

1 **Additional File 8: Suppl Table 1** Validity indices (accuracy, bias, and precision) averaged across wear location for each speed bout

	Treadmill speed, km/h (mph)									
	Slow				Normal				Fast	
	0.8 (0.5)	1.6 (1.0)	2.4 (1.5)	3.2 (2.0)	4.0 (2.5)	4.8 (3.0)	5.6 (3.5)	6.4 (4.0)	7.2 (4.5)	8.0 (5.0)
<i>Ankle</i>										
<b>MAPE ± SD</b>	9.3 ± 14.5	8.4 ± 12.8	1.6 ± 2.2	0.9 ± 0.9	0.8 ± 0.7	1.0 ± 3.1	0.8 ± 1.1	1.5 ± 3.9	8.1 ± 11.1	17.8 ± 16.3
<b>MPE ± SD</b>	-4.7 ± 16.6	7.2 ± 13.6	0.5 ± 2.7	0.1 ± 1.3	0.2 ± 1.0	0.0 ± 3.2	0.3 ± 1.3	-0.4 ± 4.2	-7.1 ± 11.8	-17.8 ± 16.3
<i>Thigh</i>										
<b>MAPE ± SD</b>	37.9 ± 29.8	5.8 ± 9.6	1.3 ± 1.3	1.0 ± 1.0	0.8 ± 0.8	1.0 ± 3.4	0.8 ± 0.8	0.9 ± 1.0	1.2 ± 1.3	1.4 ± 1.6
<b>MPE ± SD</b>	-37.7 ± 30.0	-4.1 ± 10.4	-0.1 ± 1.8	-0.1 ± 1.4	0.2 ± 1.1	0.1 ± 3.6	0.4 ± 1.0	0.3 ± 1.3	0.0 ± 1.8	-1.4 ± 1.6
<i>Waist</i>										
<b>MAPE ± SD</b>	86.3 ± 27.8	64.7 ± 36.4	30.8 ± 31.5	10.5 ± 18.8	4.5 ± 12.7	3.1 ± 10.3	2.4 ± 8.5	2.3 ± 9.3	2.3 ± 6.2	3.5 ± 8.7
<b>MPE ± SD</b>	-83.9 ± 34.4	-61.3 ± 41.9	-29.2 ± 33.0	-9.7 ± 19.2	-3.1 ± 13.1	-1.6 ± 10.6	-0.8 ± 8.8	-0.5 ± 9.5	-0.4 ± 6.6	-2.4 ± 9.0
<i>Wrist</i>										
<b>MAPE ± SD</b>	77.7 ± 30.8	45.1 ± 35.0	22.6 ± 30.0	15.7 ± 26.4	13.8 ± 22.6	13.4 ± 20.9	14.6 ± 20.1	18.2 ± 20.8	22.0 ± 20.6	27.0 ± 18.1
<b>MPE ± SD</b>	-75.5 ± 35.9	-36.5 ± 43.8	-18.0 ± 33.0	-14.8 ± 26.9	-13.0 ± 23.1	-12.7 ± 21.4	-14.0 ± 20.6	-18.0 ± 21.0	-21.3 ± 21.3	-27.0 ± 18.1

2 All mean absolute percentage error (MAPE) and mean percentage error (MPE) values are presented as mean percentage ± standard  
3 deviation (SD). MAPE and SD values closer to 0% indicate higher accuracy and precision, respectively. MPE values closer to 0%  
4 indicate lower bias. Ankle-worn wearable: StepWatch. Thigh-worn wearable: activPAL. Waist-worn wearables: Actical, ActiGraph  
5 GT9X, Digi-Walker SW-200, Fitbit One, Fitbit Zip, GENEActiv, NL-1000, PiezoRx. Wrist-worn wearables: ActiGraph GT9X, Apple  
6 Watch Serie 1, Fitbit Ionic, Garmin vivoactive 3, Garmin vivoactive HR, Garmin vivofit 2, Garmin vivofit 3, GENEActiv, Polar M600,  
7 Samsung Gear Fit2, Samsung Gear Fit2 Pro. **See Additional file 2** for a graphical classification of wearable technologies by age groups.

8 **Additional File 8: Suppl Table 2** Validity indices (accuracy, bias, and precision) averaged across all wearable technologies and  
 9 presented by age group

	Treadmill speed, km/h (mph)									
	Slow				Normal				Fast	
	0.8 (0.5)	1.6 (1.0)	2.4 (1.5)	3.2 (2.0)	4.0 (2.5)	4.8 (3.0)	5.6 (3.5)	6.4 (4.0)	7.2 (4.5)	8.0 (5.0)
<b>Young Adults</b> (21–40 years)										
<b>MAPE ± SD</b>	68.8 ± 38.4	47.2 ± 36.1	22.7 ± 28.6	10.4 ± 21.0	7.5 ± 17.4	7.4 ± 17.0	7.9 ± 16.4	8.7 ± 17.0	9.4 ± 16.4	10.7 ± 16.1
<b>MPE ± SD</b>	-63.1 ± 47.2	-37.4 ± 46.2	-20.1 ± 30.5	-9.6 ± 21.4	-6.6 ± 17.8	-6.6 ± 17.3	-7.0 ± 16.8	-7.9 ± 17.4	-8.2 ± 17.0	-10.2 ± 16.5
<b>Middle-Age Adults</b> (41–60 years)										
<b>MAPE ± SD</b>	75.0 ± 35.5	46.4 ± 38.5	21.6 ± 29.2	9.5 ± 20.1	6.2 ± 15.6	5.8 ± 14.5	5.8 ± 13.8	7.5 ± 15.8	10.0 ± 16.3	15.4 ± 18.5
<b>MPE ± SD</b>	-73.1 ± 39.1	-37.9 ± 46.9	-17.1 ± 32.1	-8.6 ± 20.5	-5.4 ± 15.9	-4.6 ± 14.9	-4.6 ± 14.3	-6.3 ± 16.2	-8.6 ± 17.1	-14.9 ± 18.9
<b>Older Adults</b> (61–85 years)										
<b>MAPE ± SD</b>	75.9 ± 34.3	51.4 ± 39.9	25.2 ± 31.6	12.9 ± 22.5	8.7 ± 18.4	7.1 ± 15.8	7.0 ± 15.0	6.4 ± 14.4	7.9 ± 14.1	NA
<b>MPE ± SD</b>	-75.1 ± 36.0	-49.3 ± 42.5	-23.7 ± 32.8	-12.0 ± 23.0	-7.2 ± 19.1	-5.8 ± 16.3	-5.6 ± 15.5	-4.6 ± 15.1	-6.0 ± 15.0	NA

10 All mean absolute percentage error (MAPE) and mean percentage error (MPE) values are presented as mean percentage ± standard  
 11 deviation (SD). MAPE and SD values closer to 0% indicate higher accuracy and precision, respectively. MPE values closer to 0%  
 12 indicate lower bias. All age groups (21-85 years) wore the Actical, ActiGraph GT9X (Waist), ActiGraph GT9X (Wrist), activPAL, Digi-  
 13 Walker SW-200, GENEActiv (Waist), GENEActiv (Wrist), NL-1000, and the StepWatch. Young Adults (21-40 years) also wore the  
 14 Fitbit One and Garmin vivofit 2. Middle-Age Adults (41-60 years) also wore the Apple Watch Serie 1, Fitbit One, Garmin vivoactive  
 15 HR, Garmin vivofit 3, and the Samsung Gear Fit2. Older Adults (61-85 years) also wore the AppleWatch Series 1, Fitbit Ionic, Fitbit

- 16 Zip, Garmin vivoactive 3, PiezoRx, Polar M600, and the Samsung Gear Fit2 Pro. See **Additional file 2** for a graphical classification of
- 17 wearable technologies by age groups.