

Table 3. Agreement between ECG- and WHOOP-derived Ln RMSSD (ms)

Sleep stage	ECG	Agreement	Filter Strength					WHOOP filter
			None	Low	Medium	Strong	Very Strong	
Time matched; SWS detected by WHOOP	3.85±0.22	WHOOP	3.95±0.20*	3.94±0.20*	3.92±0.20*	3.90±0.19	3.80±0.16	3.92±0.20*
		Bias	0.10±0.07 ^{vs}	0.09±0.07 ^{vs}	0.07±0.07 ^{vs}	0.06±0.07 ^{vs}	-0.04±0.10 ^{n,l,m,s,w}	0.07±0.07 ^{vs}
		Residual	0.10±0.05 ^{vs}	0.09±0.05 ^{vs}	0.09±0.05 ^{vs}	0.10±0.04 ^{vs}	0.17±0.04 ^{n,l,m,s,w}	0.09±0.05 ^{vs}
		LOA	±0.29	±0.26	±0.25	±0.27	±0.37	±0.25
		%Bias	2.81±1.89 ^{vs}	2.53±1.71 ^{vs}	2.12±1.71 ^{vs}	1.66±1.80 ^{vs}	-0.77±2.40 ^{n,l,m,s,w}	2.11±1.70 ^{vs}
		%Residual	2.66±1.27 ^{vs}	2.35±1.18 ^{vs}	2.28±1.22 ^{vs}	2.69±1.12 ^{vs}	4.10±1.07 ^{n,l,m,s,w}	2.34±1.18 ^{vs}
		%LOA	±7.30	±6.62	±6.61	±6.98	±9.30	±6.59
ICC	0.97 (0.91-0.99)	0.97 (0.92-0.99)	0.97 (0.92-0.99)	0.97 (0.91-0.99)	0.93 (0.79-0.98)	0.98 (0.93-0.99)		
Time matched; SWS detected by PSG	3.81±0.30	WHOOP	4.00±0.27*	3.99±0.27*	3.93±0.28*	3.89±0.26*	3.74±0.19	3.93±0.28*
		Bias	0.18±0.11 ^{s,vs}	0.18±0.11 ^{s,vs}	0.12±0.06 ^{s,vs}	0.07±0.06 ^{n,l,m,vs,w}	-0.08±0.14 ^{n,l,m,s,w}	0.11±0.06 ^{s,vs}
		Residual	0.14±0.09	0.14±0.09	0.09±0.04 ^{vs}	0.11±0.03 ^{vs}	0.21±0.08 ^{m,s,w}	0.09±0.03 ^{vs}
		LOA	±0.44	±0.44	±0.24	±0.25	±0.54	±0.21
		%Bias	5.29±3.53 ^{vs}	5.27±3.54 ^{vs}	3.35±1.67 ^{s,vs}	2.30±1.69 ^{m,vs,w}	-1.18±3.23 ^{n,l,m,s,w}	3.25±1.53 ^{s,vs}
		%Residual	4.15±2.78	4.17±2.79	2.64±0.93 ^{vs}	2.88±0.76 ^{vs}	5.11±1.82 ^{m,s,w}	2.54±0.76 ^{vs}
		%LOA	±13.68	±13.72	±6.45	±6.54	±12.53	±5.93
ICC	0.96 (0.88-0.99)	0.96 (0.88-0.99)	0.99 (0.97-1.00)	0.99 (0.97-1.00)	0.92 (0.76-0.97)	0.99 (0.97-1.00)		

ECG, electrocardiogram; ICC, intraclass correlation coefficient; Ln RMSSD, natural logarithm of the root mean square of successive beat to beat interval differences; LOA, limits of agreement; PSG, polysomnography; SWS, slow wave sleep; *, significant difference between ECG- and WHOOP-derived Ln RMSSD (P<0.05); vs, significantly different from Very Strong filter (P<0.05); s, significantly different from Strong filter (P<0.05); m, significantly different from Medium filter (P<0.05); l, significantly different from Low filter (P<0.05); w, significantly different from WHOOP proprietary filter (P<0.05). Data are presented as mean ± 95% confidence interval. Bias is calculated as WHOOP value minus ECG value. %Bias is calculated as bias as a percentage of ECG value.