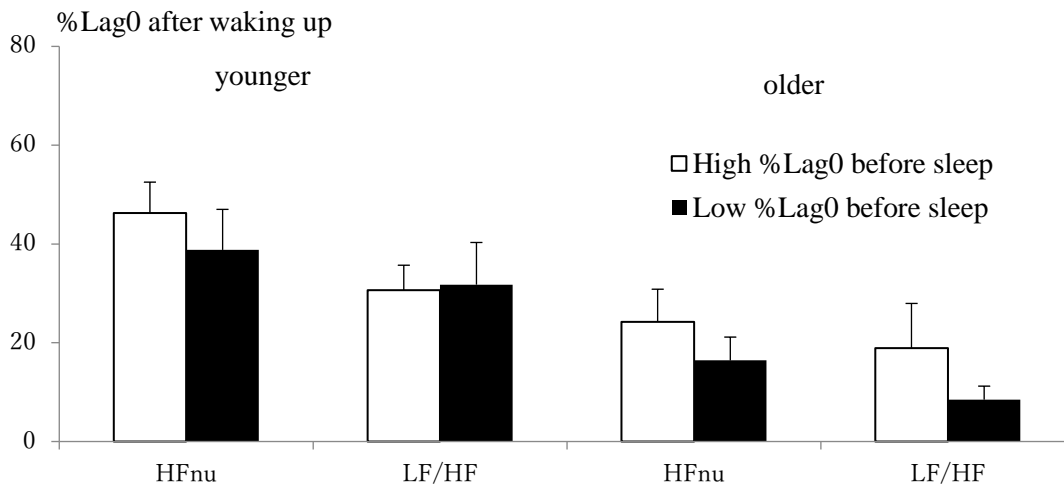


Appendix 1 (only for reviewers): Comparing %lag0 before sleep and after waking up

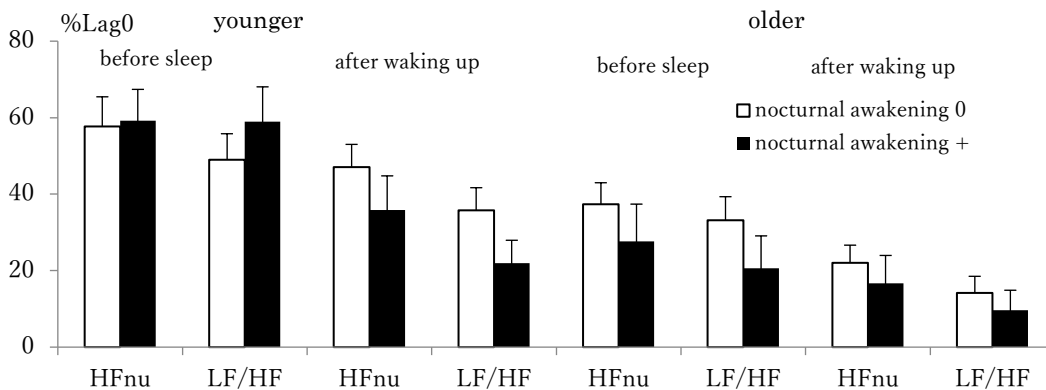
There were no significant differences between %lag0 after waking up in participants with high or low %lag0 before sleep in both the younger and older groups. Therefore, we believe that %lag0 in the hour before sleep and after waking up may have different clinical meanings. We considered that the hour before sleep may be a recovery hour or a suitable hour during which there may be fewer confounding factors for smooth correlation between physical acceleration (PA) and heart rate variability (HRV). In contrast, smooth correlation during the initial hours after waking up may be easily affected by various internal and external environmental conditions.



Supplemental Figure S1. %lag0 after waking up

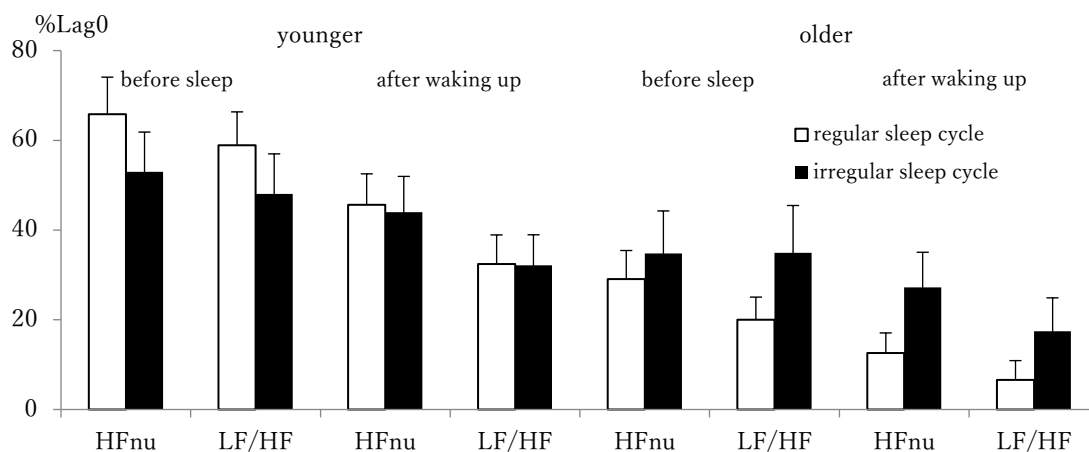
Appendix 2 (only for reviewers): Relationship between sleep disorders and %lag0

Figure S2 depicts the relationship between %lag0 and nocturnal awakening. No significant difference was observed between the groups with (n = 17 in younger group, 32 in older group) or without (n = 33 in younger group, 13 in older group) nocturnal awakening.



Supplemental Figure S2. %Lag0 and nocturnal awakening

Figure S3 depicts the relationships between %lag0 and sleep cycles based on our original questions “Is your sleep cycle is regular or irregular?”, although we could not obtain answers from all the participants. No significant differences were observed between the groups with regular (n = 26 in younger group, 28 in older group) and irregular (n = 20 in younger group, 14 in older group) sleep cycle.



Supplemental Figure S3. %Lag0 and sleep cycles

Appendix 3 (only for reviewers): Coefficients of variation (CV) in physical acceleration before and after sleep in the older and younger groups.

For unknown reasons, physical acceleration was significantly lower in older participants than that in younger participants 4 h before sleep. However, it may be attributed to early circadian rhythm of physical activities in older participants. Significant differences were not observed between %CV of physical acceleration before and after sleep, which suggests variabilities in the daily activities between the younger and older groups.

Supplemental Table S4

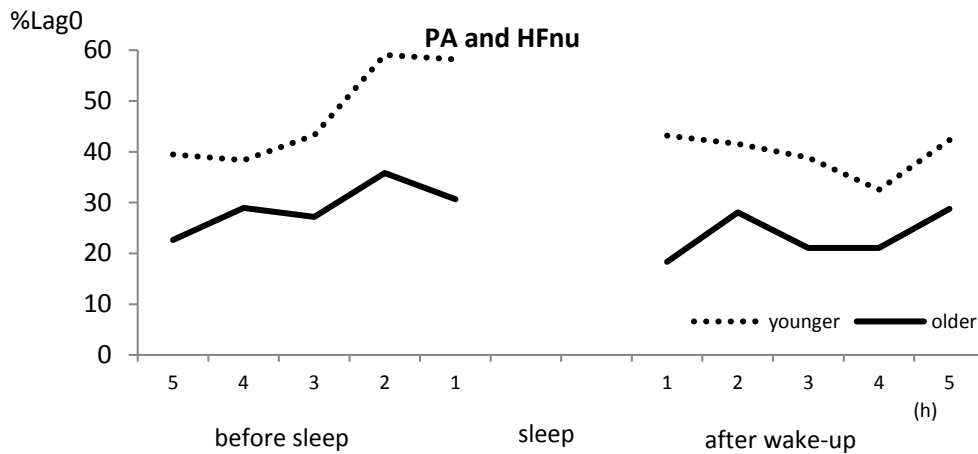
Before sleep (h)	Younger (n = 50)		Older (n = 45)	
	PA (mG)	%CV	PA (mG)	%CV
5	33.1±4.0	143.9±11.3	41.4±4.7	110.3±6.2
4	40.1±4.9	141.5±15.4	24.9±2.7*	122.1±8.1
3	28.9±4.0	150.6±8.2	23.3±2.7	123.7±8.2
2	22.9±2.4	142.8±8.8	23.9±4.1	129.5±7.1
1	28.2±2.2	124.6±5.4	27.4±2.6	119.2±6.0
Sleep				
After waking up (h)	PA (mG)	%CV	PA (mG)	%CV
1	45.3±4.3	100.8±4.7	40.3±5.9	98.1±6.5
2	44.0±4.2	124.4±9.4	48.9±9.7	116.1±13.6
3	47.5±4.7	146.9±14.6	43.3±7.6	117.7±7.8
4	43.5±5.6	148.3±14.5	49.4±4.8	103.9±6.6
5	44.6±4.8	136.2±10.3	47.7±4.6	103.7±5.0

*p < 0.05, younger vs. older

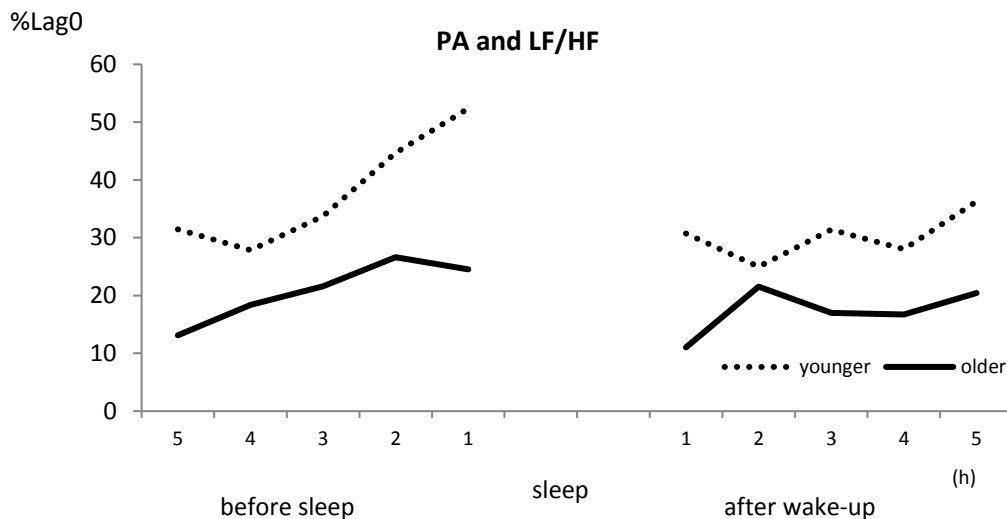
CV, coefficients of variation; PA, physical acceleration

Appendix 4 (only for reviewers): Circadian rhythm of %lag0

Fig. S5 and Fig. S6 depict the changes in %lag0 every hour between PA and HF or LF/HF. %Lag0 between PA and HF or LF/HF before sleep (evening) was slightly higher than that after waking up (morning) in both the older and younger groups. It was difficult to calculate %lag0 during sleep due to lower PA.



Supplemental Figure S5. %Lag0 between physical acceleration (PA) and heart rate variability index [HFnu = HF/(LF+HF)]



Supplemental Figure S6. %Lag0 changes between physical acceleration (PA) and low frequency (LF)/high frequency (HF).