down	Up	Down
50 BPM	MAPE (%)	49.09	35.86	53.81	29.19
	Lin's Concordance	0.57	0.65	0.53	0.70
	<i>p</i> -value	0.005	0.04	0.003	0.08
75 BPM	MAPE (%)	22.75	10.65	16.42	9.45
	Lin's Concordance	0.052	0.96	0.89	0.95
	<i>p</i> -value	0.74	0.47	0.26	0.54
100 BPM	MAPE (%)	21.42	8.97	13.06	7.34
	Lin's Concordance	0.78	0.94	0.93	0.96
	<i>p</i> -value	0.296	0.51	0.505	0.59

**CONCLUSION:** Our evidence suggests the Fitbit Charge and Fitbit Versa 2 do not provide valid step counts while ascending or descending stairs, regardless of the speed. People who wish to utilize these devices for a valid measure of steps should understand this limitation.