

Classification and processing of 24-hour wrist accelerometer data

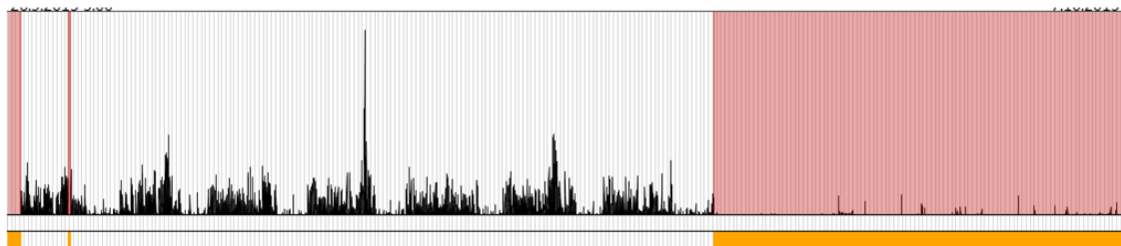
Pulakka A, Shiroma EJ, Harris TB, Pentti J, Vahtera J, Stenholm S

Online Appendix 1: Description and results of visual inspection.

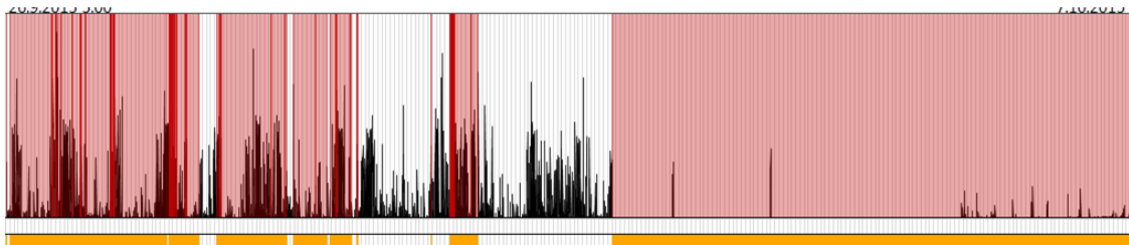
For visual inspection to test the functionality of the wear sensor, we viewed the wear time validation graphs produced by ActiLife software, where each graph plots a participant's accelerometer counts on the vertical axis and the date and time of the day on the horizontal axis and indicates non-wear by sensor with a color code (Figure S1). All accelerometer data, including data from days in the mail, were charted. Two independent raters who were masked to the participant log or Choi algorithm assessment of non-wear inspected the graphs to determine each measurement period as “wear sensor functioning” or “wear sensor not functioning”. Raters were minimally trained and determined the non-functioning of the sensor by 1) sensor indicating non-wear during apparent measurement days (Shiroma et al., 2015) on times when there were non-zero accelerometer counts or 2) sensor indicating wear outside the apparent measurement days (generally mail time). The raters spent on average 160 min inspecting data of the 584 participants. Inter-observer agreement for finding the non-functioning wear sensor was 0.90%, kappa 0.77.

Appendix Figure S1. Visual inspection of wear sensor. Examples of graphs showing wear sensor functioning appropriately (A) and showing non-wear during apparent wear time (B). Orange bars and pink areas indicate non-wear time by the wear sensor.

A



B



Appendix table S1 Accelerometer measures during waking time defined by different methods¹ n=576

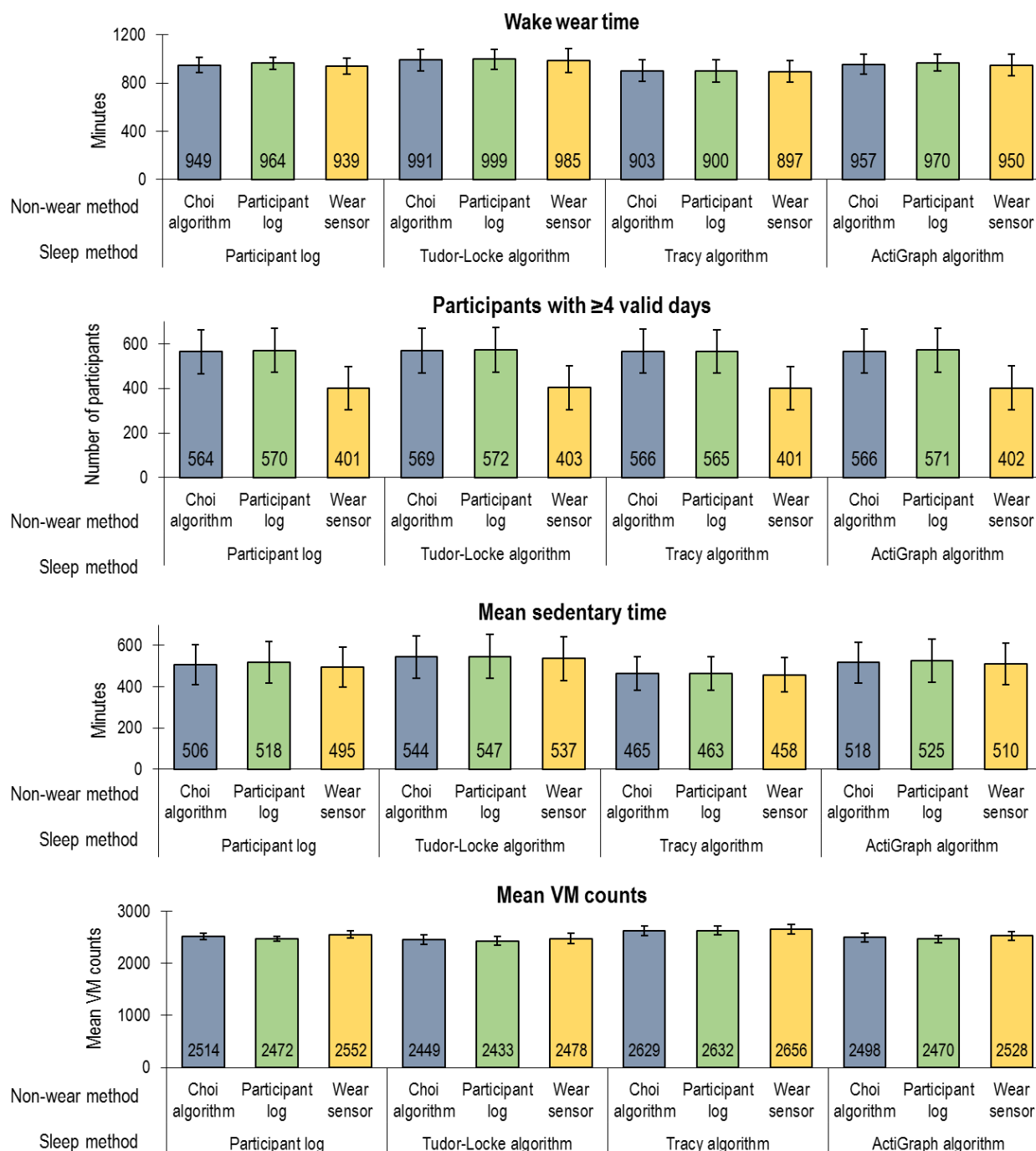
Assessment method for sleep time	Assessment method for wear time	Wake wear time		Participants with ≥ 4 valid days		Mean VM counts ²		Mean sedentary time ²	
		Mean	SD	N	%	Mean	SD	Mean	SD
Participant log	Choi algorithm	949	65	564	98	2514	587	506	98
	Participant log	964	49	570	99	2472	591	518	100
	Wear sensor ³	939	66	401	98	2552	607	495	98
Tudor-Locke algorithm	Choi algorithm	991	92	569	99	2449	560	544	104
	Participant log	999	82	572	99	2433	563	547	106
	Wear sensor ³	985	99	403	99	2478	577	537	106
Tracy algorithm	Choi algorithm	903	90	566	98	2629	557	465	82
	Participant log	900	91	565	98	2632	559	463	82
	Wear sensor ³	897	90	401	98	2656	574	458	82
ActiGraph algorithm	Choi algorithm	957	83	566	98	2498	578	518	99
	Participant log	970	70	571	99	2470	584	525	105
	Wear sensor ³	950	88	402	98	2528	597	510	100

¹ Includes only days when participants had recorded times when they went to sleep and woke up

² Includes only participants with 4 valid days

³ Includes only those with working wear sensor (n = 409)

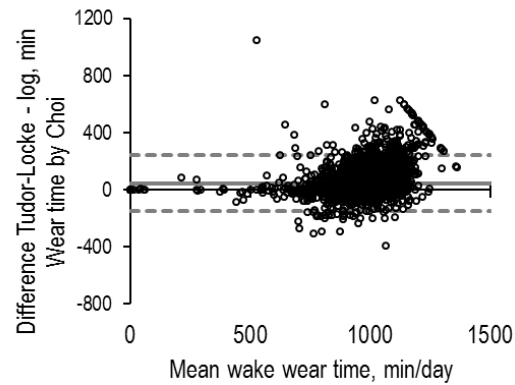
Appendix Figure S2. Graphical presentation of wake wear time, number of participants, mean sedentary time and mean vector magnitude (VM) counts obtained by different methods for excluding sleep (Participant log, Tudor-Locke algorithm, Tracy algorithm and ActiGraph algorithm) and non-wear time (Choi algorithm, participant log and wear sensor).



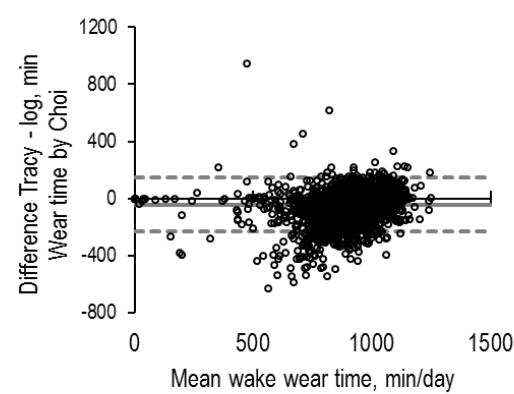
Only participants with ≥ 4 valid days included in mean sedentary time and mean VM counts, and only those with functioning wear sensor (n=409) included in analyses with wear sensor. Error bars indicate standard deviation.

Appendix Figure S3. The Bland-Altman plots describing the level of agreement in wake wear time defined by different methods. The difference in wake times between the participant log and a) Tudor-Locke, b) Tracy and c) Actigraph algorithm is plotted against the mean of wake wear time obtained by these two methods, while non-wear time is excluded by the Choi algorithm. The difference in wear time between Choi algorithm and d) the participant log, e) all wear sensors and f) functioning wear sensors is plotted against the mean of wake wear time obtained by these two methods, while waking time is defined by the participant log. Zero bias line (solid gray line) represents the mean of the difference and 95% upper and lower limits are 95% limits of agreement (dashed lines).

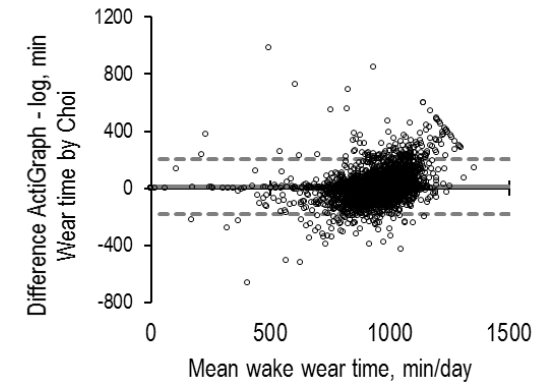
A Mean difference 46 min



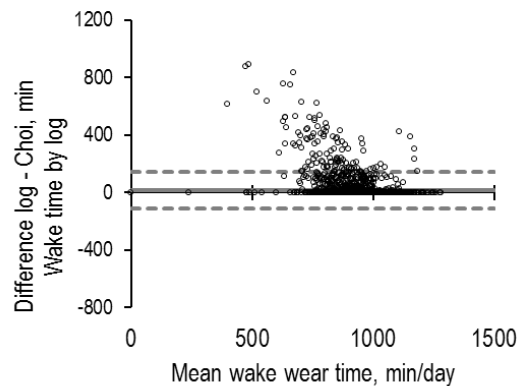
B Mean difference -42 min



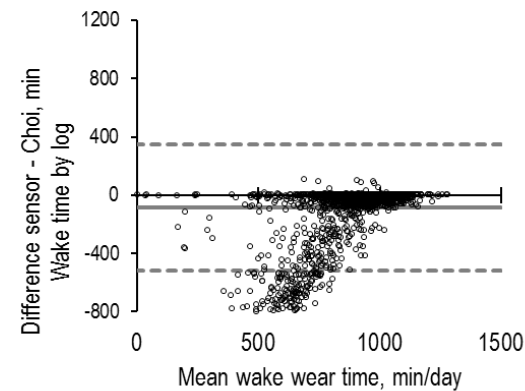
C Mean difference 12 min



D Mean difference 14 min



E Mean difference -85 min



F Mean difference -10 min

