

Multiverse analysis

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The authors made the following contributions. First Author: Conceptualization, Writing - Original Draft Preparation, Writing - Review & Editing; Ernst-August Doelle: Writing - Review & Editing, Supervision.

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Abstract

One or two sentences providing a **basic introduction** to the field, comprehensible to a scientist in any discipline.

Keywords: keywords

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Multiverse analysis

Results

Multiverse

In this document we show the results using another analytic technique. Namely treating study ID as a fixed effect. This is what we wrote in the protocol originally.

The effects of physical activity volume on sleep

We estimated the effects of physical activity on sleep (RQ1) using mixed-effects models. We estimated the effect of physical activity volume on sleep by age, and the results are presented in Table 1 and Figure 1

The effects of physical activity intensity on sleep

We estimated how physical activity intensity affects sleep across different age groups. We present the results controlling for sex, SES, and BMI, in Table 1 and Figure 2.

The effects of sleep duration on physical activity

We estimated the effect of sleep duration on physical activity by age. Results, controlling for sex, SES, and BMI are presented in Table 2 and Figure 3.

The effects of sleep efficiency on physical activity

We estimated the effect of sleep efficiency on physical activity by age. Results, controlling for sex, SES, and BMI are presented in Table 2 and Figure 4.

The effects of sleep onset on physical activity

We estimated the effect of sleep onset on physical activity by age. Results, controlling for sex, SES, and BMI are presented in Table 2 and Figure 5.

The effects of sleep regularity on physical activity

We estimated the effect of sleep regularity on physical activity by age. Results, controlling for sex, SES, and BMI are presented in Table 2 and Figure 6.

Moderation

In the following section we present models for a range of moderators which were pre-defined in our protocol.

BMI

The effects of physical activity volume on sleep by BMI. We estimated the effects of physical activity on sleep (RQ1) using mixed-effects models. We estimated the effect of physical activity volume on sleep by BMI, and the results are presented in Table 3 and Figure 7.

The effects of physical activity intensity on sleep by BMI. We estimated how physical activity intensity affects sleep across BMI. We present the results in Table 3 and Figure 8.

The effects of sleep duration on physical activity. We estimated the effect of sleep duration on physical activity by BMI. Results, controlling for sex, SES, and BMI are presented in Table 4 and Figure 9.

The effects of sleep efficiency on physical activity. We estimated the effect of sleep efficiency on physical activity by BMI. Results, controlling for sex, SES, and BMI are presented in Table 4 and Figure 10.

The effects of sleep onset on physical activity. We estimated the effect of sleep onset on physical activity by BMI. Results, controlling for sex, SES, and BMI are presented in Table 2 and Figure 11.

The effects of sleep regularity on physical activity. We estimated the effect of sleep regularity on physical activity by BMI. Results are presented in Table 4 and Figure 12.

SES

The effects of physical activity volume on sleep by SES. We estimated the effects of physical activity on sleep (RQ1) using mixed-effects models. We estimated the effect of physical activity volume on sleep by SES, and the results are presented in Table 5 and Figure 13.

The effects of physical activity intensity on sleep by SES. We estimated how physical activity intensity affects sleep across SES. We present the results in Table 5 and Figure 14.

The effects of sleep duration on physical activity. We estimated the effect of sleep duration on physical activity by SES. Results, controlling for sex, SES, and BMI are presented in Table 6 and Figure 15.

The effects of sleep efficiency on physical activity. We estimated the effect of sleep efficiency on physical activity by SES. Results, controlling for sex, SES, and BMI are presented in Table 6 and Figure 16.

The effects of sleep onset on physical activity. We estimated the effect of sleep onset on physical activity by SES. Results, controlling for sex, SES, and BMI are presented in Table 2 and Figure 17.

The effects of sleep regularity on physical activity. We estimated the effect of sleep regularity on physical activity by SES. Results are presented in Table 6 and Figure 18.

sex

The effects of physical activity volume on sleep by sex. We estimated the effects of physical activity on sleep (RQ1) using mixed-effects models. We estimated the effect of physical activity volume on sleep by sex, and the results are presented in Table 7 and Figure 19.

The effects of physical activity intensity on sleep by sex. We estimated how physical activity intensity affects sleep across sex. We present the results in Table 7 and Figure 20.

The effects of sleep duration on physical activity. We estimated the effect of sleep duration on physical activity by sex. Results, controlling for sex, SES, and BMI are presented in Table 8 and Figure 21.

The effects of sleep efficiency on physical activity. We estimated the effect of sleep efficiency on physical activity by sex. Results, controlling for sex, SES, and BMI are presented in Table 8 and Figure 22.

The effects of sleep onset on physical activity. We estimated the effect of sleep onset on physical activity by sex. Results, controlling for sex, SES, and BMI are presented in Table 2 and Figure 23.

The effects of sleep regularity on physical activity. We estimated the effect of sleep regularity on physical activity by sex. Results are presented in Table 8 and Figure 24.

weekday

The effects of physical activity volume on sleep by weekday. We estimated the effects of physical activity on sleep (RQ1) using mixed-effects models. We estimated the effect of physical activity volume on sleep by weekday, and the results are presented in Table 9 and Figure 25.

The effects of physical activity intensity on sleep by weekday. We estimated how physical activity intensity affects sleep across weekday. We present the results in Table 9 and Figure 26.

The effects of sleep duration on physical activity. We estimated the effect of sleep duration on physical activity by weekday. Results, controlling for sex, SES, and BMI are presented in Table 10 and Figure 27.

The effects of sleep efficiency on physical activity. We estimated the effect of sleep efficiency on physical activity by weekday. Results, controlling for sex, SES, and BMI are presented in Table 10 and Figure 28.

The effects of sleep onset on physical activity. We estimated the effect of sleep onset on physical activity by weekday. Results, controlling for sex, SES, and BMI are presented in Table 2 and Figure 29.

The effects of sleep regularity on physical activity. We estimated the effect of sleep regularity on physical activity by weekday. Results are presented in Table 10 and Figure 30.

season

The effects of physical activity volume on sleep by season. We estimated the effects of physical activity on sleep (RQ1) using mixed-effects models. We estimated the effect of physical activity volume on sleep by season, and the results are presented in Table 11 and Figure 31

The effects of physical activity intensity on sleep by season. We estimated how physical activity intensity affects sleep across season. We present the results in Table 11 and Figure 32.

The effects of sleep duration on physical activity. We estimated the effect of sleep duration on physical activity by season. Results, controlling for sex, SES, and BMI are presented in Table 12 and Figure 33.

The effects of sleep efficiency on physical activity. We estimated the effect of sleep efficiency on physical activity by season. Results, controlling for sex, SES, and BMI are presented in Table 12 and Figure 34.

The effects of sleep onset on physical activity. We estimated the effect of sleep onset on physical activity by season. Results, controlling for sex, SES, and BMI are presented in Table 2 and Figure 35.

The effects of sleep regularity on physical activity. We estimated the effect of sleep regularity on physical activity by season. Results are presented in Table 12 and Figure 36.

region

The effects of physical activity volume on sleep by region. We estimated the effects of physical activity on sleep (RQ1) using mixed-effects models. We estimated the effect of physical activity volume on sleep by region, and the results are presented in Table 13 and Figure 37.

The effects of physical activity intensity on sleep by region. We estimated how physical activity intensity affects sleep across region. We present the results in Table 13 and Figure 38.

The effects of sleep duration on physical activity. We estimated the effect of sleep duration on physical activity by region. Results, controlling for sex, SES, and BMI are presented in Table 14 and Figure 39.

The effects of sleep efficiency on physical activity. We estimated the effect of sleep efficiency on physical activity by region. Results, controlling for sex, SES, and BMI are presented in Table 14 and Figure 40.

The effects of sleep onset on physical activity. We estimated the effect of sleep onset on physical activity by region. Results, controlling for sex, SES, and BMI are presented in Table 2 and Figure 41.

The effects of sleep regularity on physical activity. We estimated the effect of sleep regularity on physical activity by region. Results are presented in Table 14 and Figure 42.

daylight hours

The effects of physical activity volume on sleep by daylight hours. We estimated the effects of physical activity on sleep (RQ1) using mixed-effects models. We estimated the effect of physical activity volume on sleep by daylight hours, and the results are presented in Table 15 and Figure 43.

The effects of physical activity intensity on sleep by daylight hours. We estimated how physical activity intensity affects sleep across daylight hours. We present the results in Table 15 and Figure 44.

The effects of sleep duration on physical activity. We estimated the effect of sleep duration on physical activity by daylight hours. Results, controlling for sex, SES, and BMI are presented in Table 16 and Figure 45.

The effects of sleep efficiency on physical activity. We estimated the effect of sleep efficiency on physical activity by daylight hours. Results, controlling for sex, SES, and BMI are presented in Table 16 and Figure 46.

The effects of sleep onset on physical activity. We estimated the effect of sleep onset on physical activity by daylight hours. Results, controlling for sex, SES, and BMI are presented in Table 2 and Figure 47.

The effects of sleep regularity on physical activity. We estimated the effect of sleep regularity on physical activity by daylight hours. Results are presented in Table 16 and Figure 48.

wear location

The effects of physical activity volume on sleep by wear location. We estimated the effects of physical activity on sleep (RQ1) using mixed-effects models. We estimated the effect of physical activity volume on sleep by wear location, and the results are presented in Table 17 and Figure 49.

The effects of physical activity intensity on sleep by wear location. We estimated how physical activity intensity affects sleep across wear location. We present the results in Table 17 and Figure 50.

The effects of sleep duration on physical activity. We estimated the effect of sleep duration on physical activity by wear location. Results, controlling for sex, SES, and BMI are presented in Table 18 and Figure 51.

The effects of sleep efficiency on physical activity. We estimated the effect of sleep efficiency on physical activity by wear location. Results, controlling for sex, SES, and BMI are presented in Table 18 and Figure 52.

The effects of sleep onset on physical activity. We estimated the effect of sleep onset on physical activity by wear location. Results, controlling for sex, SES, and BMI are presented in Table 2 and Figure 53.

The effects of sleep regularity on physical activity. We estimated the effect of sleep regularity on physical activity by wear location. Results are presented in Table 18 and Figure 54.

Table 1

Physical activity predicting sleep controlling for SES, sex, BMI, and the fixed effects of study IDs.

Term	Physical Activity Volume				Physical Activity Intensity			
	β [95% CI]	SE	t	p	β [95% CI]	SE	t	p
Sleep duration								
(Intercept)	0.94 [0.74, 1.13]	0.10	9.47	< .001	0.90 [0.69, 1.10]	0.10	8.67	< .001
Physical activity	0.03 [-0.01, 0.06]	0.02	1.53	.157	0.05 [0.00, 0.09]	0.02	2.01	.051
Age	0.00 [-0.01, 0.00]	0.00	-1.19	.242	0.00 [-0.01, 0.00]	0.00	-0.99	.332
Physical activity ²	0.00 [-0.01, 0.01]	0.00	0.63	.539	0.01 [-0.01, 0.04]	0.01	0.92	.356
Physical activity × age	0.00 [0.00, 0.00]	0.00	0.25	.810	0.00 [0.00, 0.00]	0.00	-0.57	.572
Age × Physical activity ²	0.00 [0.00, 0.00]	0.00	-0.35	.730	0.00 [0.00, 0.00]	0.00	-1.05	.299
Sleep efficiency								
(Intercept)	-0.31 [-0.46, -0.15]	0.08	-3.91	< .001	-0.34 [-0.50, -0.19]	0.08	-4.28	< .001
Physical activity	0.04 [0.00, 0.08]	0.02	1.81	.133	0.03 [-0.02, 0.07]	0.02	1.24	.219
Age	0.00 [-0.01, 0.00]	0.00	-0.54	.587	0.00 [-0.01, 0.00]	0.00	-0.42	.676
Physical activity ²	0.00 [-0.01, 0.01]	0.00	-0.79	.454	0.00 [-0.03, 0.03]	0.02	-0.13	.902
Physical activity × age	0.00 [0.00, 0.00]	0.00	-2.77	.006	0.00 [0.00, 0.00]	0.00	-1.56	.118
Age × Physical activity ²	0.00 [0.00, 0.00]	0.00	0.34	.741	0.00 [0.00, 0.00]	0.00	-0.29	.776
Sleep onset								
(Intercept)	-1.15 [-1.28, -1.02]	0.07	-17.18	< .001	-1.12 [-1.25, -0.99]	0.07	-16.89	< .001
Physical activity	0.01 [-0.02, 0.03]	0.01	0.39	.709	-0.04 [-0.07, -0.01]	0.02	-2.43	.016
Age	0.00 [0.00, 0.01]	0.00	0.41	.682	0.00 [0.00, 0.00]	0.00	0.30	.765
Physical activity ²	-0.01 [-0.01, 0.00]	0.00	-2.05	.052	-0.02 [-0.04, 0.00]	0.01	-2.17	.033
Physical activity × age	0.00 [0.00, 0.00]	0.00	-3.87	.007	0.00 [0.00, 0.00]	0.00	-0.27	.786
Age × Physical activity ²	0.00 [0.00, 0.00]	0.00	2.14	.036	0.00 [0.00, 0.00]	0.00	3.00	.003
Sleep regularity								

Table 1 continued

Term	Physical Activity Volume				Physical Activity Intensity			
	β [95% CI]	SE	t	p	β [95% CI]	SE	t	p
(Intercept)	0.18 [0.00, 0.36]	0.09	1.97	.049	0.15 [-0.04, 0.34]	0.10	1.51	.135
Physical activity	0.07 [0.02, 0.13]	0.03	2.54	.077	0.18 [0.12, 0.24]	0.03	5.95	< .001
Age	0.00 [-0.01, 0.01]	0.01	-0.32	.771	0.00 [-0.02, 0.01]	0.01	-0.72	.525
Physical activity ²	0.00 [-0.01, 0.02]	0.01	0.39	.721	-0.04 [-0.08, -0.01]	0.02	-2.63	.025
Physical activity × age	0.00 [0.00, 0.00]	0.00	1.70	.160	0.00 [0.00, 0.00]	0.00	-4.56	< .001
Age × Physical activity ²	0.00 [0.00, 0.00]	0.00	-2.62	.022	0.00 [0.00, 0.00]	0.00	1.07	.308

Note. Adjusted for SES, sex, BMI, and the fixed effects of study IDs. Outcomes variables are listed in the column headers.

Table 2

Sleep predicting physical activity controlling for SES, sex, BMI, and the fixed effects of study IDs

Term	Physical Activity Volume				Physical Activity Intensity			
	β [95% CI]	SE	t	p	β [95% CI]	SE	t	p
Sleep duration								
(Intercept)	0.22 [-0.01, 0.44]	0.11	1.89	.086	1.02 [0.85, 1.18]	0.08	12.03	< .001
Sleep duration	0.00 [-0.02, 0.02]	0.01	-0.03	.977	0.00 [-0.02, 0.01]	0.01	-0.33	.739
Age	-0.02 [-0.03, -0.02]	0.00	-6.63	< .001	-0.03 [-0.03, -0.02]	0.00	-7.59	.001
Sleep duration ²	0.00 [-0.01, 0.01]	0.00	0.00	.998	0.00 [0.00, 0.00]	0.00	-0.01	.991
Sleep duration × age	0.00 [0.00, 0.00]	0.00	-0.54	.589	0.00 [0.00, 0.00]	0.00	0.83	.441
Age × Sleep duration ²	0.00 [0.00, 0.00]	0.00	-0.85	.457	0.00 [0.00, 0.00]	0.00	-0.87	.425
Sleep efficiency								
(Intercept)	0.21 [-0.01, 0.43]	0.11	1.88	.083	1.02 [0.85, 1.18]	0.08	12.25	< .001
Sleep efficiency	-0.02 [-0.04, 0.01]	0.01	-1.39	.193	-0.01 [-0.03, 0.01]	0.01	-0.77	.461
Age	-0.02 [-0.03, -0.02]	0.00	-6.96	< .001	-0.03 [-0.03, -0.02]	0.00	-7.66	.001
Sleep efficiency ²	0.00 [-0.01, 0.00]	0.00	-0.33	.755	0.00 [0.00, 0.00]	0.00	-0.26	.795
Sleep efficiency × age	0.00 [0.00, 0.00]	0.00	1.90	.059	0.00 [0.00, 0.00]	0.00	0.91	.361
Age × Sleep efficiency ²	0.00 [0.00, 0.00]	0.00	-0.23	.815	0.00 [0.00, 0.00]	0.00	-0.15	.881
Sleep onset								
(Intercept)	0.18 [-0.04, 0.40]	0.11	1.60	.134	0.99 [0.84, 1.13]	0.07	13.39	< .001
Sleep onset	-0.06 [-0.09, -0.02]	0.02	-3.17	.002	-0.05 [-0.08, -0.02]	0.02	-2.89	.008
Age	-0.02 [-0.03, -0.02]	0.00	-7.06	< .001	-0.03 [-0.03, -0.02]	0.00	-7.61	.001
Sleep onset ²	-0.01 [-0.04, 0.02]	0.02	-0.55	.628	-0.01 [-0.03, 0.01]	0.01	-0.80	.478
Sleep onset × age	0.00 [0.00, 0.00]	0.00	2.28	.030	0.00 [0.00, 0.00]	0.00	1.90	.108
Age × Sleep onset ²	0.00 [0.00, 0.00]	0.00	-0.11	.919	0.00 [0.00, 0.00]	0.00	0.53	.627
Sleep regularity								

Table 2 continued

Term	Physical Activity Volume				Physical Activity Intensity			
	β [95% CI]	SE	t	p	β [95% CI]	SE	t	p
(Intercept)	0.23 [0.00, 0.45]	0.12	1.96	.079	1.02 [0.86, 1.18]	0.08	12.56	< .001
Sleep regularity	0.11 [0.08, 0.14]	0.02	6.39	.001	0.07 [0.04, 0.10]	0.02	4.52	.007
Age	-0.02 [-0.03, -0.02]	0.00	-6.77	< .001	-0.03 [-0.03, -0.02]	0.00	-7.60	.001
Sleep regularity ²	-0.02 [-0.03, 0.00]	0.01	-1.59	.181	-0.01 [-0.02, 0.01]	0.01	-0.79	.456
Sleep regularity × age	0.00 [0.00, 0.00]	0.00	-3.37	.010	0.00 [0.00, 0.00]	0.00	-2.99	.018
Age × Sleep regularity ²	0.00 [0.00, 0.00]	0.00	1.28	.227	0.00 [0.00, 0.00]	0.00	0.17	.866

Note. Adjusted for SES, sex, BMI, and the fixed effects of study IDs. Outcomes variables are listed in the row headers.

Table 3

Physical activity predicting sleep controlling for SES, age, and sex.

Term	Physical Activity Volume			Physical Activity Intensity				
	β [95% CI]	SE	t	p	β [95% CI]	SE	t	p
Sleep duration								
(Intercept)	0.51 [0.24, 0.78]	0.14	3.73	.002	0.51 [0.21, 0.81]	0.15	3.35	.009
Physical activity	0.08 [-0.05, 0.20]	0.06	1.18	.305	0.06 [-0.03, 0.14]	0.04	1.26	.234
Physical activity ²	0.00 [-0.03, 0.02]	0.01	-0.47	.640	-0.03 [-0.11, 0.06]	0.04	-0.63	.571
Age	-0.01 [-0.01, 0.00]	0.00	-2.55	.021	-0.01 [-0.01, 0.00]	0.00	-2.42	.023
Physical activity × bmi	0.00 [-0.01, 0.00]	0.00	-0.76	.493	0.00 [0.00, 0.00]	0.00	-0.20	.840
Sleep efficiency								
(Intercept)	0.29 [0.04, 0.54]	0.13	2.27	.024	0.29 [0.02, 0.57]	0.14	2.11	.041
Physical activity	0.02 [-0.07, 0.10]	0.04	0.39	.700	-0.04 [-0.16, 0.07]	0.06	-0.71	.515
Physical activity ²	-0.01 [-0.03, 0.01]	0.01	-0.71	.480	0.00 [-0.05, 0.05]	0.03	-0.09	.926
Age	0.00 [0.00, 0.01]	0.00	0.91	.365	0.00 [0.00, 0.01]	0.00	0.74	.457
Physical activity × bmi	0.00 [0.00, 0.00]	0.00	-0.04	.971	0.00 [0.00, 0.01]	0.00	0.89	.416
Sleep onset								
(Intercept)	-0.16 [-0.47, 0.15]	0.16	-1.03	.303	-0.15 [-0.45, 0.16]	0.16	-0.93	.352
Physical activity	-0.02 [-0.11, 0.07]	0.05	-0.46	.672	-0.10 [-0.26, 0.06]	0.08	-1.23	.324
Physical activity ²	-0.01 [-0.03, 0.01]	0.01	-1.17	.263	0.00 [-0.07, 0.07]	0.03	0.00	.998
Age	0.00 [0.00, 0.01]	0.00	1.19	.256	0.00 [0.00, 0.01]	0.00	0.94	.350
Physical activity × bmi	0.00 [-0.01, 0.00]	0.00	-0.11	.917	0.00 [0.00, 0.01]	0.00	0.71	.536
Sleep regularity								
(Intercept)	0.52 [0.19, 0.85]	0.17	3.08	.016	0.61 [0.27, 0.96]	0.18	3.45	.008
Physical activity	-0.08 [-0.39, 0.24]	0.16	-0.48	.676	0.09 [-0.10, 0.28]	0.10	0.92	.434
Physical activity ²	0.00 [-0.03, 0.04]	0.02	0.29	.784	-0.01 [-0.10, 0.09]	0.05	-0.16	.880

Term	Physical Activity Volume				Physical Activity Intensity					
	β	[95% CI]	SE	t	p	β	[95% CI]	SE	t	p
Age	0.00	[0.01, 0.01]	0.00	-0.27	.803	0.00	[-0.01, 0.01]	0.00	-0.33	.757
Physical activity \times bmi	0.01	[0.01, 0.03]	0.01	1.06	.392	0.00	[-0.01, 0.01]	0.00	-0.17	.875

Note. Adjusted for SES, age, and sex. Outcomes variables are listed in the column headers.

Table 4

Sleep predicting physical activity controlling for SES, age, and sex

Term	Physical Activity Volume				Physical Activity Intensity					
	β	[95% CI]	SE	t	p	β	[95% CI]	SE	t	p
Sleep duration										
(Intercept)	1.48	[1.09, 1.87]	0.20	7.46	< .001	1.37	[1.12, 1.63]	0.13	10.54	< .001
Sleep duration	0.00	[-0.05, 0.04]	0.02	-0.16	.874	0.00	[-0.04, 0.04]	0.02	-0.03	.979
Sleep duration ²	-0.01	[-0.03, 0.02]	0.01	-0.57	.609	0.00	[-0.01, 0.02]	0.01	0.17	.873
Age	-0.02	[-0.03, -0.02]	0.00	-7.46	< .001	-0.03	[-0.03, -0.02]	0.00	-9.59	< .001
Sleep duration × bmi	0.00	[0.00, 0.00]	0.00	-0.03	.974	0.00	[0.00, 0.00]	0.00	0.35	.729
Sleep efficiency										
(Intercept)	1.47	[1.07, 1.87]	0.20	7.17	< .001	1.38	[1.14, 1.63]	0.12	11.12	< .001
Sleep efficiency	-0.03	[-0.10, 0.05]	0.04	-0.71	.504	-0.02	[-0.09, 0.04]	0.03	-0.67	.532
Sleep efficiency ²	0.00	[-0.02, 0.01]	0.01	-0.37	.717	-0.01	[-0.04, 0.03]	0.02	-0.35	.756
Age	-0.02	[-0.03, -0.02]	0.00	-7.36	< .001	-0.03	[-0.03, -0.02]	0.00	-9.71	< .001
Sleep efficiency × bmi	0.00	[0.00, 0.00]	0.00	0.62	.559	0.00	[0.00, 0.00]	0.00	0.59	.586
Sleep onset										
(Intercept)	1.47	[1.07, 1.88]	0.21	7.16	< .001	1.37	[1.13, 1.62]	0.13	10.87	< .001
Sleep onset	-0.04	[-0.11, 0.02]	0.03	-1.26	.216	-0.05	[-0.14, 0.04]	0.05	-1.06	.349
Sleep onset ²	-0.01	[-0.07, 0.05]	0.03	-0.37	.738	0.00	[-0.02, 0.02]	0.01	-0.10	.924
Age	-0.02	[-0.03, -0.02]	0.00	-7.55	< .001	-0.03	[-0.03, -0.02]	0.00	-9.63	< .001
Sleep onset × bmi	0.00	[0.00, 0.00]	0.00	0.81	.429	0.00	[0.00, 0.00]	0.00	0.89	.414
Sleep regularity										
(Intercept)	1.42	[1.02, 1.83]	0.21	6.89	< .001	1.34	[1.10, 1.58]	0.12	10.94	< .001
Sleep regularity	0.06	[-0.10, 0.23]	0.08	0.74	.527	0.06	[-0.04, 0.16]	0.05	1.22	.319
Sleep regularity ²	-0.02	[-0.05, 0.01]	0.02	-1.30	.241	0.00	[-0.02, 0.02]	0.01	-0.05	.959

Term	Physical Activity Volume				Physical Activity Intensity					
	β	[95% CI]	SE	t	p	β	[95% CI]	SE	t	p
Age	-0.02	[-0.03, -0.02]	0.00	-7.56	< .001	-0.03	[-0.03, -0.02]	0.00	-9.69	< .001
Sleep regularity × bmi	0.00	[0.01, 0.01]	0.00	0.18	.875	0.00	[0.00, 0.00]	0.00	-0.44	.687

Note. Adjusted for SES, age, and sex. Outcomes variables are listed in the row headers.

Table 5

Physical activity predicting sleep controlling for BMI, age, and sex.

Term	Physical Activity Volume			Physical Activity Intensity				
	β [95% CI]	SE	t	p	β [95% CI]	SE	t	p
Sleep duration								
(Intercept)	0.49 [0.23, 0.75]	0.13	3.68	.002	0.47 [0.21, 0.73]	0.13	3.57	.002
Physical activity	0.04 [0.00, 0.08]	0.02	1.90	.066	0.04 [0.01, 0.07]	0.02	2.40	.016
Physical activity ²	0.00 [-0.02, 0.02]	0.01	0.04	.972	0.01 [-0.01, 0.03]	0.01	0.83	.418
Age	-0.01 [-0.01, 0.00]	0.00	-2.53	.021	-0.01 [-0.01, 0.00]	0.00	-2.50	.019
Physical activity × sesmedium	-0.02 [-0.09, 0.05]	0.04	-0.51	.630	0.01 [-0.03, 0.06]	0.02	0.67	.502
Physical activity × sesshigh	-0.01 [-0.06, 0.03]	0.02	-0.57	.567	0.00 [-0.05, 0.04]	0.02	-0.20	.844
Sleep efficiency								
(Intercept)	0.28 [0.04, 0.53]	0.13	2.25	.026	0.30 [0.03, 0.56]	0.13	2.22	.030
Physical activity	0.03 [-0.03, 0.08]	0.03	0.93	.375	-0.01 [-0.05, 0.04]	0.02	-0.27	.796
Physical activity ²	0.00 [-0.02, 0.01]	0.01	-0.55	.590	0.00 [-0.02, 0.02]	0.01	0.26	.798
Age	0.00 [0.00, 0.01]	0.00	0.92	.356	0.00 [0.00, 0.01]	0.00	0.74	.462
Physical activity × sesmedium	-0.02 [-0.07, 0.03]	0.03	-0.71	.479	0.01 [-0.04, 0.06]	0.03	0.27	.791
Physical activity × sesshigh	-0.01 [-0.06, 0.04]	0.03	-0.33	.745	0.02 [-0.02, 0.07]	0.02	1.02	.311
Sleep onset								
(Intercept)	-0.17 [-0.48, 0.14]	0.16	-1.07	.282	-0.14 [-0.45, 0.17]	0.16	-0.89	.375
Physical activity	-0.05 [-0.08, -0.02]	0.01	-3.42	.001	-0.05 [-0.09, -0.02]	0.02	-2.82	.035
Physical activity ²	0.00 [-0.01, 0.01]	0.01	0.13	.902	0.00 [-0.02, 0.02]	0.01	-0.26	.806
Age	0.00 [0.00, 0.01]	0.00	1.24	.229	0.00 [0.00, 0.01]	0.00	1.05	.299
Physical activity × sesmedium	0.02 [-0.02, 0.07]	0.02	0.94	.372	-0.01 [-0.05, 0.02]	0.02	-0.76	.458
Physical activity × sesshigh	0.03 [0.00, 0.06]	0.02	1.78	.079	0.01 [-0.03, 0.06]	0.02	0.60	.566
Sleep regularity								

Term	Physical Activity Volume			Physical Activity Intensity				
	β [95% CI]	SE	t	p	β [95% CI]	SE	t	p
(Intercept)	0.58 [0.30, 0.86]	0.14	4.01	.001	0.62 [0.33, 0.91]	0.15	4.14	< .001
Physical activity	0.13 [0.09, 0.17]	0.02	6.21	< .001	0.06 [0.02, 0.09]	0.02	3.09	.002
Physical activity ²	-0.01 [-0.03, 0.01]	0.01	-1.44	.215	0.00 [-0.03, 0.02]	0.01	-0.41	.686
Age	0.00 [-0.01, 0.01]	0.00	-0.26	.809	0.00 [-0.01, 0.01]	0.00	-0.33	.758
Physical activity × sesmedium	-0.02 [-0.11, 0.07]	0.05	-0.45	.675	0.02 [-0.03, 0.07]	0.03	0.63	.530
Physical activity × seshigh	-0.05 [-0.11, 0.01]	0.03	-1.68	.112	0.03 [-0.02, 0.07]	0.03	1.01	.318

Note. Adjusted for BMI, age, and sex. Outcomes variables are listed in the column headers.

Table 6

Sleep predicting physical activity controlling for BMI, age, and sex

Term	Physical Activity Volume			Physical Activity Intensity				
	β [95% CI]	SE	t	p	β [95% CI]	SE	t	p
Sleep duration								
(Intercept)	1.47 [1.08, 1.87]	0.20	7.32	< .001	1.37 [1.12, 1.63]	0.13	10.71	< .001
Sleep duration	-0.01 [-0.04, 0.03]	0.02	-0.38	.720	0.00 [-0.03, 0.03]	0.02	0.30	.778
Sleep duration ²	-0.01 [-0.02, 0.01]	0.01	-0.60	.598	0.00 [-0.01, 0.01]	0.00	-0.10	.927
Age	-0.02 [-0.03, -0.02]	0.00	-7.39	< .001	-0.03 [-0.03, -0.02]	0.00	-9.63	< .001
Sleep duration × sesmedium	-0.01 [-0.05, 0.03]	0.02	-0.55	.599	0.00 [-0.03, 0.04]	0.02	0.12	.907
Sleep duration × seshigh	0.01 [-0.06, 0.09]	0.04	0.35	.749	0.00 [-0.03, 0.03]	0.02	-0.05	.959
Sleep efficiency								
(Intercept)	1.47 [1.07, 1.87]	0.20	7.18	< .001	1.38 [1.13, 1.63]	0.13	10.86	< .001
Sleep efficiency	-0.02 [-0.08, 0.04]	0.03	-0.69	.538	-0.01 [-0.04, 0.02]	0.01	-0.82	.421
Sleep efficiency ²	0.00 [-0.01, 0.01]	0.00	-0.18	.862	0.00 [-0.01, 0.01]	0.00	0.09	.928
Age	-0.02 [-0.03, -0.02]	0.00	-7.44	< .001	-0.03 [-0.03, -0.02]	0.00	-9.54	< .001
Sleep efficiency × sesmedium	0.02 [-0.07, 0.11]	0.05	0.51	.647	0.02 [-0.01, 0.06]	0.02	1.37	.179
Sleep efficiency × seshigh	0.02 [-0.04, 0.08]	0.03	0.70	.525	0.00 [-0.03, 0.04]	0.02	0.19	.851
Sleep onset								
(Intercept)	1.49 [1.09, 1.88]	0.20	7.41	< .001	1.39 [1.14, 1.64]	0.13	10.88	< .001
Sleep onset	-0.01 [-0.04, 0.03]	0.02	-0.46	.651	0.00 [-0.04, 0.05]	0.02	0.22	.835
Sleep onset ²	-0.02 [-0.05, 0.01]	0.02	-1.34	.270	0.00 [-0.02, 0.01]	0.01	-0.36	.727
Age	-0.02 [-0.03, -0.02]	0.00	-7.61	< .001	-0.03 [-0.03, -0.02]	0.00	-9.41	< .001
Sleep onset × sesmedium	-0.01 [-0.07, 0.04]	0.03	-0.38	.716	-0.01 [-0.05, 0.03]	0.02	-0.59	.562
Sleep onset × seshigh	-0.01 [-0.06, 0.03]	0.02	-0.59	.567	-0.03 [-0.09, 0.02]	0.03	-1.12	.316
Sleep regularity								

Term	Physical Activity Volume			Physical Activity Intensity				
	β [95% CI]	SE	t	p	β [95% CI]	SE	t	p
(Intercept)	1.41 [1.02, 1.81]	0.20	7.08	< .001	1.35 [1.11, 1.59]	0.12	11.13	< .001
Sleep regularity	0.05 [0.01, 0.08]	0.02	2.58	.046	0.04 [0.02, 0.06]	0.01	3.42	.001
Sleep regularity ²	-0.01 [-0.02, 0.00]	0.01	-1.90	.059	-0.01 [-0.02, 0.00]	0.01	-1.38	.213
Age	-0.02 [-0.03, -0.02]	0.00	-7.53	< .001	-0.03 [-0.03, -0.02]	0.00	-9.81	< .001
Sleep regularity × sesmedium	0.03 [-0.02, 0.07]	0.02	1.23	.253	0.00 [-0.04, 0.04]	0.02	-0.10	.922
Sleep regularity × seshigh	0.04 [-0.02, 0.10]	0.03	1.29	.266	0.01 [-0.02, 0.05]	0.02	0.70	.499

Note. Adjusted for BMI, age, and sex. Outcomes variables are listed in the row headers.

Table 7

Physical activity predicting sleep controlling for SES, age, and BMI.

Term	Physical Activity Volume			Physical Activity Intensity				
	β [95% CI]	SE	t	p	β [95% CI]	SE	t	p
Sleep duration								
(Intercept)	0.49 [0.23, 0.75]	0.13	3.74	.001	0.47 [0.22, 0.72]	0.13	3.67	.001
Physical activity	0.04 [0.00, 0.08]	0.02	2.02	.071	0.03 [0.00, 0.06]	0.02	2.21	.032
Physical activity ²	0.00 [-0.01, 0.01]	0.01	0.39	.719	0.01 [0.00, 0.03]	0.01	1.45	.155
Age	-0.01 [-0.01, 0.00]	0.00	-2.58	.019	-0.01 [-0.01, 0.00]	0.00	-2.46	.022
Physical activity × sexmale	-0.02 [-0.07, 0.03]	0.02	-0.70	.500	0.02 [-0.02, 0.06]	0.02	1.01	.321
Sleep efficiency								
(Intercept)	0.28 [0.04, 0.53]	0.13	2.25	.026	0.29 [0.03, 0.55]	0.13	2.18	.033
Physical activity	0.01 [-0.03, 0.05]	0.02	0.49	.640	-0.03 [-0.06, 0.00]	0.02	-1.71	.104
Physical activity ²	0.00 [-0.01, 0.00]	0.00	-0.75	.466	0.00 [-0.02, 0.03]	0.01	0.18	.863
Age	0.00 [0.00, 0.01]	0.00	0.90	.368	0.00 [0.00, 0.01]	0.00	0.85	.395
Physical activity × sexmale	0.01 [-0.03, 0.05]	0.02	0.29	.775	0.06 [0.03, 0.10]	0.02	3.38	.001
Sleep onset								
(Intercept)	-0.17 [-0.48, 0.13]	0.16	-1.11	.269	-0.14 [-0.45, 0.17]	0.16	-0.90	.369
Physical activity	-0.03 [-0.05, 0.00]	0.01	-2.36	.030	-0.05 [-0.07, -0.02]	0.01	-3.90	.001
Physical activity ²	0.00 [-0.01, 0.00]	0.00	-0.53	.597	-0.01 [-0.02, 0.01]	0.01	-0.79	.452
Age	0.00 [0.00, 0.01]	0.00	1.29	.212	0.00 [0.00, 0.01]	0.00	1.03	.311
Physical activity × sexmale	0.00 [-0.03, 0.02]	0.01	-0.08	.934	-0.02 [-0.04, 0.01]	0.01	-1.30	.192
Sleep regularity								
(Intercept)	0.58 [0.30, 0.85]	0.14	4.13	< .001	0.62 [0.33, 0.91]	0.15	4.16	< .001
Physical activity	0.10 [0.04, 0.17]	0.03	3.00	.059	0.05 [0.02, 0.09]	0.02	2.82	.013
Physical activity ²	-0.01 [-0.03, 0.01]	0.01	-0.70	.545	-0.01 [-0.03, 0.01]	0.01	-0.92	.358

Term	Physical Activity Volume			Physical Activity Intensity				
	β [95% CI]	SE	t	p	β [95% CI]	SE	t	p
Age	0.00 [-0.01, 0.01]	0.00	-0.29	.788	0.00 [-0.01, 0.01]	0.00	-0.28	.792
Physical activity \times sexmale	-0.01 [-0.09, 0.06]	0.04	-0.32	.767	0.04 [-0.01, 0.08]	0.02	1.61	.124

Note. Adjusted for SES, age, and BMI. Outcomes variables are listed in the column headers.

Table 8

Sleep predicting physical activity controlling for SES, age, and BMI

Term	Physical Activity Volume			Physical Activity Intensity				
	β [95% CI]	SE	t	p	β [95% CI]	SE	t	p
Sleep duration								
(Intercept)	1.47 [1.07, 1.87]	0.20	7.25	< .001	1.37 [1.12, 1.63]	0.13	10.75	< .001
Sleep duration	-0.02 [-0.04, 0.01]	0.01	-1.42	.204	0.00 [-0.02, 0.02]	0.01	-0.06	.953
Sleep duration ²	-0.01 [-0.02, 0.01]	0.01	-0.92	.432	0.00 [-0.01, 0.01]	0.00	-0.44	.678
Age	-0.02 [-0.03, -0.02]	0.00	-7.31	< .001	-0.03 [-0.03, -0.02]	0.00	-9.65	< .001
Sleep duration × sexmale	0.03 [-0.03, 0.08]	0.03	0.93	.424	0.01 [-0.02, 0.04]	0.01	0.86	.408
Sleep efficiency								
(Intercept)	1.47 [1.07, 1.87]	0.20	7.16	< .001	1.38 [1.13, 1.62]	0.13	10.96	< .001
Sleep efficiency	0.01 [-0.02, 0.03]	0.01	0.47	.643	0.00 [-0.02, 0.02]	0.01	0.03	.974
Sleep efficiency ²	0.00 [-0.01, 0.01]	0.00	-0.07	.946	0.00 [0.00, 0.00]	0.00	0.38	.708
Age	-0.02 [-0.03, -0.02]	0.00	-7.43	< .001	-0.03 [-0.03, -0.02]	0.00	-9.60	< .001
Sleep efficiency × sexmale	-0.02 [-0.05, 0.02]	0.02	-0.88	.409	-0.01 [-0.03, 0.02]	0.01	-0.44	.664
Sleep onset								
(Intercept)	1.48 [1.07, 1.89]	0.21	7.15	< .001	1.37 [1.13, 1.62]	0.12	11.07	< .001
Sleep onset	0.02 [-0.01, 0.04]	0.01	1.17	.242	-0.01 [-0.03, 0.01]	0.01	-0.71	.477
Sleep onset ²	-0.01 [-0.03, 0.00]	0.01	-1.47	.169	0.00 [-0.01, 0.01]	0.01	0.08	.935
Age	-0.02 [-0.03, -0.02]	0.00	-7.50	< .001	-0.03 [-0.03, -0.02]	0.00	-9.54	< .001
Sleep onset × sexmale	-0.07 [-0.11, -0.02]	0.02	-3.01	.012	0.00 [-0.04, 0.04]	0.02	-0.17	.869
Sleep regularity								
(Intercept)	1.42 [1.02, 1.81]	0.20	7.03	< .001	1.35 [1.11, 1.59]	0.12	10.88	< .001
Sleep regularity	0.06 [0.04, 0.08]	0.01	5.37	< .001	0.04 [0.02, 0.06]	0.01	4.80	< .001
Sleep regularity ²	-0.01 [-0.02, 0.00]	0.01	-1.26	.219	-0.01 [-0.02, 0.00]	0.01	-1.15	.297

Term	Physical Activity Volume				Physical Activity Intensity			
	β [95% CI]	SE	t	p	β [95% CI]	SE	t	p
Age	-0.02 [-0.03, -0.02]	0.00	-7.54	< .001	-0.03 [-0.03, -0.02]	0.00	-9.76	< .001
Sleep regularity \times sexmale	0.03 [-0.01, 0.06]	0.02	1.32	.227	0.00 [-0.03, 0.03]	0.01	0.18	.861

Note. Adjusted for SES, age, and BMI. Outcomes variables are listed in the row headers.

Table 9

Physical activity predicting sleep controlling for BMI, age, and sex.

TITLE

Term	Physical Activity Volume			Physical Activity Intensity				
	β [95% CI]	SE	t	p	β [95% CI]	SE	t	p
Sleep duration								
(Intercept)	0.46 [0.22, 0.70]	0.12	3.72	.001	0.44 [0.19, 0.68]	0.12	3.53	.001
Physical activity	0.01 [-0.03, 0.06]	0.02	0.56	.577	0.06 [0.02, 0.10]	0.02	3.09	.005
Weekday xmonday	-0.03 [-0.09, 0.02]	0.03	-1.29	.207	-0.03 [-0.09, 0.04]	0.03	-0.88	.390
Weekday xsaturday	0.05 [0.00, 0.10]	0.03	2.11	.044	0.07 [0.02, 0.13]	0.03	2.55	.012
Weekday xsunday	0.03 [-0.02, 0.08]	0.02	1.22	.223	0.04 [-0.01, 0.10]	0.03	1.63	.105
Weekday xthursday	-0.02 [-0.06, 0.03]	0.02	-0.71	.477	-0.01 [-0.07, 0.06]	0.03	-0.20	.841
Weekday xtuesday	-0.03 [-0.09, 0.04]	0.03	-0.84	.421	-0.03 [-0.11, 0.04]	0.04	-0.91	.386
Weekday xwednesday	-0.03 [-0.08, 0.02]	0.03	-1.00	.325	-0.02 [-0.08, 0.05]	0.03	-0.51	.619
Physical activity ²	0.00 [-0.01, 0.02]	0.01	0.48	.632	0.01 [-0.01, 0.04]	0.01	0.83	.408
Age	-0.01 [-0.01, 0.00]	0.00	-2.54	.019	-0.01 [-0.01, 0.00]	0.00	-2.42	.022
Physical activity × weekday xmonday	0.02 [-0.04, 0.09]	0.03	0.70	.493	-0.01 [-0.06, 0.04]	0.02	-0.46	.647
Physical activity × weekday xsaturday	0.02 [-0.04, 0.08]	0.03	0.74	.461	-0.06 [-0.11, 0.00]	0.03	-2.05	.063
Physical activity × weekday xsunday	0.04 [-0.02, 0.10]	0.03	1.43	.162	-0.04 [-0.08, 0.00]	0.02	-1.94	.053
Physical activity × weekday xthursday	0.00 [-0.06, 0.07]	0.03	0.11	.911	-0.01 [-0.06, 0.03]	0.02	-0.67	.505
Physical activity × weekday xtuesday	0.02 [-0.04, 0.08]	0.03	0.79	.432	0.01 [-0.04, 0.06]	0.03	0.41	.688
Physical activity × weekday xwednesday	-0.02 [-0.08, 0.05]	0.03	-0.48	.639	0.00 [-0.04, 0.05]	0.02	0.06	.954
Weekday xmonday × Physical activity ²	0.00 [-0.01, 0.02]	0.01	0.26	.792	0.00 [-0.04, 0.03]	0.02	-0.23	.817
Weekday xsaturday × Physical activity ²	-0.01 [-0.03, 0.01]	0.01	-0.92	.383	-0.03 [-0.06, 0.00]	0.02	-1.70	.090
Weekday xsunday × Physical activity ²	0.00 [-0.03, 0.02]	0.01	-0.26	.802	-0.02 [-0.05, 0.01]	0.02	-1.23	.223
Weekday xthursday × Physical activity ²	0.00 [-0.01, 0.02]	0.01	0.41	.686	-0.01 [-0.04, 0.03]	0.02	-0.31	.760
Weekday xtuesday × Physical activity ²	0.00 [-0.02, 0.01]	0.01	-0.33	.743	0.00 [-0.03, 0.04]	0.02	0.22	.824

Table 9 continued

TITLE

Term	Physical Activity Volume				Physical Activity Intensity			
	β [95% CI]	SE	t	p	β [95% CI]	SE	t	p
Weekday xwednesday \times Physical activity ²	0.00 [-0.01, 0.02]	0.01	0.52	.606	0.00 [-0.04, 0.03]	0.02	-0.23	.819
Sleep efficency								
(Intercept)	0.27 [0.03, 0.51]	0.12	2.22	.027	0.29 [0.05, 0.54]	0.13	2.31	.022
Physical activity	0.01 [-0.04, 0.06]	0.02	0.54	.595	-0.01 [-0.05, 0.03]	0.02	-0.51	.617
Weekday xmunday	0.01 [-0.04, 0.05]	0.02	0.27	.784	-0.01 [-0.07, 0.04]	0.03	-0.43	.667
Weekday xsaturday	-0.04 [-0.08, 0.01]	0.02	-1.65	.099	-0.05 [-0.11, 0.01]	0.03	-1.75	.085
Weekday xsunday	-0.06 [-0.11, 0.00]	0.03	-2.03	.057	-0.08 [-0.15, -0.01]	0.04	-2.10	.059
Weekday xthursday	0.00 [-0.05, 0.04]	0.02	-0.14	.889	-0.01 [-0.08, 0.06]	0.03	-0.27	.792
Weekday xtuesday	0.00 [-0.05, 0.06]	0.03	0.17	.866	0.00 [-0.07, 0.07]	0.03	-0.01	.989
Weekday xwednesday	0.02 [-0.03, 0.06]	0.02	0.72	.472	0.01 [-0.06, 0.07]	0.03	0.22	.825
Physical activity ²	0.00 [-0.01, 0.01]	0.01	0.13	.894	-0.01 [-0.04, 0.03]	0.02	-0.34	.742
Age	0.00 [0.00, 0.01]	0.00	0.97	.330	0.00 [0.00, 0.01]	0.00	0.84	.401
Physical activity \times weekday xmonday	0.00 [-0.05, 0.06]	0.03	0.09	.926	0.02 [-0.03, 0.07]	0.03	0.96	.345
Physical activity \times weekday xsaturday	0.03 [-0.03, 0.09]	0.03	0.89	.385	0.00 [-0.06, 0.05]	0.03	-0.07	.944
Physical activity \times weekday xsunday	0.02 [-0.05, 0.10]	0.04	0.61	.560	0.01 [-0.04, 0.06]	0.02	0.34	.732
Physical activity \times weekday xthursday	-0.01 [-0.06, 0.05]	0.03	-0.23	.822	0.04 [-0.01, 0.08]	0.02	1.66	.100
Physical activity \times weekday xtuesday	-0.02 [-0.08, 0.05]	0.03	-0.55	.587	0.01 [-0.04, 0.05]	0.02	0.28	.776
Physical activity \times weekday xwednesday	-0.03 [-0.10, 0.03]	0.03	-1.01	.322	0.01 [-0.05, 0.06]	0.03	0.25	.809
Weekday xmunday \times Physical activity ²	-0.01 [-0.02, 0.01]	0.01	-0.68	.501	0.01 [-0.02, 0.05]	0.02	0.65	.516
Weekday xsaturday \times Physical activity ²	0.00 [-0.02, 0.01]	0.01	-0.44	.657	0.01 [-0.04, 0.05]	0.02	0.34	.742
Weekday xsunday \times Physical activity ²	-0.01 [-0.03, 0.02]	0.01	-0.72	.498	0.00 [-0.04, 0.05]	0.02	0.23	.825
Weekday xthursday \times Physical activity ²	0.00 [-0.02, 0.01]	0.01	-0.17	.866	0.00 [-0.05, 0.05]	0.03	0.10	.927
Weekday xtuesday \times Physical activity ²	0.00 [-0.02, 0.02]	0.01	-0.19	.849	0.00 [-0.04, 0.04]	0.02	0.12	.905

Table 9 continued

TITLE

Term	Physical Activity Volume				Physical Activity Intensity			
	β [95% CI]	SE	t	p	β [95% CI]	SE	t	p
Weekday xwednesday \times Physical activity ²	0.00 [-0.02, 0.02]	0.01	0.21	.837	0.01 [-0.03, 0.05]	0.02	0.49	.636
Sleep onset								
(Intercept)	-0.12 [-0.43, 0.18]	0.16	-0.78	.435	-0.10 [-0.41, 0.21]	0.16	-0.64	.522
Physical activity	-0.03 [-0.08, 0.02]	0.03	-1.13	.318	-0.03 [-0.06, -0.01]	0.01	-2.55	.015
Weekday xmunday	-0.07 [-0.10, -0.03]	0.02	-3.68	.001	-0.06 [-0.10, -0.02]	0.02	-3.10	.002
Weekday xsaturday	0.07 [0.04, 0.10]	0.02	4.55	< .001	0.07 [0.03, 0.10]	0.02	3.53	.001
Weekday xsunday	0.06 [0.03, 0.10]	0.02	3.36	.004	0.04 [0.00, 0.08]	0.02	1.94	.059
Weekday xthursday	-0.06 [-0.11, -0.02]	0.02	-3.02	.017	-0.06 [-0.10, -0.02]	0.02	-2.93	.006
Weekday xtuesday	-0.06 [-0.09, -0.03]	0.02	-3.82	< .001	-0.05 [-0.09, -0.01]	0.02	-2.53	.014
Weekday xwednesday	-0.06 [-0.09, -0.03]	0.02	-3.88	< .001	-0.06 [-0.10, -0.02]	0.02	-3.26	.001
Physical activity ²	0.00 [-0.01, 0.02]	0.01	0.56	.605	0.00 [-0.01, 0.02]	0.01	0.52	.604
Age	0.00 [0.00, 0.01]	0.00	1.20	.243	0.00 [0.00, 0.01]	0.00	0.96	.340
Physical activity \times weekday xmonday	-0.03 [-0.10, 0.04]	0.04	-0.74	.503	-0.02 [-0.06, 0.01]	0.02	-1.46	.149
Physical activity \times weekday xsaturday	0.05 [0.01, 0.10]	0.02	2.36	.034	0.01 [-0.02, 0.04]	0.02	0.52	.606
Physical activity \times weekday xsunday	0.02 [-0.04, 0.09]	0.03	0.75	.490	-0.02 [-0.05, 0.01]	0.02	-1.37	.176
Physical activity \times weekday xthursday	-0.02 [-0.08, 0.04]	0.03	-0.75	.487	-0.02 [-0.06, 0.01]	0.02	-1.22	.241
Physical activity \times weekday xtuesday	-0.04 [-0.10, 0.02]	0.03	-1.25	.261	-0.02 [-0.05, 0.01]	0.02	-1.41	.164
Physical activity \times weekday xwednesday	-0.02 [-0.09, 0.06]	0.04	-0.46	.672	-0.02 [-0.05, 0.01]	0.02	-1.51	.133
Weekday xmunday \times Physical activity ²	0.00 [-0.02, 0.01]	0.01	-0.42	.693	0.00 [-0.03, 0.02]	0.01	-0.28	.783
Weekday xsaturday \times Physical activity ²	-0.01 [-0.02, 0.01]	0.01	-0.89	.383	0.00 [-0.03, 0.02]	0.01	-0.24	.811
Weekday xsunday \times Physical activity ²	-0.01 [-0.03, 0.01]	0.01	-1.22	.289	0.01 [-0.01, 0.04]	0.01	0.82	.420
Weekday xthursday \times Physical activity ²	0.00 [-0.02, 0.01]	0.01	-0.62	.542	-0.01 [-0.03, 0.02]	0.01	-0.53	.596
Weekday xtuesday \times Physical activity ²	0.00 [-0.01, 0.02]	0.01	0.22	.834	-0.01 [-0.04, 0.02]	0.02	-0.41	.690

Table 9 continued

TITLE

Term	Physical Activity Volume				Physical Activity Intensity			
	β [95% CI]	SE	t	p	β [95% CI]	SE	t	p
Weekday xwednesday \times Physical activity ²	0.00 [-0.02, 0.01]	0.01	-0.51	.639	0.00 [-0.03, 0.02]	0.01	-0.11	.911
Sleep regularity								
(Intercept)	0.58 [0.32, 0.83]	0.13	4.50	< .001	0.63 [0.36, 0.91]	0.14	4.52	< .001
Physical activity	0.09 [0.05, 0.14]	0.02	4.02	< .001	0.01 [-0.03, 0.06]	0.02	0.52	.614
Weekday xmunday	0.00 [-0.06, 0.07]	0.03	0.08	.941	-0.01 [-0.10, 0.09]	0.05	-0.15	.886
Weekday xsaturday	-0.12 [-0.17, -0.06]	0.03	-4.09	.001	-0.11 [-0.18, -0.03]	0.04	-2.88	.020
Weekday xsunday	-0.16 [-0.22, -0.09]	0.03	-4.68	.002	-0.17 [-0.24, -0.09]	0.04	-4.46	.002
Weekday xthursday	0.12 [0.05, 0.19]	0.03	3.49	.013	0.13 [0.06, 0.20]	0.04	3.51	.006
Weekday xtuesday	0.14 [0.08, 0.21]	0.03	4.34	.002	0.14 [0.06, 0.21]	0.04	3.73	.003
Weekday xwednesday	0.12 [0.08, 0.17]	0.02	5.00	< .001	0.13 [0.06, 0.21]	0.04	3.42	.008
Physical activity ²	-0.01 [-0.02, 0.01]	0.01	-1.07	.286	-0.01 [-0.04, 0.02]	0.02	-0.44	.670
Age	0.00 [-0.01, 0.01]	0.00	-0.35	.745	0.00 [-0.01, 0.01]	0.00	-0.41	.700
Physical activity \times weekday xmonday	0.04 [-0.06, 0.13]	0.05	0.79	.471	0.09 [0.02, 0.16]	0.03	2.48	.050
Physical activity \times weekday xsaturday	-0.02 [-0.10, 0.07]	0.04	-0.38	.715	-0.02 [-0.06, 0.02]	0.02	-0.96	.337
Physical activity \times weekday xsunday	0.02 [-0.05, 0.10]	0.04	0.62	.551	-0.01 [-0.06, 0.04]	0.02	-0.37	.715
Physical activity \times weekday xthursday	0.00 [-0.07, 0.07]	0.04	-0.08	.935	0.10 [0.05, 0.15]	0.03	3.78	.001
Physical activity \times weekday xtuesday	0.01 [-0.07, 0.10]	0.04	0.32	.761	0.08 [0.02, 0.14]	0.03	2.75	.024
Physical activity \times weekday xwednesday	-0.03 [-0.10, 0.04]	0.04	-0.82	.431	0.07 [0.02, 0.12]	0.03	2.64	.015
Weekday xmunday \times Physical activity ²	0.00 [-0.03, 0.02]	0.01	-0.32	.762	-0.01 [-0.06, 0.04]	0.02	-0.28	.789
Weekday xsaturday \times Physical activity ²	0.00 [-0.03, 0.03]	0.02	0.06	.959	-0.02 [-0.06, 0.02]	0.02	-0.80	.440
Weekday xsunday \times Physical activity ²	0.00 [-0.02, 0.02]	0.01	-0.02	.981	0.00 [-0.04, 0.03]	0.02	-0.22	.829
Weekday xthursday \times Physical activity ²	0.00 [-0.02, 0.03]	0.01	0.27	.798	-0.01 [-0.04, 0.03]	0.02	-0.44	.660
Weekday xtuesday \times Physical activity ²	0.00 [-0.03, 0.02]	0.01	-0.25	.815	0.00 [-0.03, 0.03]	0.02	-0.02	.986

Table 9 continued

Term	Physical Activity Volume			Physical Activity Intensity				
	β [95% CI]	SE	t	p	β [95% CI]	SE	t	p
Weekday x wednesday \times Physical activity ²	0.00 [-0.02, 0.03]	0.01	0.21	.847	-0.01 [-0.05, 0.03]	0.02	-0.45	.656

Note. Adjusted for BMI, age, and sex. Outcomes variables are listed in the column headers.

Table 10

Sleep predicting physical activity controlling for BMI, age, and sex

TITLE

Term	Physical Activity Volume			Physical Activity Intensity				
	β [95% CI]	SE	t	p	β [95% CI]	SE	t	p
Sleep duration								
(Intercept)	1.53 [1.12, 1.95]	0.21	7.27	< .001	1.44 [1.20, 1.67]	0.12	12.03	< .001
Sleep duration	0.01 [-0.02, 0.05]	0.02	0.77	.442	0.04 [0.01, 0.08]	0.02	2.21	.071
Weekday xmonday	-0.18 [-0.22, -0.13]	0.02	-7.17	< .001	-0.06 [-0.11, -0.01]	0.02	-2.60	.023
Weekday xsaturday	-0.09 [-0.14, -0.05]	0.02	-4.13	< .001	-0.06 [-0.10, -0.03]	0.02	-3.37	.001
Weekday xsunday	-0.18 [-0.24, -0.12]	0.03	-5.81	.001	-0.13 [-0.16, -0.09]	0.02	-7.26	< .001
Weekday xthursday	-0.04 [-0.10, 0.01]	0.03	-1.66	.124	0.02 [-0.04, 0.07]	0.03	0.54	.613
Weekday xtuesday	-0.05 [-0.10, 0.00]	0.03	-1.96	.065	0.00 [-0.05, 0.04]	0.02	-0.21	.835
Weekday xwednesday	-0.07 [-0.12, -0.02]	0.03	-2.53	.028	0.00 [-0.04, 0.03]	0.02	-0.01	.993
Sleep duration ²	-0.01 [-0.03, 0.00]	0.01	-1.73	.119	0.00 [-0.01, 0.01]	0.01	0.28	.781
Age	-0.02 [-0.03, -0.02]	0.00	-7.39	< .001	-0.03 [-0.03, -0.02]	0.00	-9.64	< .001
Sleep duration × weekday xmonday	-0.03 [-0.07, 0.01]	0.02	-1.31	.189	-0.08 [-0.13, -0.02]	0.03	-2.85	.031
Sleep duration × weekday xsaturday	-0.01 [-0.06, 0.04]	0.03	-0.48	.641	-0.05 [-0.09, 0.00]	0.02	-1.87	.104
Sleep duration × weekday xsunday	-0.05 [-0.10, 0.00]	0.03	-1.78	.100	-0.06 [-0.12, 0.00]	0.03	-1.90	.135
Sleep duration × weekday xtuesday	0.01 [-0.04, 0.05]	0.02	0.30	.763	-0.02 [-0.05, 0.02]	0.02	-0.96	.335
Sleep duration × weekday xtuesday	-0.02 [-0.06, 0.03]	0.02	-0.64	.529	-0.02 [-0.07, 0.04]	0.03	-0.65	.543
Sleep duration × weekday xwednesday	-0.02 [-0.07, 0.02]	0.02	-1.02	.312	-0.04 [-0.10, 0.02]	0.03	-1.41	.217
Weekday xmonday × Sleep duration ²	0.01 [-0.01, 0.03]	0.01	0.56	.588	-0.01 [-0.03, 0.01]	0.01	-1.15	.289
Weekday xsaturday × Sleep duration ²	0.01 [-0.01, 0.03]	0.01	0.91	.423	0.00 [-0.02, 0.01]	0.01	-0.51	.627
Weekday xsunday × Sleep duration ²	0.01 [-0.01, 0.03]	0.01	0.91	.376	-0.01 [-0.02, 0.01]	0.01	-0.63	.547
Weekday xthursday × Sleep duration ²	0.01 [-0.01, 0.02]	0.01	0.87	.385	-0.01 [-0.03, 0.02]	0.01	-0.37	.733
Weekday xtuesday × Sleep duration ²	0.01 [-0.01, 0.02]	0.01	1.21	.226	0.00 [-0.01, 0.01]	0.01	-0.01	.988

Table 10 continued

TITLE

Term	Physical Activity Volume				Physical Activity Intensity			
	β [95% CI]	SE	t	p	β [95% CI]	SE	t	p
Weekday xwednesday \times Sleep duration ²	0.01 [-0.01, 0.02]	0.01	0.67	.523	0.00 [-0.02, 0.01]	0.01	-0.26	.802
Sleep efficiency (Intercept)	1.53 [1.11, 1.94]	0.21	7.26	< .001	1.45 [1.22, 1.68]	0.12	12.40	< .001
Sleep efficiency	-0.01 [-0.06, 0.04]	0.02	-0.54	.607	-0.02 [-0.06, 0.02]	0.02	-1.14	.281
Weekday xmunday	-0.17 [-0.22, -0.12]	0.03	-6.83	< .001	-0.08 [-0.11, -0.04]	0.02	-4.09	< .001
Weekday xsaturday	-0.09 [-0.14, -0.04]	0.03	-3.60	.004	-0.07 [-0.11, -0.04]	0.02	-4.15	< .001
Weekday xsunday	-0.17 [-0.23, -0.11]	0.03	-5.73	.001	-0.14 [-0.17, -0.10]	0.02	-8.05	< .001
Weekday xthursday	-0.04 [-0.09, 0.01]	0.03	-1.61	.134	0.01 [-0.03, 0.05]	0.02	0.41	.691
Weekday xtuesday	-0.04 [-0.09, 0.01]	0.03	-1.66	.114	-0.01 [-0.05, 0.03]	0.02	-0.58	.567
Weekday xwednesday	-0.07 [-0.11, -0.02]	0.02	-2.80	.010	-0.01 [-0.04, 0.03]	0.02	-0.53	.597
Sleep efficiency ²	0.00 [-0.01, 0.01]	0.01	-0.52	.614	0.00 [-0.02, 0.01]	0.01	-0.81	.445
Age	-0.02 [-0.03, -0.02]	0.00	-7.32	< .001	-0.03 [-0.03, -0.02]	0.00	-9.48	< .001
Sleep efficiency \times weekday xmonday	0.01 [-0.04, 0.07]	0.03	0.52	.610	0.04 [0.00, 0.08]	0.02	1.77	.091
Sleep efficiency \times weekday xsaturday	0.00 [-0.05, 0.05]	0.03	0.05	.962	0.03 [-0.01, 0.07]	0.02	1.66	.102
Sleep efficiency \times weekday xsunday	0.01 [-0.04, 0.06]	0.02	0.43	.668	0.05 [0.01, 0.08]	0.02	2.56	.011
Sleep efficiency \times weekday xthursday	0.02 [-0.05, 0.08]	0.03	0.53	.617	0.01 [-0.03, 0.05]	0.02	0.69	.495
Sleep efficiency \times weekday xtuesday	0.01 [-0.05, 0.06]	0.03	0.30	.766	0.00 [-0.05, 0.04]	0.02	-0.11	.914
Sleep efficiency \times weekday xwednesday	0.01 [-0.04, 0.06]	0.03	0.31	.758	0.00 [-0.04, 0.04]	0.02	-0.20	.844
Weekday xmunday \times Sleep efficiency ²	0.00 [-0.01, 0.02]	0.01	0.54	.598	0.00 [-0.01, 0.01]	0.01	0.47	.647
Weekday xsaturday \times Sleep efficiency ²	0.01 [-0.02, 0.03]	0.01	0.69	.537	0.01 [-0.01, 0.02]	0.01	1.08	.296
Weekday xsunday \times Sleep efficiency ²	0.00 [-0.01, 0.01]	0.01	-0.14	.892	0.00 [-0.01, 0.01]	0.01	0.75	.454
Weekday xthursday \times Sleep efficiency ²	0.00 [-0.01, 0.02]	0.01	0.48	.641	0.00 [-0.01, 0.01]	0.01	0.24	.810
Weekday xtuesday \times Sleep efficiency ²	0.00 [-0.01, 0.01]	0.01	-0.05	.963	0.01 [0.00, 0.02]	0.01	1.24	.218

Table 10 continued

TITLE

Term	Physical Activity Volume				Physical Activity Intensity			
	β [95% CI]	SE	t	p	β [95% CI]	SE	t	p
Weekday xwednesday \times Sleep efficiency ²	0.00 [-0.01, 0.02]	0.01	0.31	.773	0.01 [-0.01, 0.02]	0.01	1.01	.348
Sleep onset								
(Intercept)	1.52 [1.12, 1.93]	0.21	7.38	< .001	1.44 [1.20, 1.67]	0.12	11.98	< .001
Sleep onset	-0.04 [-0.07, -0.01]	0.02	-2.28	.023	-0.05 [-0.08, -0.01]	0.02	-2.48	.034
Weekday xmunday	-0.15 [-0.23, -0.07]	0.04	-3.64	.019	-0.06 [-0.11, -0.02]	0.02	-2.72	.013
Weekday xsaturday	-0.08 [-0.13, -0.03]	0.03	-3.22	.003	-0.07 [-0.10, -0.03]	0.02	-3.34	.001
Weekday xsunday	-0.17 [-0.25, -0.10]	0.04	-4.45	.008	-0.13 [-0.17, -0.09]	0.02	-6.02	< .001
Weekday xthursday	-0.04 [-0.10, 0.02]	0.03	-1.33	.219	0.00 [-0.04, 0.05]	0.02	0.18	.859
Weekday xtuesday	-0.03 [-0.09, 0.03]	0.03	-0.99	.343	0.00 [-0.04, 0.04]	0.02	-0.06	.951
Weekday xwednesday	-0.06 [-0.11, -0.02]	0.02	-2.71	.007	-0.01 [-0.05, 0.03]	0.02	-0.52	.604
Sleep onset ²	-0.01 [-0.04, 0.02]	0.02	-0.56	.612	0.00 [-0.01, 0.01]	0.01	0.00	.998
Age	-0.02 [-0.03, -0.02]	0.00	-7.42	< .001	-0.03 [-0.03, -0.02]	0.00	-9.49	< .001
Sleep onset \times weekday xmonday	0.03 [-0.01, 0.07]	0.02	1.39	.170	0.08 [0.05, 0.12]	0.02	4.52	< .001
Sleep onset \times weekday xsaturday	0.03 [-0.01, 0.07]	0.02	1.61	.109	0.05 [0.01, 0.09]	0.02	2.40	.026
Sleep onset \times weekday xsunday	0.05 [0.01, 0.09]	0.02	2.40	.018	0.09 [0.05, 0.13]	0.02	4.31	.001
Sleep onset \times weekday xthursday	0.01 [-0.04, 0.05]	0.02	0.34	.738	0.02 [-0.02, 0.06]	0.02	1.11	.277
Sleep onset \times weekday xtuesday	0.03 [-0.02, 0.07]	0.02	1.17	.245	0.02 [-0.02, 0.06]	0.02	0.94	.368
Sleep onset \times weekday xwednesday	0.04 [0.00, 0.08]	0.02	2.08	.038	0.02 [-0.02, 0.05]	0.02	1.06	.292
Weekday xmunday \times Sleep onset ²	-0.02 [-0.06, 0.03]	0.02	-0.69	.538	-0.01 [-0.03, 0.01]	0.01	-0.94	.353
Weekday xsaturday \times Sleep onset ²	0.00 [-0.03, 0.03]	0.02	0.00	.998	0.00 [-0.02, 0.02]	0.01	0.02	.982
Weekday xsunday \times Sleep onset ²	0.00 [-0.05, 0.05]	0.02	0.02	.988	-0.01 [-0.03, 0.01]	0.01	-0.79	.437
Weekday xthursday \times Sleep onset ²	0.00 [-0.03, 0.04]	0.02	0.21	.844	0.01 [-0.02, 0.03]	0.01	0.50	.628
Weekday xtuesday \times Sleep onset ²	-0.01 [-0.06, 0.03]	0.02	-0.55	.609	-0.01 [-0.04, 0.03]	0.02	-0.33	.752

Table 10 continued

TITLE

Term	Physical Activity Volume				Physical Activity Intensity			
	β [95% CI]	SE	t	p	β [95% CI]	SE	t	p
Weekday xwednesday \times Sleep onset ²	0.00 [-0.03, 0.03]	0.02	0.06	.957	0.01 [-0.02, 0.03]	0.01	0.61	.545
Sleep regularity								
(Intercept)	1.47 [1.05, 1.88]	0.21	6.91	< .001	1.42 [1.19, 1.65]	0.12	12.24	< .001
Sleep regularity	0.07 [0.03, 0.10]	0.02	3.84	.002	0.03 [-0.01, 0.06]	0.02	1.50	.176
Weekday xmunday	-0.16 [-0.22, -0.10]	0.03	-5.29	< .001	-0.08 [-0.12, -0.04]	0.02	-3.80	< .001
Weekday xsaturday	-0.07 [-0.14, 0.00]	0.04	-1.95	.111	-0.06 [-0.12, 0.00]	0.03	-2.03	.091
Weekday xsunday	-0.14 [-0.19, -0.09]	0.03	-5.25	< .001	-0.13 [-0.17, -0.09]	0.02	-6.07	< .001
Weekday xthursday	-0.04 [-0.10, 0.02]	0.03	-1.18	.274	0.01 [-0.04, 0.06]	0.03	0.29	.780
Weekday xtuesday	-0.04 [-0.09, 0.01]	0.03	-1.59	.118	-0.01 [-0.05, 0.03]	0.02	-0.53	.598
Weekday xwednesday	-0.06 [-0.14, 0.01]	0.04	-1.70	.148	-0.02 [-0.06, 0.02]	0.02	-0.90	.368
Sleep regularity ²	-0.01 [-0.03, 0.02]	0.01	-0.63	.547	-0.01 [-0.03, 0.01]	0.01	-1.21	.242
Age	-0.02 [-0.03, -0.02]	0.00	-7.37	< .001	-0.03 [-0.03, -0.02]	0.00	-9.62	< .001
Sleep regularity \times weekday xmonday	-0.02 [-0.08, 0.05]	0.03	-0.52	.628	0.01 [-0.03, 0.05]	0.02	0.63	.536
Sleep regularity \times weekday xsaturday	0.00 [-0.05, 0.04]	0.02	-0.15	.883	0.02 [-0.02, 0.06]	0.02	1.10	.296
Sleep regularity \times weekday xsunday	0.00 [-0.07, 0.08]	0.04	0.07	.947	0.03 [-0.02, 0.07]	0.02	1.16	.271
Sleep regularity \times weekday xthursday	-0.02 [-0.06, 0.02]	0.02	-0.92	.358	0.01 [-0.02, 0.05]	0.02	0.64	.530
Sleep regularity \times weekday xtuesday	0.01 [-0.03, 0.06]	0.02	0.53	.602	0.00 [-0.04, 0.04]	0.02	-0.05	.964
Sleep regularity \times weekday xwednesday	-0.03 [-0.09, 0.03]	0.03	-1.02	.347	-0.02 [-0.05, 0.02]	0.02	-0.88	.377
Weekday xmunday \times Sleep regularity ²	0.01 [-0.02, 0.03]	0.01	0.58	.565	0.01 [-0.01, 0.03]	0.01	1.08	.285
Weekday xsaturday \times Sleep regularity ²	0.00 [-0.06, 0.05]	0.03	-0.16	.880	0.00 [-0.04, 0.04]	0.02	-0.09	.930
Weekday xsunday \times Sleep regularity ²	-0.02 [-0.04, 0.01]	0.01	-1.24	.232	0.00 [-0.02, 0.03]	0.01	0.13	.901
Weekday xthursday \times Sleep regularity ²	0.00 [-0.02, 0.03]	0.01	0.09	.926	0.00 [-0.02, 0.02]	0.01	0.15	.881
Weekday xtuesday \times Sleep regularity ²	0.01 [-0.02, 0.03]	0.01	0.39	.702	0.01 [-0.01, 0.03]	0.01	0.95	.349

Term	Physical Activity Volume			Physical Activity Intensity							
	β	[95% CI]	SE	t	p	β	[95% CI]	SE	t	p	
Weekday x wednesday × Sleep regularity ²	0.00	[-0.03, 0.03]		0.02	0.12	.905	0.02	[0.00, 0.04]	0.01	1.54	.123

Note. Adjusted for BMI, age, and sex. Outcomes variables are listed in the row headers.

Table 11

Physical activity predicting sleep controlling for BMI, age, and sex.

Term	Physical Activity Volume				Physical Activity Intensity			
	β [95% CI]	SE	t	p	β [95% CI]	SE	t	p
Sleep duration								
(Intercept)	0.46 [0.23, 0.69]	0.12	3.93	< .001	0.45 [0.22, 0.68]	0.12	3.85	< .001
Physical activity	0.05 [-0.02, 0.13]	0.04	1.37	.265	0.06 [0.01, 0.11]	0.02	2.59	.025
Seasonspring	-0.02 [-0.10, 0.05]	0.04	-0.64	.521	-0.04 [-0.11, 0.04]	0.04	-1.01	.315
Seasonsummer	-0.10 [-0.20, 0.00]	0.05	-2.00	.079	-0.11 [-0.20, -0.02]	0.04	-2.50	.017
Seasonwinter	0.04 [-0.04, 0.13]	0.04	0.94	.366	0.03 [-0.04, 0.11]	0.04	0.82	.410
Physical activity ²	0.00 [-0.01, 0.01]	0.00	-0.52	.611	-0.01 [-0.04, 0.01]	0.01	-1.16	.249
Age	-0.01 [-0.01, 0.00]	0.00	-2.41	.024	0.00 [-0.01, 0.00]	0.00	-2.33	.027
Physical activity × seasonspring	-0.04 [-0.15, 0.07]	0.05	-0.75	.509	-0.03 [-0.10, 0.04]	0.03	-0.89	.406
Physical activity × seasonsummer	-0.01 [-0.14, 0.11]	0.06	-0.23	.832	-0.02 [-0.08, 0.03]	0.03	-0.83	.412
Physical activity × seasonwinter	-0.04 [-0.13, 0.05]	0.05	-0.83	.460	-0.01 [-0.06, 0.04]	0.03	-0.35	.727
Seasonspring × Physical activity ²	0.01 [-0.01, 0.02]	0.01	0.78	.463	0.02 [-0.01, 0.06]	0.02	1.45	.152
Seasonsummer × Physical activity ²	0.01 [-0.02, 0.03]	0.01	0.66	.515	0.02 [-0.02, 0.06]	0.02	0.92	.372
Seasonwinter × Physical activity ²	0.01 [-0.01, 0.02]	0.01	0.77	.471	0.02 [-0.01, 0.06]	0.02	1.14	.264
Sleep efficiency								
(Intercept)	0.22 [-0.02, 0.45]	0.12	1.77	.078	0.24 [-0.02, 0.49]	0.13	1.83	.071
Physical activity	0.03 [-0.03, 0.08]	0.03	0.93	.399	0.04 [0.00, 0.09]	0.02	2.04	.052
Seasonspring	0.05 [-0.02, 0.13]	0.04	1.39	.169	0.05 [-0.04, 0.15]	0.05	1.09	.299
Seasonsummer	0.01 [-0.07, 0.09]	0.04	0.35	.728	-0.02 [-0.10, 0.07]	0.04	-0.37	.710
Seasonwinter	0.08 [0.01, 0.14]	0.03	2.22	.027	0.08 [0.01, 0.16]	0.04	2.12	.035
Physical activity ²	0.00 [-0.01, 0.01]	0.00	-0.68	.507	-0.01 [-0.04, 0.02]	0.01	-0.62	.541
Age	0.00 [0.00, 0.01]	0.00	1.05	.292	0.00 [0.00, 0.01]	0.00	0.89	.373

Table 11 continued

Term	Physical Activity Volume				Physical Activity Intensity			
	β [95% CI]	SE	t	p	β [95% CI]	SE	t	p
Physical activity \times seasonspring	-0.03 [-0.10, 0.04]	0.04	-0.74	.489	-0.05 [-0.10, 0.00]	0.03	-2.11	.038
Physical activity \times seasonsummer	0.04 [-0.03, 0.11]	0.04	1.06	.296	-0.06 [-0.12, 0.00]	0.03	-1.89	.065
Physical activity \times seasonwinter	-0.02 [-0.07, 0.02]	0.02	-0.94	.350	-0.04 [-0.10, 0.01]	0.03	-1.58	.127
Seasonspring \times Physical activity ²	0.01 [-0.01, 0.02]	0.01	0.76	.455	0.01 [-0.03, 0.05]	0.02	0.37	.721
Seasonsummer \times Physical activity ²	-0.01 [-0.04, 0.02]	0.02	-0.66	.534	0.02 [-0.01, 0.06]	0.02	1.25	.216
Seasonwinter \times Physical activity ²	0.00 [-0.01, 0.01]	0.01	0.32	.746	0.00 [-0.03, 0.04]	0.02	0.18	.863
Sleep onset								
(Intercept)	-0.15 [-0.46, 0.16]	0.16	-0.95	.342	-0.12 [-0.43, 0.19]	0.16	-0.76	.447
Physical activity	-0.02 [-0.06, 0.01]	0.02	-1.22	.269	-0.03 [-0.07, 0.00]	0.02	-1.90	.098
Seasonspring	0.02 [-0.04, 0.07]	0.03	0.58	.560	0.01 [-0.06, 0.08]	0.04	0.34	.739
Seasonsummer	0.07 [0.01, 0.12]	0.03	2.24	.027	0.07 [0.01, 0.13]	0.03	2.12	.037
Seasonwinter	0.02 [-0.04, 0.07]	0.03	0.54	.591	0.02 [-0.04, 0.08]	0.03	0.75	.456
Physical activity ²	0.00 [0.00, 0.00]	0.00	0.02	.985	0.00 [-0.01, 0.02]	0.01	0.37	.714
Age	0.00 [0.00, 0.01]	0.00	1.13	.272	0.00 [0.00, 0.01]	0.00	0.81	.423
Physical activity \times seasonspring	-0.02 [-0.06, 0.02]	0.02	-0.98	.340	-0.02 [-0.06, 0.01]	0.02	-1.27	.209
Physical activity \times seasonsummer	0.00 [-0.05, 0.05]	0.02	-0.05	.956	-0.02 [-0.08, 0.03]	0.03	-0.77	.466
Physical activity \times seasonwinter	-0.01 [-0.06, 0.04]	0.03	-0.35	.741	-0.03 [-0.07, 0.00]	0.02	-1.93	.053
Seasonspring \times Physical activity ²	0.00 [-0.01, 0.01]	0.00	-0.22	.824	0.00 [-0.03, 0.03]	0.01	0.15	.887
Seasonsummer \times Physical activity ²	-0.01 [-0.03, 0.01]	0.01	-0.90	.383	-0.01 [-0.04, 0.02]	0.01	-0.53	.604
Seasonwinter \times Physical activity ²	0.00 [-0.01, 0.01]	0.00	0.08	.940	-0.01 [-0.03, 0.02]	0.01	-0.34	.740
Sleep regularity								
(Intercept)	0.59 [0.34, 0.85]	0.13	4.61	< .001	0.66 [0.37, 0.94]	0.15	4.51	< .001
Physical activity	0.07 [-0.01, 0.15]	0.04	1.74	.181	0.06 [0.01, 0.11]	0.03	2.33	.047

Table 11 continued

Term	Physical Activity Volume				Physical Activity Intensity			
	β [95% CI]	SE	t	p	β [95% CI]	SE	t	p
Seasonspring	-0.08 [-0.16, 0.00]	0.04	-1.89	.065	-0.10 [-0.19, -0.02]	0.04	-2.40	.019
Seasonsummer	-0.02 [-0.12, 0.07]	0.05	-0.48	.636	-0.06 [-0.15, 0.02]	0.04	-1.47	.143
Seasonwinter	-0.02 [-0.11, 0.07]	0.05	-0.43	.674	-0.03 [-0.11, 0.06]	0.04	-0.61	.543
Physical activity ²	-0.01 [-0.03, 0.01]	0.01	-0.56	.621	-0.02 [-0.05, 0.01]	0.01	-1.54	.138
Age	0.00 [-0.01, 0.01]	0.00	-0.18	.861	0.00 [-0.01, 0.01]	0.00	-0.23	.831
Physical activity \times seasonspring	0.07 [-0.04, 0.17]	0.05	1.26	.290	0.01 [-0.05, 0.06]	0.03	0.31	.758
Physical activity \times seasonsummer	0.10 [-0.08, 0.28]	0.09	1.10	.360	0.03 [-0.06, 0.12]	0.05	0.66	.543
Physical activity \times seasonwinter	0.01 [-0.07, 0.09]	0.04	0.30	.780	0.01 [-0.07, 0.09]	0.04	0.27	.794
Seasonspring \times Physical activity ²	0.00 [-0.04, 0.03]	0.02	-0.22	.841	0.02 [-0.02, 0.06]	0.02	1.12	.277
Seasonsummer \times Physical activity ²	-0.02 [-0.06, 0.03]	0.02	-0.71	.524	0.03 [-0.02, 0.07]	0.02	1.16	.266
Seasonwinter \times Physical activity ²	0.00 [-0.02, 0.02]	0.01	0.46	.671	0.01 [-0.02, 0.05]	0.02	0.60	.551

Note. Adjusted for BMI, age, and sex. Outcomes variables are listed in the column headers.

Table 12

Sleep predicting physical activity controlling for BMI, age, and sex

Term	Physical Activity Volume			Physical Activity Intensity				
	β [95% CI]	SE	t	p	β [95% CI]	SE	t	p
Sleep duration								
(Intercept)	1.47 [1.05, 1.88]	0.21	6.93	< .001	1.43 [1.20, 1.66]	0.12	12.08	< .001
Sleep duration	0.01 [-0.01, 0.04]	0.01	0.98	.327	0.01 [-0.01, 0.03]	0.01	0.79	.436
Seasonspring	-0.02 [-0.09, 0.05]	0.04	-0.46	.650	-0.05 [-0.12, 0.01]	0.03	-1.70	.100
Seasonsummer	-0.02 [-0.10, 0.05]	0.04	-0.68	.496	-0.03 [-0.11, 0.04]	0.04	-0.86	.412
Seasonwinter	-0.05 [-0.11, 0.01]	0.03	-1.64	.101	-0.05 [-0.12, 0.03]	0.04	-1.28	.239
Sleep duration ²	0.00 [-0.01, 0.01]	0.00	-0.14	.893	0.00 [-0.01, 0.01]	0.00	-0.05	.963
Age	-0.02 [-0.03, -0.02]	0.00	-7.57	< .001	-0.03 [-0.03, -0.02]	0.00	-9.69	< .001
Sleep duration × seasonspring	-0.03 [-0.06, 0.01]	0.02	-1.55	.124	0.00 [-0.03, 0.03]	0.02	-0.20	.843
Sleep duration × seasonsummer	-0.02 [-0.06, 0.02]	0.02	-1.19	.238	-0.01 [-0.04, 0.03]	0.02	-0.47	.642
Sleep duration × seasonwinter	-0.03 [-0.09, 0.04]	0.03	-0.84	.452	-0.01 [-0.06, 0.04]	0.02	-0.40	.706
Seasonspring × Sleep duration ²	-0.01 [-0.03, 0.01]	0.01	-1.36	.252	-0.01 [-0.01, 0.00]	0.00	-1.29	.198
Seasonsummer × Sleep duration ²	-0.01 [-0.02, 0.01]	0.01	-0.70	.516	-0.01 [-0.02, 0.01]	0.01	-1.01	.364
Seasonwinter × Sleep duration ²	-0.01 [-0.02, 0.01]	0.01	-0.64	.558	0.00 [-0.02, 0.01]	0.01	-0.49	.651
Sleep efficiency								
(Intercept)	1.47 [1.06, 1.88]	0.21	7.03	< .001	1.44 [1.20, 1.67]	0.12	12.07	< .001
Sleep efficiency	-0.01 [-0.04, 0.03]	0.02	-0.46	.669	-0.01 [-0.03, 0.02]	0.01	-0.63	.542
Seasonspring	-0.03 [-0.11, 0.05]	0.04	-0.69	.502	-0.06 [-0.12, 0.00]	0.03	-2.10	.040
Seasonsummer	-0.03 [-0.11, 0.04]	0.04	-0.84	.410	-0.04 [-0.12, 0.03]	0.04	-1.10	.294
Seasonwinter	-0.06 [-0.12, 0.00]	0.03	-1.98	.047	-0.05 [-0.12, 0.02]	0.04	-1.52	.157
Sleep efficiency ²	0.00 [0.00, 0.00]	0.00	-0.11	.917	0.00 [-0.01, 0.00]	0.00	-0.12	.909
Age	-0.02 [-0.03, -0.02]	0.00	-7.43	< .001	-0.03 [-0.03, -0.02]	0.00	-9.65	< .001

Table 12 continued

Term	Physical Activity Volume				Physical Activity Intensity			
	β [95% CI]	SE	t	p	β [95% CI]	SE	t	p
Sleep efficiency \times seasonspring	0.00 [-0.07, 0.06]	0.03	-0.07	.949	0.00 [-0.03, 0.04]	0.02	0.31	.761
Sleep efficiency \times seasonsummer	0.03 [-0.01, 0.08]	0.02	1.48	.143	0.02 [-0.02, 0.05]	0.02	0.92	.360
Sleep efficiency \times seasonwinter	0.00 [-0.05, 0.06]	0.03	0.13	.902	0.00 [-0.03, 0.04]	0.02	0.24	.810
Seasonspring \times Sleep efficiency ²	0.00 [-0.02, 0.01]	0.01	-0.38	.728	0.00 [-0.01, 0.01]	0.00	0.34	.746
Seasonsummer \times Sleep efficiency ²	0.00 [-0.01, 0.01]	0.01	-0.16	.876	0.00 [-0.02, 0.01]	0.01	-0.25	.811
Seasonwinter \times Sleep efficiency ²	0.00 [-0.01, 0.01]	0.01	0.11	.913	0.00 [-0.02, 0.02]	0.01	-0.05	.966
Sleep onset								
(Intercept)	1.48 [1.07, 1.88]	0.21	7.12	< .001	1.44 [1.20, 1.67]	0.12	11.95	< .001
Sleep onset	-0.01 [-0.04, 0.02]	0.02	-0.55	.583	0.00 [-0.04, 0.03]	0.02	-0.27	.790
Seasonspring	-0.02 [-0.10, 0.05]	0.04	-0.68	.495	-0.05 [-0.12, 0.02]	0.03	-1.44	.166
Seasonsummer	-0.04 [-0.12, 0.03]	0.04	-1.15	.255	-0.05 [-0.13, 0.03]	0.04	-1.32	.216
Seasonwinter	-0.07 [-0.14, 0.00]	0.04	-1.84	.071	-0.06 [-0.14, 0.02]	0.04	-1.44	.196
Sleep onset ²	-0.01 [-0.03, 0.00]	0.01	-1.73	.085	0.00 [-0.02, 0.01]	0.01	-0.43	.668
Age	-0.02 [-0.03, -0.02]	0.00	-7.59	< .001	-0.03 [-0.03, -0.02]	0.00	-9.55	< .001
Sleep onset \times seasonspring	0.00 [-0.05, 0.05]	0.03	-0.07	.945	0.00 [-0.04, 0.04]	0.02	0.02	.987
Sleep onset \times seasonsummer	0.01 [-0.06, 0.08]	0.03	0.31	.765	0.02 [-0.03, 0.06]	0.02	0.62	.539
Sleep onset \times seasonwinter	-0.02 [-0.08, 0.03]	0.03	-0.82	.426	-0.02 [-0.06, 0.02]	0.02	-0.98	.330
Seasonspring \times Sleep onset ²	-0.01 [-0.03, 0.02]	0.01	-0.51	.611	-0.01 [-0.04, 0.01]	0.01	-0.89	.384
Seasonsummer \times Sleep onset ²	0.01 [-0.02, 0.04]	0.01	0.75	.460	0.01 [-0.02, 0.04]	0.01	0.65	.530
Seasonwinter \times Sleep onset ²	0.00 [-0.02, 0.03]	0.01	0.26	.797	0.01 [-0.01, 0.03]	0.01	0.55	.583
Sleep regularity								
(Intercept)	1.42 [1.01, 1.82]	0.21	6.83	< .001	1.40 [1.18, 1.63]	0.12	12.08	< .001
Sleep regularity	0.05 [0.02, 0.08]	0.02	3.44	.004	0.04 [0.01, 0.07]	0.02	2.31	.060

Table 12 continued

Term	Physical Activity Volume				Physical Activity Intensity			
	β [95% CI]	SE	t	p	β [95% CI]	SE	t	p
Seasonspring	-0.03 [-0.10, 0.05]	0.04	-0.68	.503	-0.05 [-0.11, 0.01]	0.03	-1.53	.138
Seasonsummer	-0.03 [-0.11, 0.05]	0.04	-0.69	.493	-0.03 [-0.12, 0.07]	0.05	-0.60	.574
Seasonwinter	-0.05 [-0.11, 0.01]	0.03	-1.58	.114	-0.04 [-0.14, 0.05]	0.05	-0.91	.412
Sleep regularity ²	-0.01 [-0.03, 0.01]	0.01	-0.78	.483	0.00 [-0.02, 0.01]	0.01	-0.16	.877
Age	-0.02 [-0.03, -0.02]	0.00	-7.63	< .001	-0.03 [-0.03, -0.02]	0.00	-9.70	< .001
Sleep regularity \times seasonspring	0.02 [-0.01, 0.06]	0.02	1.20	.236	0.01 [-0.04, 0.05]	0.02	0.26	.800
Sleep regularity \times seasonsummer	0.00 [-0.06, 0.05]	0.03	-0.15	.885	-0.01 [-0.05, 0.03]	0.02	-0.53	.606
Sleep regularity \times seasonwinter	0.03 [-0.02, 0.08]	0.03	1.22	.266	0.01 [-0.02, 0.04]	0.02	0.40	.686
Seasonspring \times Sleep regularity ²	0.00 [-0.03, 0.03]	0.01	0.15	.890	-0.01 [-0.02, 0.01]	0.01	-0.76	.458
Seasonsummer \times Sleep regularity ²	0.00 [-0.02, 0.03]	0.01	0.16	.876	-0.01 [-0.04, 0.02]	0.02	-0.59	.585
Seasonwinter \times Sleep regularity ²	0.00 [-0.04, 0.03]	0.02	-0.21	.842	-0.01 [-0.03, 0.02]	0.01	-0.51	.632

Note. Adjusted for BMI, age, and sex. Outcomes variables are listed in the row headers.

Table 13

Physical activity predicting sleep controlling for SES, age, and sex.

TITLE

Term	Physical Activity Volume			Physical Activity Intensity				
	β [95% CI]	SE	t	p	β [95% CI]	SE	t	p
Sleep duration								
(Intercept)	0.42 [0.16, 0.68]	0.13	3.19	.003	0.41 [0.13, 0.69]	0.14	2.83	.010
Physical activity	0.00 [-0.03, 0.04]	0.02	0.08	.939	-0.02 [-0.18, 0.14]	0.08	-0.26	.808
Regioneurope	-0.21 [-0.39, -0.03]	0.09	-2.28	.023	-0.20 [-0.40, -0.01]	0.10	-2.04	.044
Regionafrica	-0.20 [-0.42, 0.02]	0.11	-1.81	.073	-0.25 [-0.50, 0.00]	0.13	-1.96	.062
Regionasia	-0.47 [-0.71, -0.23]	0.12	-3.78	< .001	-0.54 [-0.76, -0.31]	0.12	-4.64	< .001
Regionnorth america	-0.08 [-0.29, 0.13]	0.11	-0.74	.457	-0.10 [-0.31, 0.12]	0.11	-0.86	.393
Regionsouth america	-0.38 [-0.57, -0.19]	0.10	-3.92	< .001	-0.40 [-0.60, -0.20]	0.10	-3.89	< .001
Physical activity ²	0.00 [-0.01, 0.01]	0.01	0.54	.622	0.04 [-0.02, 0.10]	0.03	1.38	.218
Age	-0.01 [-0.01, 0.00]	0.00	-2.65	.017	-0.01 [-0.01, 0.00]	0.00	-2.45	.027
Physical activity × regioneurope	0.04 [-0.01, 0.09]	0.02	1.56	.125	0.06 [-0.10, 0.23]	0.08	0.73	.511
Physical activity × regionafrica	0.08 [-0.03, 0.19]	0.06	1.41	.165	0.13 [-0.08, 0.34]	0.11	1.19	.277
Physical activity × regionasia	0.10 [-0.06, 0.25]	0.08	1.20	.234	0.05 [-0.15, 0.25]	0.10	0.49	.631
Physical activity × regionnorth america	0.01 [-0.12, 0.13]	0.06	0.10	.918	0.10 [-0.16, 0.37]	0.14	0.78	.479
Physical activity × regionsouth america	0.05 [-0.02, 0.12]	0.04	1.29	.198	0.02 [-0.17, 0.22]	0.10	0.24	.824
Regioneurope × Physical activity ²	0.00 [-0.01, 0.02]	0.01	0.03	.981	-0.05 [-0.11, 0.01]	0.03	-1.66	.130
Regionafrica × Physical activity ²	0.00 [-0.07, 0.07]	0.04	-0.05	.964	-0.05 [-0.14, 0.03]	0.04	-1.24	.220
Regionasia × Physical activity ²	-0.06 [-0.21, 0.10]	0.08	-0.71	.486	-0.03 [-0.17, 0.11]	0.07	-0.41	.684
Regionnorth america × Physical activity ²	0.00 [-0.04, 0.03]	0.02	-0.25	.803	-0.04 [-0.16, 0.07]	0.06	-0.70	.505
Regionsouth america × Physical activity ²	-0.01 [-0.03, 0.02]	0.01	-0.68	.509	-0.01 [-0.10, 0.08]	0.04	-0.22	.832
Sleep efficiency								
(Intercept)	0.32 [0.07, 0.57]	0.13	2.51	.015	0.33 [0.08, 0.57]	0.13	2.60	.010

Table 13 continued

TITLE

Term	Physical Activity Volume				Physical Activity Intensity			
	β [95% CI]	SE	t	p	β [95% CI]	SE	t	p
Physical activity	-0.01 [-0.05, 0.02]	0.02	-0.79	.430	0.05 [-0.04, 0.15]	0.05	1.10	.278
Regioneurope	-0.16 [-0.35, 0.02]	0.09	-1.73	.085	-0.16 [-0.35, 0.03]	0.10	-1.66	.097
Regionafrica	-0.07 [-0.28, 0.14]	0.11	-0.64	.522	-0.10 [-0.32, 0.11]	0.11	-0.94	.345
Regionasia	-0.18 [-0.44, 0.07]	0.13	-1.39	.172	-0.39 [-0.64, -0.15]	0.13	-3.12	.003
Regionnorth america	-0.07 [-0.29, 0.15]	0.11	-0.62	.534	-0.11 [-0.33, 0.12]	0.12	-0.93	.356
Regionsouth america	-0.35 [-0.57, -0.13]	0.11	-3.13	.004	-0.43 [-0.66, -0.20]	0.12	-3.68	.001
Physical activity ²	0.00 [-0.01, 0.01]	0.00	0.03	.980	-0.04 [-0.08, 0.01]	0.02	-1.52	.141
Age	0.00 [0.00, 0.00]	0.00	0.58	.559	0.00 [0.00, 0.01]	0.00	0.63	.532
Physical activity × regioneurope	0.01 [-0.03, 0.06]	0.02	0.62	.539	-0.05 [-0.16, 0.05]	0.06	-0.97	.347
Physical activity × regionafrica	0.02 [-0.12, 0.15]	0.07	0.24	.811	-0.01 [-0.16, 0.14]	0.07	-0.15	.877
Physical activity × regionasia	0.20 [0.05, 0.35]	0.08	2.57	.010	-0.04 [-0.22, 0.14]	0.09	-0.47	.640
Physical activity × regionnorth america	0.04 [-0.08, 0.15]	0.06	0.66	.510	-0.01 [-0.27, 0.24]	0.13	-0.11	.919
Physical activity × regionsouth america	0.17 [0.06, 0.28]	0.06	3.06	.022	-0.11 [-0.27, 0.04]	0.08	-1.41	.204
Regioneurope × Physical activity ²	0.00 [-0.01, 0.01]	0.01	0.18	.858	0.03 [-0.02, 0.08]	0.03	1.33	.193
Regionafrica × Physical activity ²	0.00 [-0.08, 0.09]	0.04	0.03	.974	0.05 [-0.03, 0.14]	0.04	1.17	.247
Regionasia × Physical activity ²	-0.18 [-0.33, -0.03]	0.08	-2.31	.029	0.03 [-0.15, 0.21]	0.09	0.34	.739
Regionnorth america × Physical activity ²	0.01 [-0.03, 0.05]	0.02	0.60	.551	0.06 [-0.07, 0.19]	0.07	0.94	.389
Regionsouth america × Physical activity ²	-0.01 [-0.06, 0.03]	0.02	-0.57	.607	0.09 [-0.01, 0.18]	0.05	1.76	.131
Sleep onset								
(Intercept)	-0.13 [-0.45, 0.19]	0.16	-0.81	.419	-0.11 [-0.42, 0.20]	0.16	-0.69	.492
Physical activity	-0.01 [-0.05, 0.02]	0.02	-0.77	.470	-0.02 [-0.12, 0.08]	0.05	-0.39	.715
Regioneurope	0.14 [-0.03, 0.30]	0.08	1.62	.107	0.13 [-0.03, 0.29]	0.08	1.56	.118
Regionafrica	0.11 [-0.09, 0.31]	0.10	1.13	.270	0.10 [-0.11, 0.30]	0.10	0.95	.352

Table 13 continued

TITLE

Term	Physical Activity Volume			Physical Activity Intensity				
	β [95% CI]	SE	t	p	β [95% CI]	SE	t	p
Regionasia	0.28 [0.07, 0.49]	0.11	2.61	.012	0.19 [0.01, 0.38]	0.09	2.05	.041
Regionnorth america	0.07 [-0.11, 0.25]	0.09	0.77	.443	0.05 [-0.13, 0.23]	0.09	0.51	.613
Regionsouth america	0.07 [-0.10, 0.23]	0.08	0.81	.418	0.03 [-0.13, 0.20]	0.09	0.40	.691
Physical activity ²	0.00 [-0.01, 0.00]	0.00	-0.56	.586	-0.04 [-0.09, 0.02]	0.03	-1.32	.263
Age	0.00 [0.00, 0.01]	0.00	1.38	.173	0.00 [0.00, 0.01]	0.00	1.18	.243
Physical activity × regioneurope	-0.04 [-0.10, 0.01]	0.03	-1.60	.184	-0.03 [-0.14, 0.08]	0.06	-0.61	.576
Physical activity × regionafrica	-0.02 [-0.10, 0.07]	0.04	-0.39	.700	-0.05 [-0.23, 0.13]	0.09	-0.52	.631
Physical activity × regionasia	0.04 [-0.13, 0.20]	0.09	0.44	.680	0.04 [-0.08, 0.16]	0.06	0.66	.509
Physical activity × regionnorth america	0.02 [-0.06, 0.10]	0.04	0.51	.607	-0.02 [-0.23, 0.18]	0.11	-0.22	.834
Physical activity × regionsouth america	0.02 [-0.04, 0.09]	0.03	0.68	.514	-0.04 [-0.16, 0.08]	0.06	-0.65	.543
Regioneurope × Physical activity ²	0.00 [-0.01, 0.01]	0.00	0.52	.612	0.04 [-0.01, 0.09]	0.03	1.58	.184
Regionafrica × Physical activity ²	0.00 [-0.05, 0.04]	0.02	-0.06	.955	0.06 [-0.06, 0.17]	0.06	0.99	.388
Regionasia × Physical activity ²	-0.06 [-0.15, 0.03]	0.05	-1.32	.188	0.00 [-0.11, 0.10]	0.05	-0.07	.945
Regionnorth america × Physical activity ²	0.00 [-0.02, 0.03]	0.01	0.37	.709	0.03 [-0.07, 0.13]	0.05	0.59	.583
Regionsouth america × Physical activity ²	0.01 [-0.01, 0.03]	0.01	0.82	.448	0.05 [-0.04, 0.14]	0.04	1.14	.329
Sleep regularity								
(Intercept)	0.14 [-0.15, 0.43]	0.15	0.93	.368	0.18 [-0.13, 0.49]	0.16	1.14	.274
Physical activity	0.06 [0.01, 0.10]	0.02	2.48	.031	0.16 [0.04, 0.27]	0.06	2.64	.028
Regioneurope	0.22 [0.02, 0.42]	0.10	2.11	.037	0.20 [-0.02, 0.42]	0.11	1.82	.074
Regionafrica	0.34 [0.12, 0.56]	0.11	3.00	.003	0.33 [0.09, 0.58]	0.12	2.71	.007
Regionasia	0.38 [0.13, 0.63]	0.13	2.95	.003	0.19 [-0.07, 0.44]	0.13	1.42	.160
Regionnorth america	0.06 [-0.18, 0.30]	0.12	0.47	.636	0.07 [-0.18, 0.31]	0.12	0.53	.597
Regionsouth america	-0.10 [-0.32, 0.12]	0.11	-0.90	.371	-0.14 [-0.35, 0.07]	0.11	-1.34	.180

Table 13 continued

TITLE

Term	Physical Activity Volume				Physical Activity Intensity			
	β [95% CI]	SE	t	p	β [95% CI]	SE	t	p
Physical activity ²	0.00 [-0.01, 0.01]	0.01	-0.12	.910	-0.06 [-0.12, 0.00]	0.03	-1.89	.105
Age	0.00 [-0.01, 0.00]	0.00	-0.77	.490	0.00 [-0.01, 0.00]	0.00	-0.90	.422
Physical activity × regioneurope	0.08 [-0.01, 0.17]	0.05	1.82	.152	-0.10 [-0.22, 0.03]	0.06	-1.54	.160
Physical activity × regionafrica	-0.03 [-0.22, 0.17]	0.10	-0.28	.791	0.00 [-0.23, 0.22]	0.12	-0.03	.976
Physical activity × regionasia	0.03 [-0.14, 0.20]	0.09	0.36	.719	0.01 [-0.17, 0.20]	0.09	0.16	.877
Physical activity × regionnorth america	0.07 [-0.05, 0.20]	0.06	1.14	.258	-0.15 [-0.46, 0.15]	0.16	-0.99	.382
Physical activity × regionsouth america	0.11 [0.01, 0.21]	0.05	2.16	.059	0.00 [-0.16, 0.15]	0.08	-0.05	.963
Regioneurope × Physical activity ²	-0.01 [-0.03, 0.01]	0.01	-1.41	.241	0.06 [-0.01, 0.13]	0.03	1.76	.128
Regionafrica × Physical activity ²	-0.03 [-0.16, 0.10]	0.07	-0.44	.689	0.00 [-0.11, 0.12]	0.06	0.08	.939
Regionasia × Physical activity ²	-0.26 [-0.47, -0.06]	0.10	-2.49	.048	0.06 [-0.17, 0.28]	0.12	0.51	.634
Regionnorth america × Physical activity ²	-0.02 [-0.07, 0.02]	0.02	-1.04	.317	0.05 [-0.13, 0.23]	0.09	0.56	.612
Regionsouth america × Physical activity ²	-0.01 [-0.04, 0.03]	0.02	-0.36	.728	0.01 [-0.08, 0.09]	0.04	0.16	.874

Note. Adjusted for SES, age, and sex. Outcomes variables are listed in the column headers.

Table 14

Sleep predicting physical activity controlling for SES, age, and sex

TITLE

Term	Physical Activity Volume			Physical Activity Intensity				
	β [95% CI]	SE	t	p	β [95% CI]	SE	t	p
Sleep duration								
(Intercept)	1.23 [0.85, 1.61]	0.19	6.36	< .001	1.13 [0.91, 1.34]	0.11	10.15	< .001
Sleep duration	0.02 [-0.09, 0.14]	0.06	0.38	.733	0.01 [-0.04, 0.06]	0.02	0.27	.798
Regioneurope	-0.20 [-0.40, 0.00]	0.10	-1.91	.061	-0.14 [-0.29, 0.01]	0.08	-1.82	.068
Regionafrica	-0.20 [-0.41, 0.00]	0.10	-1.95	.051	-0.05 [-0.23, 0.12]	0.09	-0.57	.567
Regionasia	-0.44 [-0.66, -0.22]	0.11	-3.95	< .001	-0.40 [-0.59, -0.22]	0.09	-4.32	< .001
Regionnorth america	-0.34 [-0.57, -0.12]	0.12	-2.97	.004	-0.19 [-0.37, -0.01]	0.09	-2.11	.035
Regionsouth america	-0.37 [-0.57, -0.16]	0.10	-3.54	.001	-0.29 [-0.46, -0.13]	0.08	-3.45	.001
Sleep duration ²	-0.01 [-0.02, 0.00]	0.01	-1.66	.100	0.00 [-0.02, 0.01]	0.01	-0.50	.636
Age	-0.02 [-0.03, -0.02]	0.00	-7.50	< .001	-0.03 [-0.03, -0.02]	0.00	-10.59	< .001
Sleep duration × regioneurope	-0.04 [-0.17, 0.09]	0.07	-0.57	.618	0.01 [-0.04, 0.05]	0.02	0.24	.815
Sleep duration × regionafrica	0.00 [0.12, 0.12]	0.06	-0.03	.974	-0.03 [-0.10, 0.05]	0.04	-0.67	.510
Sleep duration × regionasia	-0.02 [-0.13, 0.10]	0.06	-0.27	.795	0.02 [-0.10, 0.14]	0.06	0.33	.755
Sleep duration × regiornnorth america	0.00 [-0.09, 0.09]	0.05	-0.05	.964	-0.02 [-0.10, 0.05]	0.04	-0.60	.560
Sleep duration × regionsouth america	-0.05 [-0.16, 0.07]	0.06	-0.80	.482	-0.01 [-0.06, 0.03]	0.02	-0.60	.553
Regioneurope × Sleep duration ²	0.00 [-0.03, 0.03]	0.01	0.07	.950	0.00 [-0.01, 0.01]	0.01	0.07	.945
Regionafrica × Sleep duration ²	0.01 [-0.03, 0.05]	0.02	0.58	.570	0.00 [-0.04, 0.03]	0.02	-0.18	.865
Regionasia × Sleep duration ²	0.00 [-0.03, 0.04]	0.02	0.22	.836	0.01 [-0.02, 0.03]	0.01	0.37	.720
Regionnorth america × Sleep duration ²	0.00 [-0.02, 0.03]	0.01	0.14	.886	0.00 [-0.03, 0.02]	0.01	-0.25	.807
Regionsouth america × Sleep duration ²	0.01 [-0.01, 0.02]	0.01	0.63	.529	0.00 [-0.02, 0.02]	0.01	-0.14	.893
Sleep efficiency								
(Intercept)	1.23 [0.86, 1.60]	0.19	6.46	< .001	1.12 [0.91, 1.33]	0.11	10.50	< .001

Table 14 continued

TITLE

Term	Physical Activity Volume				Physical Activity Intensity			
	β [95% CI]	SE	t	p	β [95% CI]	SE	t	p
Sleep efficiency	-0.03 [-0.08, 0.02]	0.02	-1.20	.243	0.01 [-0.04, 0.05]	0.02	0.29	.778
Regioneurope	-0.21 [-0.40, -0.03]	0.09	-2.27	.023	-0.14 [-0.29, 0.01]	0.08	-1.82	.069
Regionafrica	-0.18 [-0.39, 0.02]	0.10	-1.76	.079	-0.06 [-0.24, 0.12]	0.09	-0.67	.502
Regionasia	-0.43 [-0.65, -0.22]	0.11	-3.99	< .001	-0.37 [-0.55, -0.20]	0.09	-4.15	< .001
Regionnorth america	-0.34 [-0.55, -0.12]	0.11	-3.09	.002	-0.21 [-0.38, -0.04]	0.09	-2.37	.018
Regionsouth america	-0.37 [-0.57, -0.17]	0.10	-3.64	< .001	-0.30 [-0.46, -0.14]	0.08	-3.64	< .001
Sleep efficiency ²	0.00 [-0.02, 0.01]	0.01	-0.50	.633	0.00 [-0.01, 0.01]	0.01	0.44	.669
Age	-0.02 [-0.03, -0.02]	0.00	-7.51	< .001	-0.03 [-0.03, -0.02]	0.00	-10.42	< .001
Sleep efficiency × regioneurope	0.02 [-0.03, 0.07]	0.03	0.96	.342	-0.01 [-0.06, 0.05]	0.03	-0.22	.837
Sleep efficiency × regionafrica	0.02 [-0.08, 0.11]	0.05	0.33	.748	-0.02 [-0.08, 0.04]	0.03	-0.66	.510
Sleep efficiency × regionasia	0.06 [-0.06, 0.19]	0.06	1.02	.347	0.00 [-0.09, 0.10]	0.05	0.08	.938
Sleep efficiency × regionnorth america	0.01 [-0.07, 0.10]	0.04	0.30	.766	0.00 [-0.08, 0.09]	0.04	0.10	.919
Sleep efficiency × regionsouth america	0.03 [-0.02, 0.09]	0.03	1.15	.262	-0.02 [-0.06, 0.03]	0.02	-0.79	.433
Regioneurope × Sleep efficiency ²	0.00 [-0.01, 0.01]	0.01	0.26	.798	0.00 [-0.02, 0.01]	0.01	-0.25	.815
Regionafrica × Sleep efficiency ²	0.00 [-0.02, 0.02]	0.01	-0.20	.844	-0.01 [-0.03, 0.01]	0.01	-0.55	.597
Regionasia × Sleep efficiency ²	0.01 [-0.03, 0.06]	0.02	0.55	.610	-0.01 [-0.03, 0.01]	0.01	-1.08	.280
Regionnorth america × Sleep efficiency ²	0.00 [-0.02, 0.02]	0.01	-0.12	.902	0.00 [-0.02, 0.03]	0.01	0.21	.838
Regionsouth america × Sleep efficiency ²	0.00 [-0.01, 0.02]	0.01	0.45	.659	0.00 [-0.02, 0.01]	0.01	-0.54	.608
Sleep onset								
(Intercept)	1.22 [0.84, 1.59]	0.19	6.35	< .001	1.10 [0.87, 1.32]	0.11	9.69	< .001
Sleep onset	-0.06 [-0.12, 0.00]	0.03	-2.01	.054	-0.06 [-0.12, 0.01]	0.03	-1.79	.112
Regioneurope	-0.19 [-0.39, 0.01]	0.10	-1.88	.060	-0.10 [-0.27, 0.07]	0.09	-1.18	.242
Regionafrica	-0.12 [-0.38, 0.13]	0.13	-0.97	.337	-0.12 [-0.36, 0.13]	0.13	-0.92	.376

Table 14 continued

TITLE

Term	Physical Activity Volume				Physical Activity Intensity			
	β [95% CI]	SE	t	p	β [95% CI]	SE	t	p
Regionasia	-0.43 [-0.70, -0.16]	0.14	-3.13	.003	-0.36 [-0.58, -0.13]	0.11	-3.14	.003
Regionnorth america	-0.28 [-0.52, -0.03]	0.12	-2.23	.026	-0.17 [-0.38, 0.04]	0.11	-1.56	.121
Regionsouth america	-0.36 [-0.59, -0.14]	0.11	-3.18	.002	-0.26 [-0.44, -0.08]	0.09	-2.90	.004
Sleep onset ²	-0.03 [-0.08, 0.02]	0.03	-1.14	.323	-0.01 [-0.04, 0.03]	0.02	-0.36	.733
Age	-0.02 [-0.03, -0.02]	0.00	-7.82	< .001	-0.03 [-0.03, -0.02]	0.00	-10.52	< .001
Sleep onset × regioneurope	0.05 [-0.01, 0.12]	0.03	1.61	.115	0.06 [0.00, 0.12]	0.03	1.88	.082
Sleep onset × regionafrica	0.12 [-0.08, 0.31]	0.10	1.19	.262	-0.06 [-0.24, 0.12]	0.09	-0.64	.542
Sleep onset × regionasia	-0.01 [-0.23, 0.21]	0.11	-0.08	.939	0.00 [-0.22, 0.22]	0.11	-0.01	.990
Sleep onset × regionnorth america	0.06 [-0.10, 0.22]	0.08	0.75	.461	0.08 [-0.03, 0.20]	0.06	1.40	.161
Sleep onset × regionsouth america	0.03 [-0.07, 0.13]	0.05	0.61	.548	0.04 [-0.05, 0.12]	0.04	0.82	.429
Regioneurope × Sleep onset ²	0.02 [-0.04, 0.07]	0.03	0.62	.572	0.01 [-0.03, 0.04]	0.02	0.29	.782
Regionafrica × Sleep onset ²	0.04 [-0.06, 0.13]	0.05	0.73	.477	-0.01 [-0.08, 0.06]	0.03	-0.25	.800
Regionasia × Sleep onset ²	-0.02 [-0.18, 0.14]	0.08	-0.26	.798	-0.04 [-0.21, 0.13]	0.09	-0.45	.669
Regionnorth america × Sleep onset ²	-0.01 [-0.12, 0.11]	0.06	-0.10	.925	0.03 [-0.08, 0.14]	0.05	0.54	.608
Regionsouth america × Sleep onset ²	0.01 [-0.04, 0.06]	0.03	0.38	.713	-0.01 [-0.05, 0.03]	0.02	-0.50	.620
Sleep regularity								
(Intercept)	1.26 [0.87, 1.65]	0.20	6.34	< .001	1.13 [0.92, 1.33]	0.11	10.71	< .001
Sleep regularity	0.15 [0.03, 0.26]	0.06	2.55	.101	0.04 [-0.01, 0.08]	0.02	1.67	.139
Regioneurope	-0.30 [-0.52, -0.09]	0.11	-2.82	.009	-0.15 [-0.30, -0.01]	0.08	-2.03	.043
Regionafrica	-0.27 [-0.51, -0.03]	0.12	-2.18	.042	-0.11 [-0.28, 0.07]	0.09	-1.19	.234
Regionasia	-0.52 [-0.80, -0.24]	0.14	-3.60	.005	-0.38 [-0.56, -0.21]	0.09	-4.26	< .001
Regionnorth america	-0.42 [-0.69, -0.15]	0.14	-3.03	.012	-0.20 [-0.38, -0.03]	0.09	-2.33	.020
Regionsouth america	-0.45 [-0.71, -0.18]	0.13	-3.33	.010	-0.30 [-0.46, -0.15]	0.08	-3.80	< .001

Table 14 continued

TITLE

Term	Physical Activity Volume				Physical Activity Intensity			
	β [95% CI]	SE	t	p	β [95% CI]	SE	t	p
Sleep regularity ²	-0.03 [-0.06, 0.01]	0.02	-1.42	.238	-0.01 [-0.03, 0.01]	0.01	-0.76	.479
Age	-0.02 [-0.03, -0.02]	0.00	-7.67	< .001	-0.03 [-0.03, -0.02]	0.00	-10.54	< .001
Sleep regularity × regioneurope	-0.09 [-0.22, 0.04]	0.06	-1.41	.272	0.00 [-0.05, 0.05]	0.03	-0.08	.942
Sleep regularity × regionafrica	-0.09 [-0.22, 0.04]	0.07	-1.31	.263	0.03 [-0.04, 0.10]	0.04	0.84	.409
Sleep regularity × regionasia	-0.08 [-0.20, 0.03]	0.06	-1.45	.189	0.01 [-0.07, 0.09]	0.04	0.26	.798
Sleep regularity × regionnorth america	-0.08 [-0.24, 0.07]	0.08	-1.06	.357	0.02 [-0.05, 0.08]	0.03	0.54	.591
Sleep regularity × regionsouth america	-0.07 [-0.18, 0.04]	0.06	-1.32	.272	0.02 [-0.05, 0.09]	0.04	0.59	.578
Regioneurope × Sleep regularity ²	0.02 [-0.01, 0.05]	0.02	1.13	.307	0.00 [-0.02, 0.03]	0.01	0.22	.835
Regionafrica × Sleep regularity ²	0.00 [-0.05, 0.05]	0.02	0.07	.946	0.03 [-0.01, 0.07]	0.02	1.28	.210
Regionasia × Sleep regularity ²	0.02 [-0.05, 0.08]	0.03	0.47	.655	-0.01 [-0.06, 0.04]	0.02	-0.44	.666
Regionnorth america × Sleep regularity ²	0.02 [-0.03, 0.07]	0.02	0.78	.459	0.00 [-0.03, 0.03]	0.02	-0.11	.912
Regionsouth america × Sleep regularity ²	0.03 [-0.01, 0.07]	0.02	1.34	.241	0.01 [-0.03, 0.06]	0.02	0.56	.610

Note. Adjusted for SES, age, and sex. Outcomes variables are listed in the row headers.

Table 15

Physical activity predicting sleep controlling for BMI, age, and sex.

Term	Physical Activity Volume				Physical Activity Intensity			
	β [95% CI]	SE	t	p	β [95% CI]	SE	t	p
Sleep duration								
(Intercept)	0.78 [0.51, 1.05]	0.14	5.63	< .001	0.77 [0.49, 1.05]	0.14	5.37	< .001
Physical activity	0.09 [-0.09, 0.27]	0.09	0.97	.384	0.14 [0.03, 0.24]	0.05	2.49	.018
Daylight hours	-0.03 [-0.04, -0.02]	0.01	-4.45	< .001	-0.03 [-0.04, -0.01]	0.01	-4.15	< .001
Physical activity ²	-0.01 [-0.04, 0.02]	0.02	-0.47	.643	0.00 [-0.06, 0.05]	0.03	-0.16	.875
Age	-0.01 [-0.01, 0.00]	0.00	-2.37	.026	0.00 [-0.01, 0.00]	0.00	-2.24	.031
Physical activity × daylight hours	-0.01 [-0.02, 0.01]	0.01	-0.68	.527	-0.01 [-0.02, 0.00]	0.00	-1.77	.084
Daylight hours × Physical activity ²	0.00 [0.00, 0.00]	0.00	0.52	.612	0.00 [0.00, 0.01]	0.00	0.22	.825
Sleep efficiency								
(Intercept)	0.29 [0.02, 0.56]	0.14	2.09	.036	0.30 [0.01, 0.59]	0.15	2.05	.042
Physical activity	0.01 [-0.13, 0.16]	0.07	0.20	.849	0.04 [-0.06, 0.14]	0.05	0.83	.409
Daylight hours	0.00 [-0.02, 0.01]	0.01	-0.42	.674	0.00 [-0.02, 0.01]	0.01	-0.40	.689
Physical activity ²	-0.01 [-0.04, 0.02]	0.02	-0.37	.714	0.00 [-0.07, 0.07]	0.03	-0.03	.978
Age	0.00 [0.00, 0.01]	0.00	1.02	.306	0.00 [0.00, 0.01]	0.00	0.92	.359
Physical activity × daylight hours	0.00 [-0.01, 0.01]	0.01	0.01	.993	0.00 [-0.01, 0.00]	0.00	-0.78	.438
Daylight hours × Physical activity ²	0.00 [0.00, 0.00]	0.00	0.27	.784	0.00 [-0.01, 0.01]	0.00	0.03	.973
Sleep onset								
(Intercept)	-0.28 [-0.60, 0.04]	0.16	-1.69	.091	-0.25 [-0.57, 0.08]	0.16	-1.49	.136
Physical activity	-0.02 [-0.11, 0.06]	0.04	-0.52	.609	-0.06 [-0.18, 0.07]	0.06	-0.93	.406
Daylight hours	0.01 [0.00, 0.02]	0.01	2.41	.020	0.01 [0.00, 0.02]	0.01	2.19	.035
Physical activity ²	0.00 [-0.02, 0.03]	0.01	0.37	.716	0.00 [-0.04, 0.05]	0.02	0.19	.849
Age	0.00 [0.00, 0.01]	0.00	1.00	.331	0.00 [0.00, 0.01]	0.00	0.71	.478

Table 15 continued

Term	Physical Activity Volume				Physical Activity Intensity			
	β [95% CI]	SE	t	p	β [95% CI]	SE	t	p
Physical activity \times daylight hours	0.00 [-0.01, 0.01]	0.00	-0.17	.866	0.00 [-0.01, 0.01]	0.00	0.09	.929
Daylight hours \times Physical activity ²	0.00 [0.00, 0.00]	0.00	-0.41	.685	0.00 [0.00, 0.00]	0.00	-0.13	.898
Sleep regularity								
(Intercept)	0.59 [0.29, 0.88]	0.15	3.93	< .001	0.68 [0.32, 1.04]	0.19	3.66	.003
Physical activity	-0.04 [-0.26, 0.18]	0.11	-0.36	.736	0.04 [-0.06, 0.14]	0.05	0.86	.389
Daylight hours	0.00 [-0.01, 0.01]	0.01	-0.12	.905	-0.01 [-0.02, 0.01]	0.01	-0.69	.492
Physical activity ²	0.02 [-0.04, 0.07]	0.03	0.54	.615	-0.05 [-0.13, 0.04]	0.04	-1.13	.289
Age	0.00 [-0.01, 0.01]	0.00	-0.27	.799	0.00 [-0.01, 0.01]	0.00	-0.30	.779
Physical activity \times daylight hours	0.01 [0.00, 0.03]	0.01	1.46	.213	0.00 [-0.01, 0.01]	0.00	0.56	.579
Daylight hours \times Physical activity ²	0.00 [-0.01, 0.00]	0.00	-0.76	.491	0.00 [0.00, 0.01]	0.00	1.00	.340

Note. Adjusted for BMI, age, and sex. Outcomes variables are listed in the column headers.

Table 16

Sleep predicting physical activity controlling for BMI, age, and sex

Term	Physical Activity Volume				Physical Activity Intensity			
	β [95% CI]	SE	t	p	β [95% CI]	SE	t	p
Sleep duration								
(Intercept)	1.32 [0.88, 1.76]	0.22	5.89	< .001	1.41 [1.16, 1.67]	0.13	10.89	< .001
Sleep duration	0.01 [-0.10, 0.11]	0.05	0.13	.900	0.02 [-0.09, 0.12]	0.05	0.35	.740
Daylight hours	0.01 [0.00, 0.02]	0.01	1.94	.053	0.00 [-0.01, 0.01]	0.00	-0.19	.846
Sleep duration ²	0.00 [-0.05, 0.05]	0.02	0.12	.912	0.01 [-0.02, 0.03]	0.01	0.47	.644
Age	-0.02 [-0.03, -0.02]	0.00	-7.35	< .001	-0.03 [-0.03, -0.02]	0.00	-9.55	< .001
Sleep duration × daylight hours	0.00 [-0.01, 0.01]	0.00	-0.25	.806	0.00 [-0.01, 0.01]	0.00	-0.28	.788
Daylight hours × Sleep duration ²	0.00 [0.00, 0.00]	0.00	-0.29	.783	0.00 [0.00, 0.00]	0.00	-0.69	.492
Sleep efficiency								
(Intercept)	1.32 [0.90, 1.75]	0.22	6.09	< .001	1.43 [1.19, 1.67]	0.12	11.51	< .001
Sleep efficiency	-0.03 [-0.11, 0.05]	0.04	-0.70	.487	-0.04 [-0.12, 0.03]	0.04	-1.11	.275
Daylight hours	0.01 [0.00, 0.02]	0.01	1.90	.058	0.00 [-0.01, 0.01]	0.01	-0.44	.659
Sleep efficiency ²	0.00 [-0.02, 0.02]	0.01	0.16	.875	0.00 [-0.04, 0.03]	0.02	-0.20	.854
Age	-0.02 [-0.03, -0.02]	0.00	-7.31	< .001	-0.03 [-0.03, -0.02]	0.00	-9.50	< .001
Sleep efficiency × daylight hours	0.00 [0.00, 0.01]	0.00	0.63	.529	0.00 [0.00, 0.01]	0.00	1.07	.294
Daylight hours × Sleep efficiency ²	0.00 [0.00, 0.00]	0.00	-0.24	.815	0.00 [0.00, 0.00]	0.00	0.19	.858
Sleep onset								
(Intercept)	1.33 [0.90, 1.76]	0.22	6.03	< .001	1.41 [1.17, 1.66]	0.13	11.24	< .001
Sleep onset	-0.03 [-0.17, 0.11]	0.07	-0.42	.694	-0.05 [-0.13, 0.03]	0.04	-1.15	.250
Daylight hours	0.01 [0.00, 0.02]	0.01	1.55	.131	0.00 [-0.01, 0.01]	0.01	-0.22	.825
Sleep onset ²	-0.01 [-0.10, 0.07]	0.04	-0.31	.772	0.01 [-0.04, 0.06]	0.02	0.48	.640
Age	-0.02 [-0.03, -0.02]	0.00	-7.38	< .001	-0.03 [-0.03, -0.02]	0.00	-9.43	< .001

Table 16 continued

Term	Physical Activity Volume				Physical Activity Intensity			
	β [95% CI]	SE	t	p	β [95% CI]	SE	t	p
Sleep onset × daylight hours	0.00 [-0.01, 0.01]	0.01	0.16	.877	0.00 [0.00, 0.01]	0.00	0.92	.362
Daylight hours × Sleep onset ²	0.00 [-0.01, 0.01]	0.00	0.11	.919	0.00 [0.00, 0.00]	0.00	-0.59	.562
Sleep regularity								
(Intercept)	1.27 [0.86, 1.68]	0.21	6.09	< .001	1.38 [1.12, 1.65]	0.13	10.27	< .001
Sleep regularity	0.11 [-0.04, 0.26]	0.08	1.47	.229	0.08 [-0.02, 0.18]	0.05	1.66	.157
Daylight hours	0.01 [0.00, 0.02]	0.01	1.93	.054	0.00 [-0.01, 0.01]	0.01	-0.14	.892
Sleep regularity ²	-0.01 [-0.05, 0.04]	0.02	-0.28	.783	0.00 [-0.04, 0.05]	0.02	0.13	.899
Age	-0.02 [-0.03, -0.02]	0.00	-7.36	< .001	-0.03 [-0.03, -0.02]	0.00	-9.62	< .001
Sleep regularity × daylight hours	0.00 [-0.02, 0.01]	0.01	-0.60	.588	0.00 [-0.01, 0.00]	0.00	-0.92	.394
Daylight hours × Sleep regularity ²	0.00 [0.00, 0.00]	0.00	-0.11	.916	0.00 [0.00, 0.00]	0.00	-0.33	.750

Note. Adjusted for BMI, age, and sex. Outcomes variables are listed in the row headers.

Table 17

Physical activity predicting sleep controlling for BMI, age, and sex.

Term	Physical Activity Volume			Physical Activity Intensity						
	β	[95% CI]	SE	t	p	β [95% CI]	SE	t	p	
Sleep duration										
(Intercept)	0.84	[0.57, 1.10]	0.14	6.19	< .001	0.79	[0.52, 1.05]	0.13	5.88	< .001
Physical activity	0.05	[0.00, 0.10]	0.02	2.15	.053	0.04	[0.00, 0.09]	0.02	1.84	.075
Wrist	-0.49	[-0.77, -0.22]	0.14	-3.49	.001	-0.46	[-0.73, -0.18]	0.14	-3.27	.001
Physical activity ²	0.00	[-0.02, 0.02]	0.01	-0.37	.711	0.01	[-0.02, 0.04]	0.02	0.46	.651
Age	-0.01	[-0.01, 0.00]	0.00	-2.78	.008	0.00	[-0.01, 0.00]	0.00	-2.48	.017
Physical activity × wrist	-0.03	[-0.08, 0.02]	0.03	-1.21	.243	0.00	[-0.05, 0.06]	0.03	0.06	.949
Wrist × Physical activity ²	0.01	[-0.01, 0.03]	0.01	0.75	.459	-0.01	[-0.04, 0.03]	0.02	-0.29	.775
Sleep efficiency										
(Intercept)	-0.36	[-0.48, -0.23]	0.06	-5.67	< .001	-0.41	[-0.56, -0.26]	0.08	-5.22	< .001
Physical activity	0.10	[0.02, 0.18]	0.04	2.43	.087	0.03	[-0.02, 0.08]	0.02	1.29	.208
Wrist	0.76	[0.63, 0.89]	0.07	11.33	< .001	0.81	[0.69, 0.93]	0.06	13.35	< .001
Physical activity ²	-0.01	[-0.05, 0.03]	0.02	-0.61	.579	0.00	[-0.03, 0.03]	0.02	0.00	.999
Age	0.00	[0.00, 0.00]	0.00	1.04	.301	0.00	[0.00, 0.00]	0.00	0.94	.351
Physical activity × wrist	-0.12	[-0.19, -0.04]	0.04	-2.91	.043	-0.04	[-0.09, 0.00]	0.02	-1.77	.077
Wrist × Physical activity ²	0.01	[-0.02, 0.05]	0.02	0.69	.532	0.00	[-0.04, 0.03]	0.02	-0.29	.775
Sleep onset										
(Intercept)	-1.04	[-1.46, -0.62]	0.21	-4.89	< .001	-1.02	[-1.43, -0.61]	0.21	-4.83	< .001
Physical activity	0.02	[-0.03, 0.06]	0.02	0.73	.500	-0.03	[-0.06, 0.01]	0.02	-1.40	.188
Wrist	1.13	[0.68, 1.59]	0.23	4.94	< .001	1.13	[0.69, 1.58]	0.23	5.01	< .001
Physical activity ²	0.00	[-0.02, 0.01]	0.01	-0.14	.891	0.00	[-0.02, 0.02]	0.01	-0.37	.709
Age	0.00	[0.00, 0.01]	0.00	1.00	.329	0.00	[0.00, 0.01]	0.00	0.70	.489

Table 17 continued

Term	Physical Activity Volume				Physical Activity Intensity					
	β	[95% CI]	SE	t	p	β	[95% CI]	SE	t	p
Physical activity \times wrist	-0.06	[-0.12, 0.00]	0.03	-1.98	.130	-0.04	[-0.08, 0.00]	0.02	-2.07	.048
Wrist \times Physical activity ²	0.00	[0.01, 0.02]	0.01	0.24	.813	0.00	[-0.02, 0.02]	0.01	0.27	.787
Sleep regularity										
(Intercept)	0.24	[0.07, 0.55]	0.16	1.53	.126	0.18	[0.15, 0.50]	0.16	1.08	.283
Physical activity	0.12	[0.07, 0.18]	0.03	4.19	.006	0.16	[0.09, 0.23]	0.04	4.37	.009
Wrist	0.45	[0.13, 0.78]	0.17	2.72	.007	0.58	[0.22, 0.94]	0.18	3.18	.003
Physical activity ²	-0.03	[-0.11, 0.06]	0.04	-0.63	.586	-0.06	[-0.10, -0.01]	0.02	-2.68	.035
Age	0.00	[-0.01, 0.00]	0.00	-0.62	.562	0.00	[-0.01, 0.00]	0.00	-0.82	.442
Physical activity \times wrist	-0.04	[-0.12, 0.04]	0.04	-0.91	.417	-0.11	[-0.19, -0.04]	0.04	-2.85	.035
Wrist \times Physical activity ²	0.02	[-0.07, 0.11]	0.05	0.51	.659	0.05	[0.01, 0.09]	0.02	2.49	.035

Note. Adjusted for BMI, age, and sex. Outcomes variables are listed in the column headers.

Table 18

Sleep predicting physical activity controlling for BMI, age, and sex

Term	Physical Activity Volume				Physical Activity Intensity			
	β [95% CI]	SE	t	p	β [95% CI]	SE	t	p
Sleep duration								
(Intercept)	0.33 [-0.14, 0.81]	0.24	1.38	.166	1.07 [0.73, 1.41]	0.17	6.17	< .001
Sleep duration	0.00 [-0.03, 0.02]	0.01	-0.26	.802	0.00 [-0.03, 0.02]	0.01	-0.07	.947
Wrist	1.38 [0.86, 1.90]	0.26	5.22	< .001	0.43 [0.06, 0.80]	0.19	2.27	.024
Sleep duration ²	0.00 [0.00, 0.01]	0.00	0.64	.530	0.00 [0.00, 0.00]	0.00	0.04	.965
Age	-0.02 [-0.03, -0.02]	0.00	-8.06	< .001	-0.03 [-0.03, -0.02]	0.00	-10.04	< .001
Sleep duration × wrist	0.00 [-0.05, 0.05]	0.03	-0.02	.984	0.01 [-0.03, 0.05]	0.02	0.53	.628
Wrist × Sleep duration ²	-0.01 [-0.03, 0.01]	0.01	-1.28	.306	-0.01 [-0.02, 0.01]	0.01	-0.98	.392
Sleep efficiency								
(Intercept)	0.34 [-0.14, 0.81]	0.24	1.40	.163	1.07 [0.73, 1.41]	0.17	6.15	< .001
Sleep efficiency	0.00 [-0.02, 0.02]	0.01	-0.07	.949	0.00 [-0.02, 0.02]	0.01	-0.37	.722
Wrist	1.37 [0.85, 1.89]	0.27	5.16	< .001	0.42 [0.05, 0.80]	0.19	2.22	.026
Sleep efficiency ²	0.00 [0.00, 0.00]	0.00	-0.10	.921	0.00 [0.00, 0.00]	0.00	-0.48	.643
Age	-0.02 [-0.03, -0.02]	0.00	-8.08	< .001	-0.03 [-0.03, -0.02]	0.00	-9.92	< .001
Sleep efficiency × wrist	-0.01 [-0.04, 0.02]	0.02	-0.53	.604	0.00 [-0.02, 0.03]	0.01	0.28	.781
Wrist × Sleep efficiency ²	0.00 [-0.02, 0.01]	0.01	-0.49	.651	0.00 [-0.01, 0.01]	0.00	0.40	.692
Sleep onset								
(Intercept)	0.33 [-0.14, 0.81]	0.24	1.37	.170	1.05 [0.71, 1.39]	0.17	6.06	< .001
Sleep onset	0.00 [-0.06, 0.06]	0.03	-0.11	.911	-0.04 [-0.08, 0.00]	0.02	-1.87	.064
Wrist	1.38 [0.86, 1.90]	0.27	5.19	< .001	0.45 [0.07, 0.83]	0.19	2.33	.021
Sleep onset ²	0.00 [-0.03, 0.02]	0.01	-0.27	.797	-0.01 [-0.04, 0.02]	0.01	-0.82	.465
Age	-0.02 [-0.03, -0.02]	0.00	-8.25	< .001	-0.03 [-0.03, -0.02]	0.00	-9.92	< .001

Term	Physical Activity Volume				Physical Activity Intensity			
	β [95% CI]	SE	t	p	β [95% CI]	SE	t	p
Sleep onset × wrist	-0.01 [-0.08, 0.05]	0.03	-0.38	.708	0.03 [-0.01, 0.08]	0.02	1.45	.149
Wrist × Sleep onset ²	-0.01 [-0.05, 0.02]	0.02	-0.63	.563	0.01 [-0.02, 0.04]	0.02	0.83	.456
Sleep regularity								
(Intercept)	0.33 [-0.14, 0.80]	0.24	1.38	.168	1.08 [0.74, 1.42]	0.17	6.20	< .001
Sleep regularity	0.07 [0.01, 0.12]	0.03	2.40	.094	0.07 [0.04, 0.10]	0.02	4.92	.002
Wrist	1.32 [0.81, 1.83]	0.26	5.05	< .001	0.40 [0.03, 0.76]	0.19	2.11	.035
Sleep regularity ²	-0.02 [-0.04, 0.01]	0.01	-1.18	.317	-0.01 [-0.02, 0.01]	0.01	-1.11	.289
Age	-0.02 [-0.03, -0.02]	0.00	-8.24	< .001	-0.03 [-0.03, -0.02]	0.00	-9.92	< .001
Sleep regularity × wrist	0.00 [-0.07, 0.07]	0.04	0.00	> .999	-0.05 [-0.08, -0.02]	0.01	-3.69	.001
Wrist × Sleep regularity ²	0.01 [-0.01, 0.03]	0.01	0.74	.491	0.01 [-0.01, 0.02]	0.01	0.67	.516

Note. Adjusted for BMI, age, and sex. Outcomes variables are listed in the row headers.

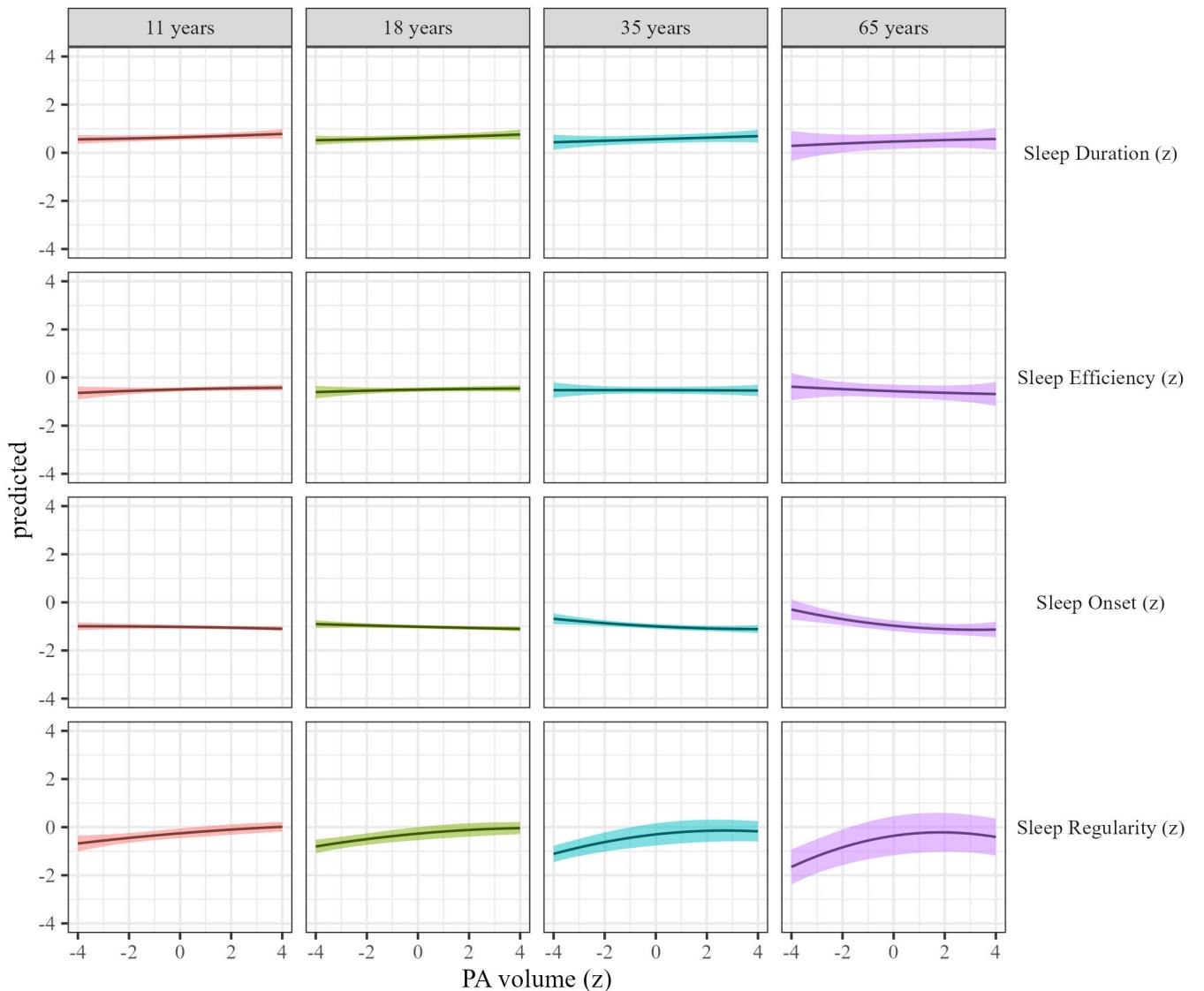


Figure 1. Sleep metrics on Physical activity volume

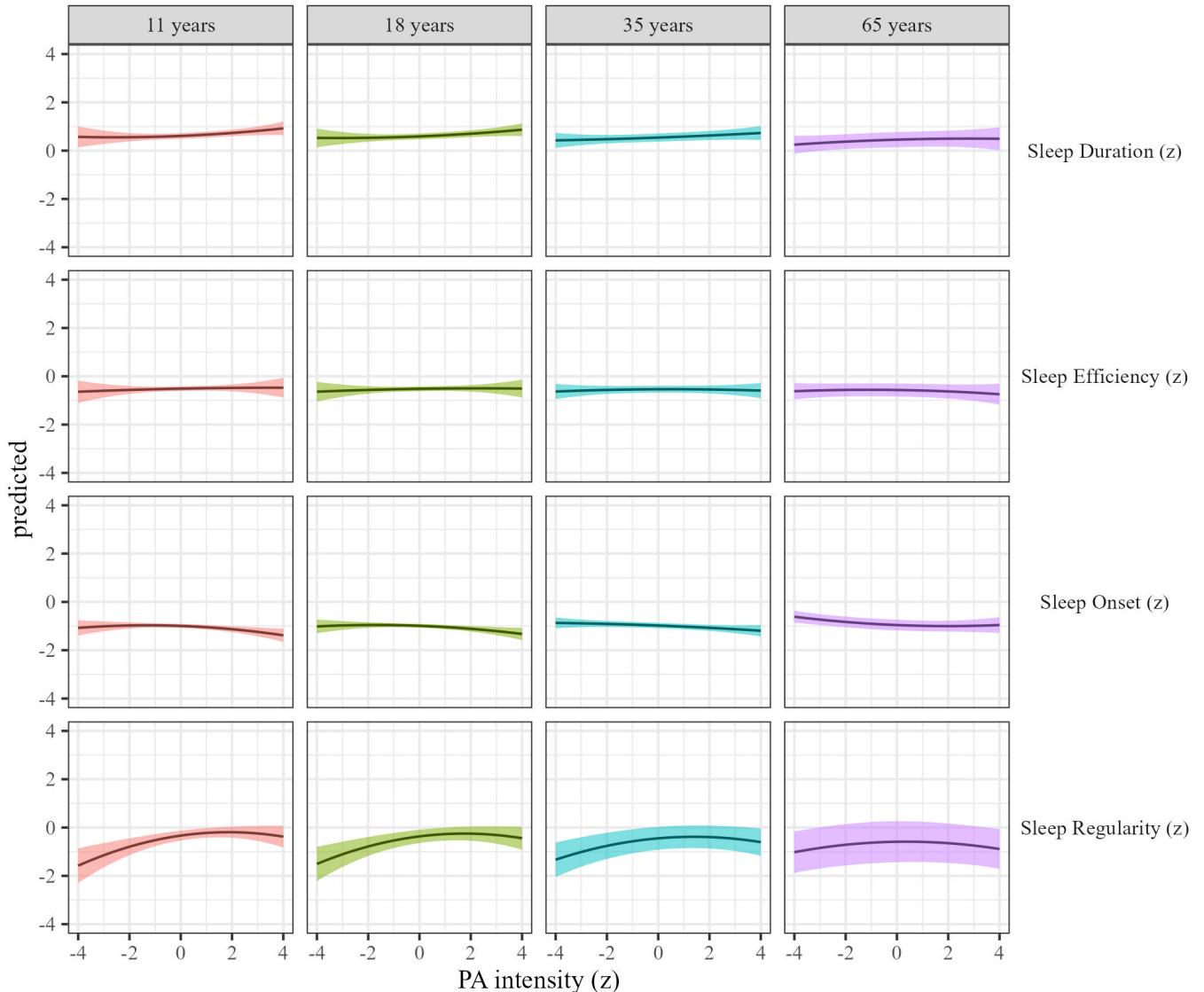


Figure 2. Sleep metrics on Physical activity intensity

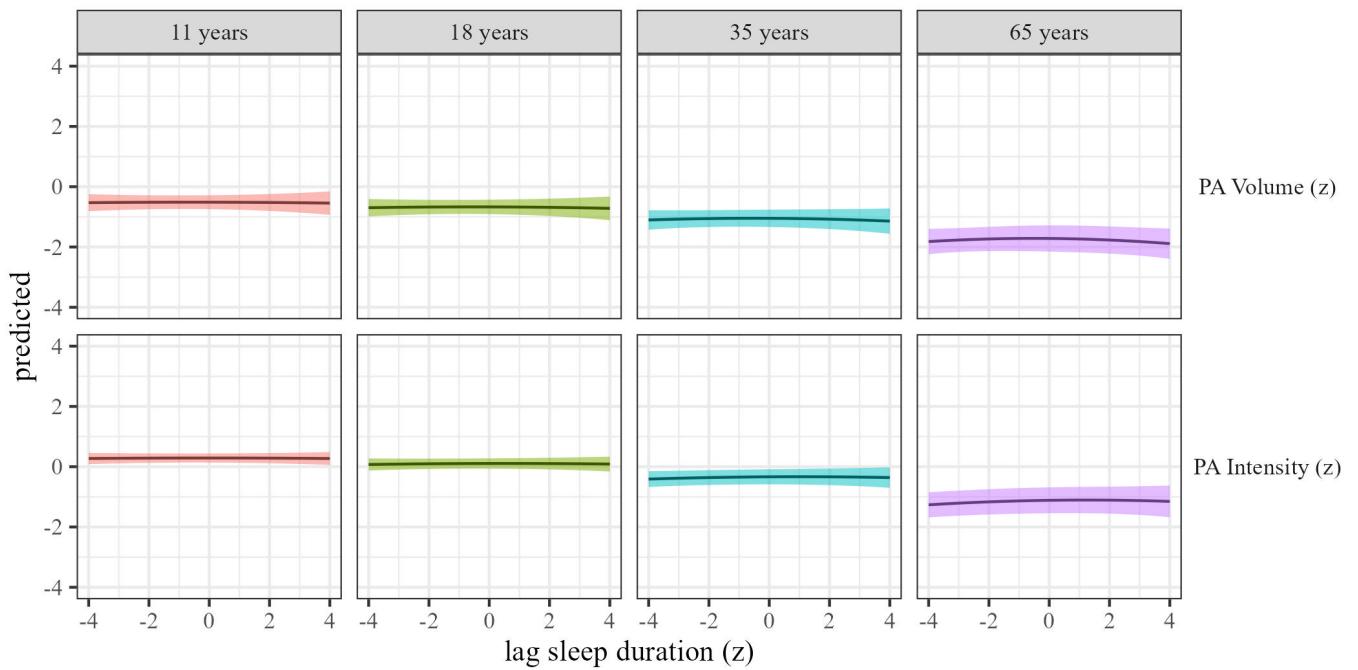


Figure 3. Physical activity by sleep duration

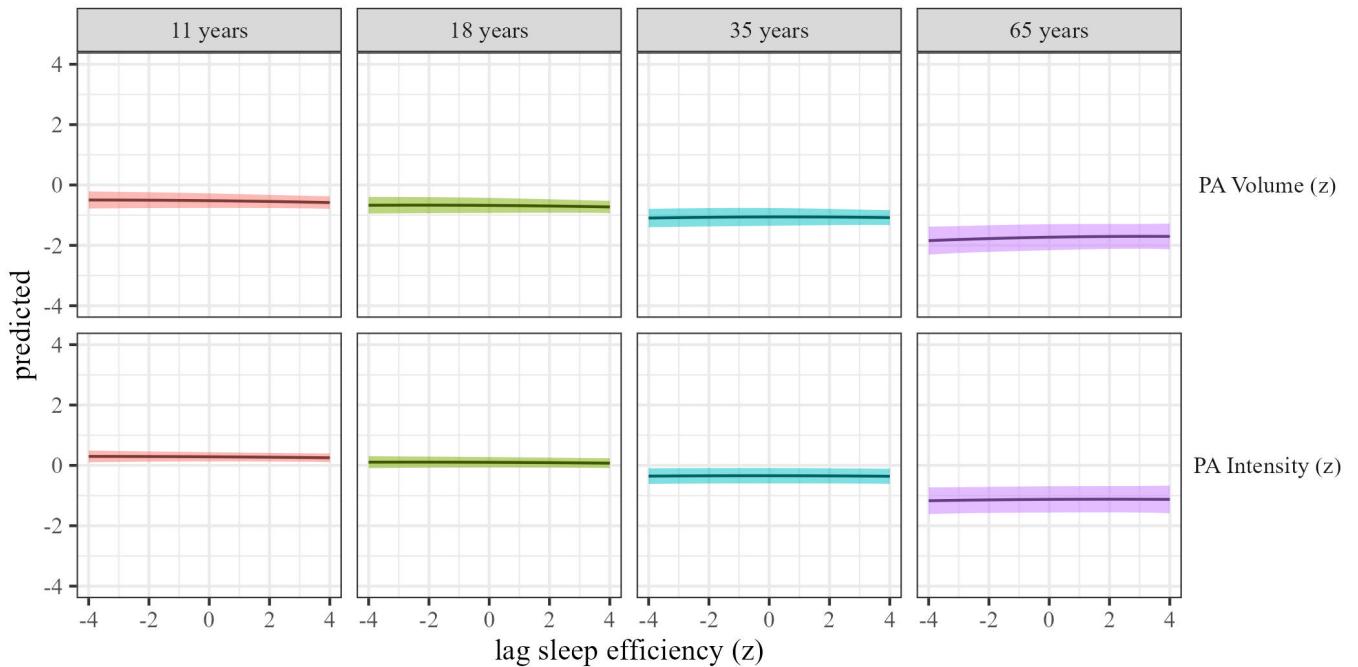


Figure 4. Physical activity by sleep efficiency

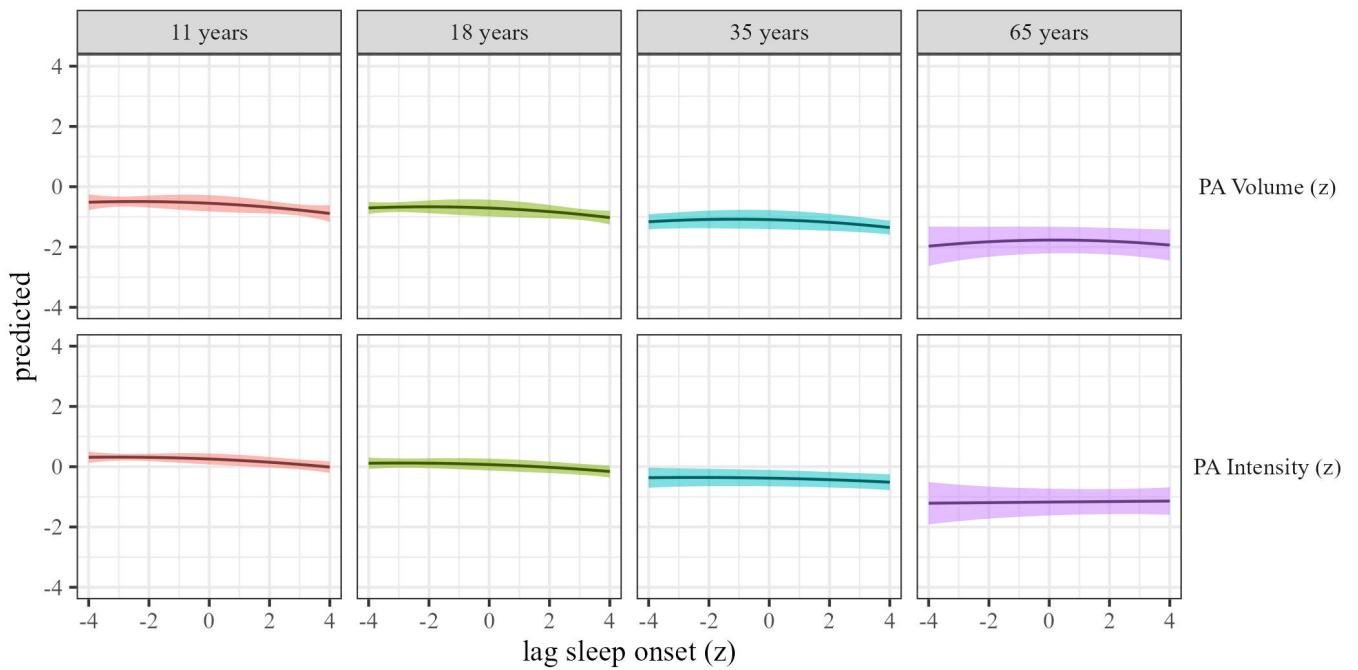


Figure 5. Physical activity by sleep onset

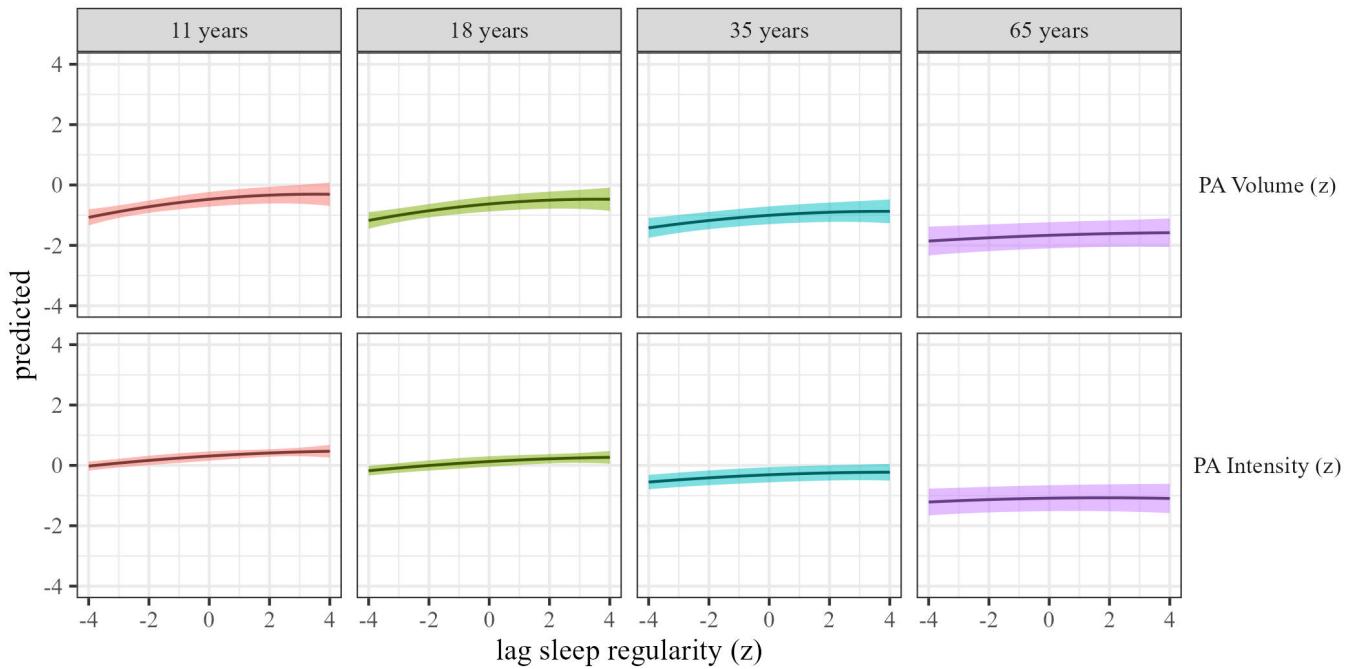


Figure 6. Physical activity by sleep regularity

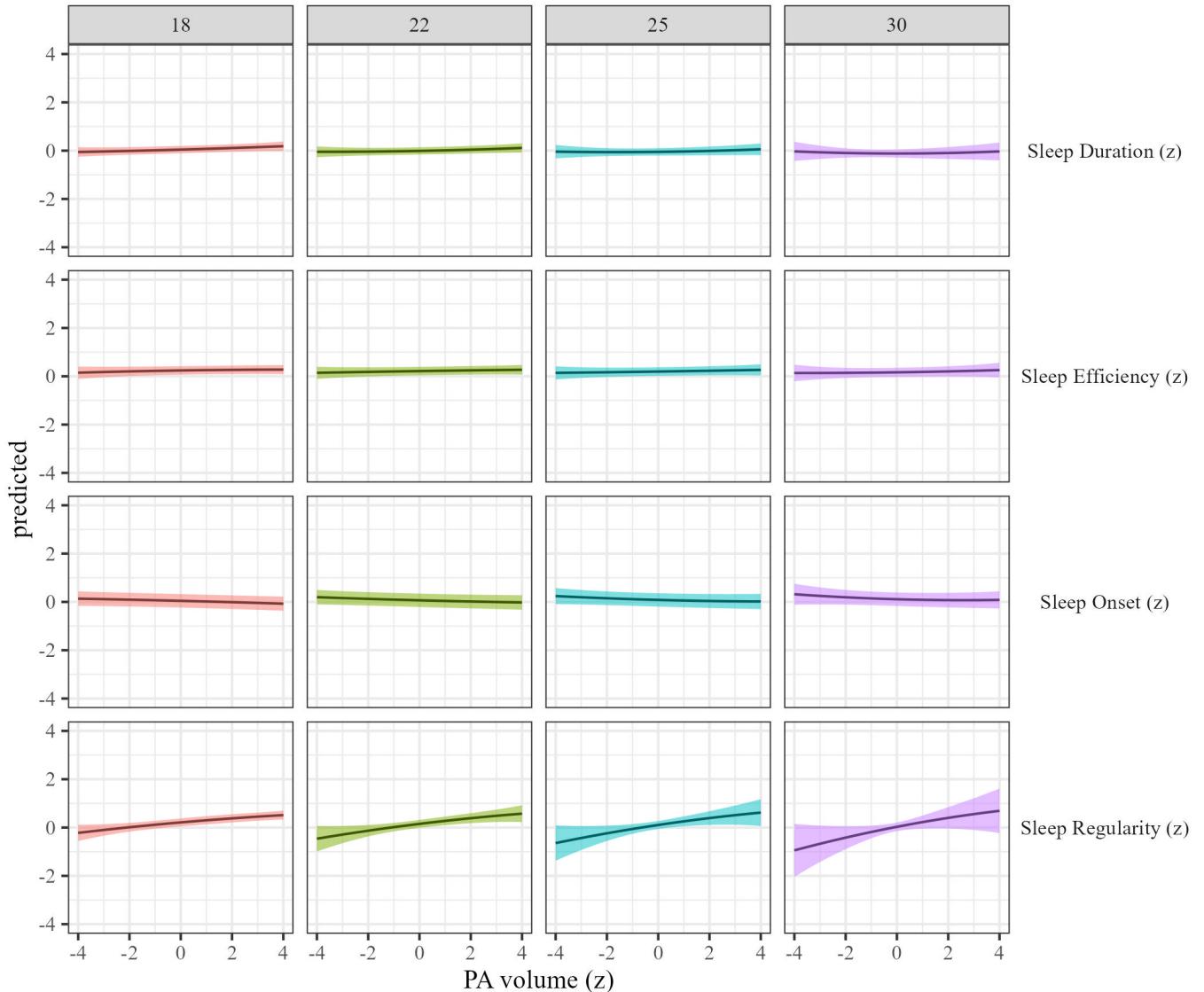


Figure 7. Sleep metrics on Physical activity volume by BMI

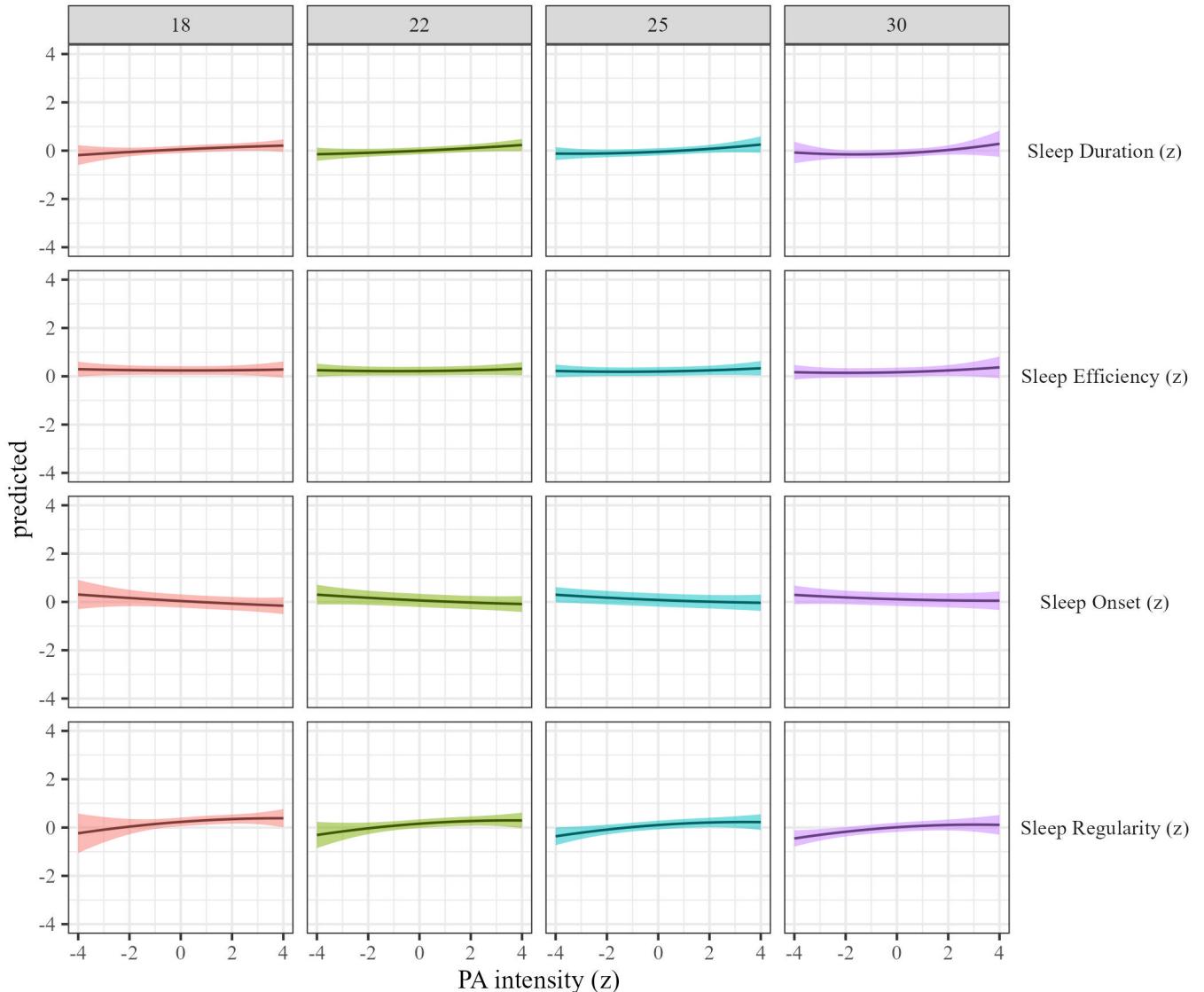


Figure 8. Sleep metrics on Physical activity intensity moderated by BMI

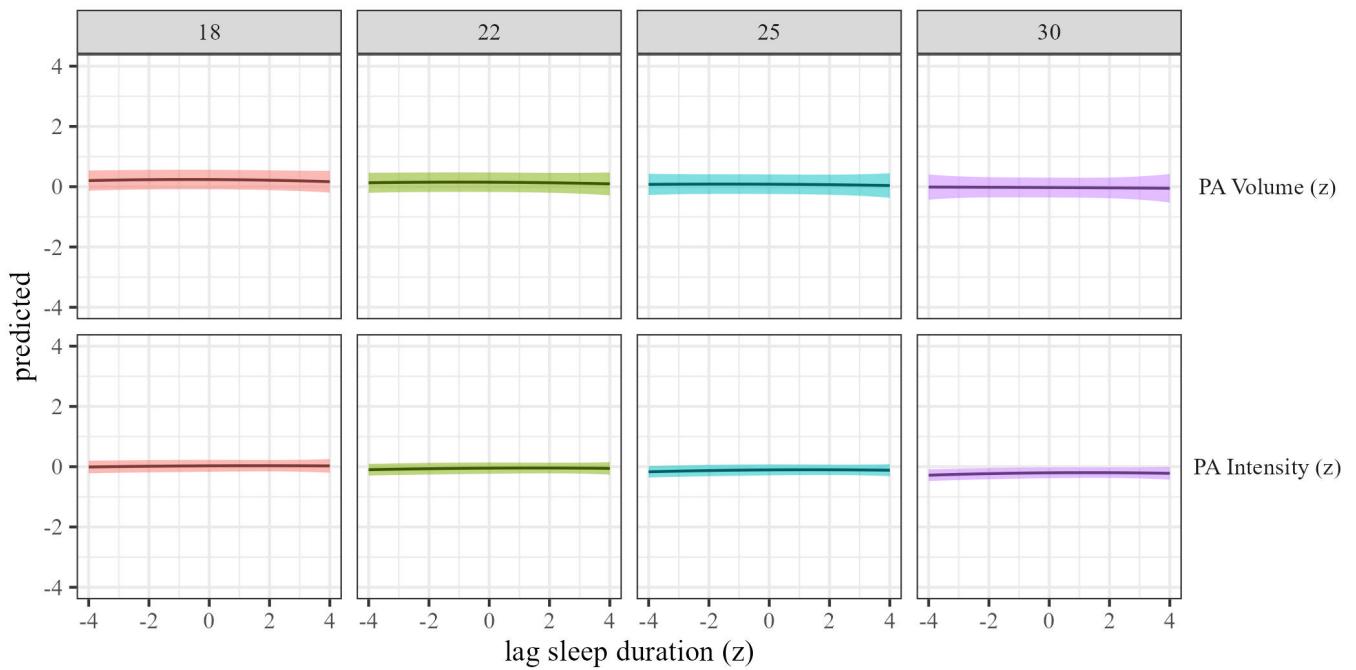


Figure 9. Physical activity by sleep duration moderated by BMI

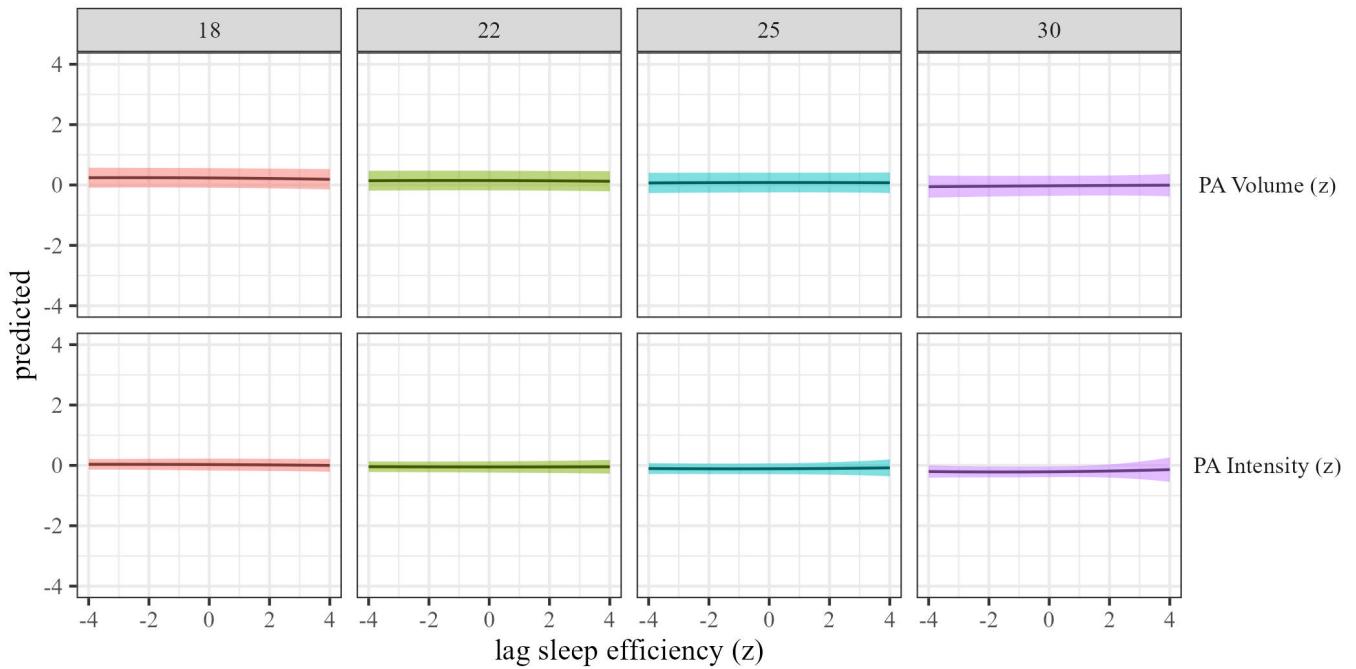


Figure 10. Physical activity by sleep efficiency moderated by BMI

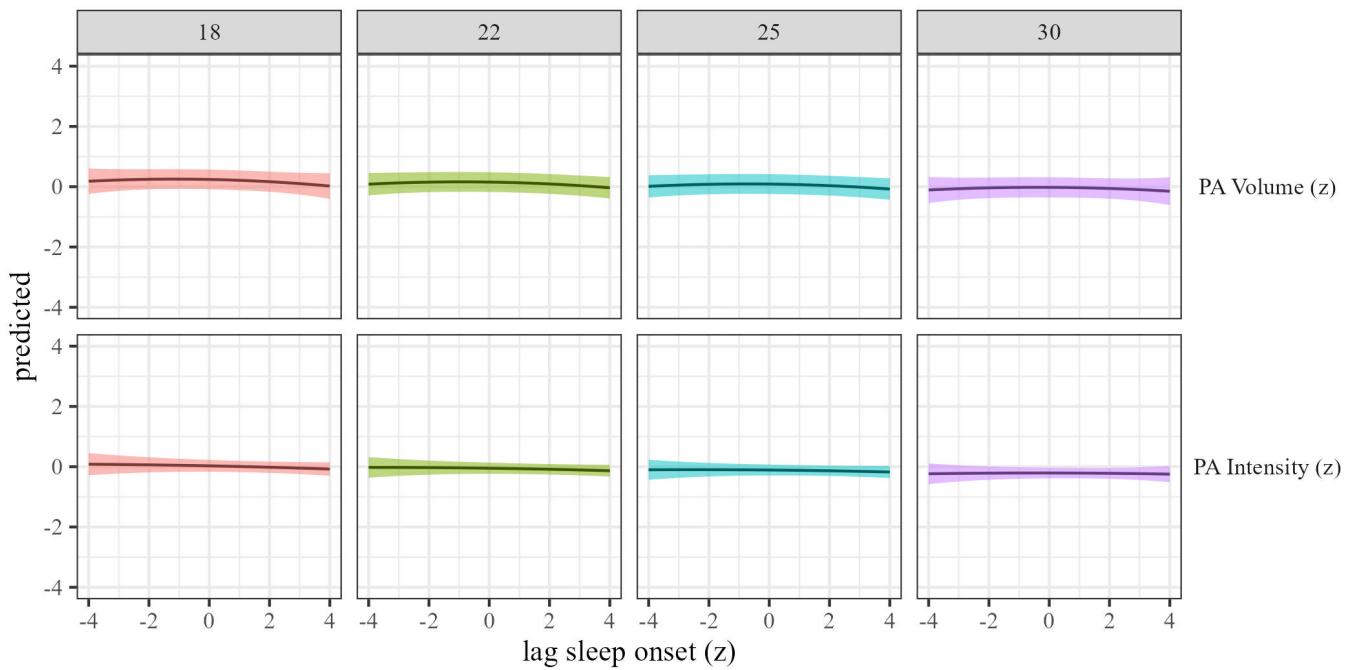


Figure 11. Physical activity by sleep onset moderated by BMI

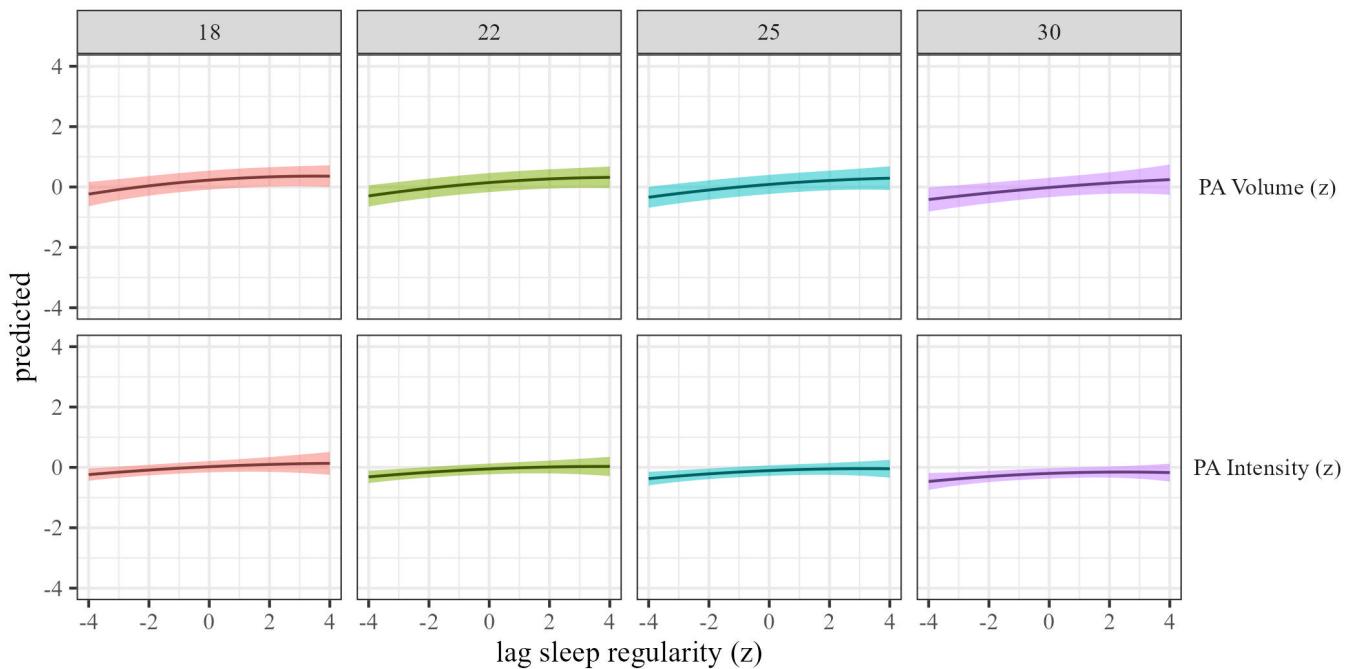


Figure 12. Physical activity by sleep regularity moderated by BMI

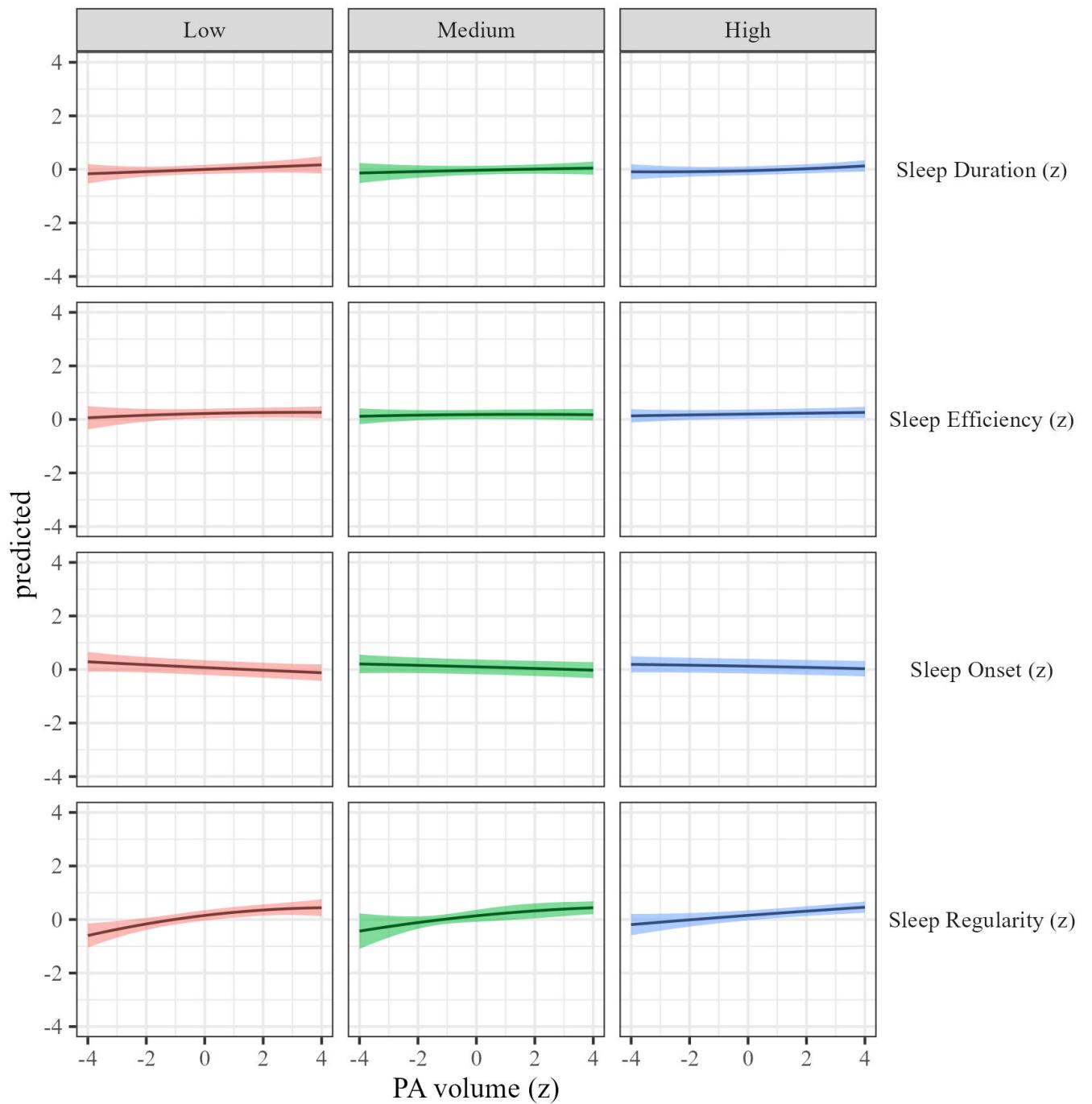


Figure 13. Sleep metrics on Physical activity volume by SES

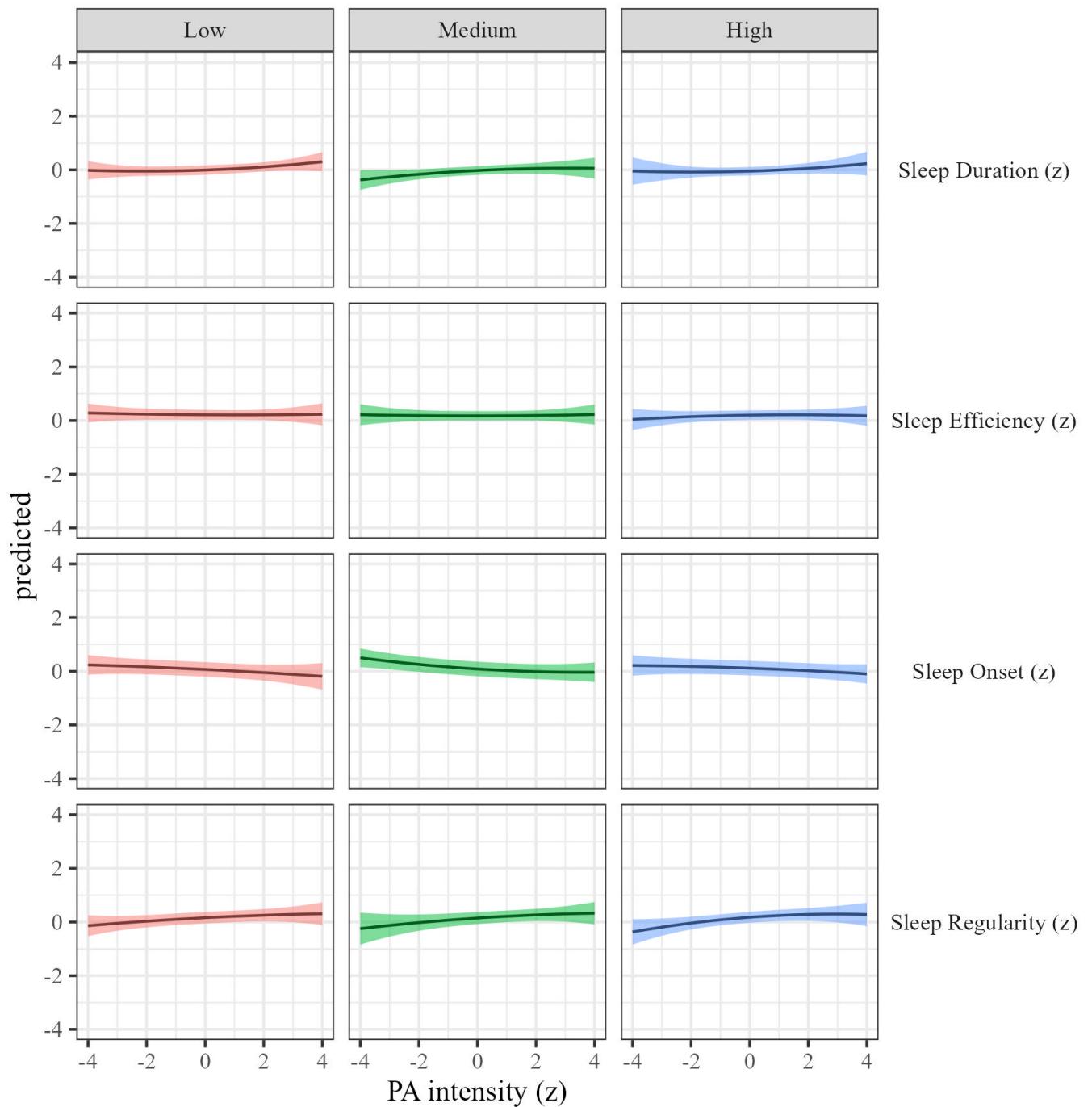


Figure 14. Sleep metrics on Physical activity intensity moderated by SES

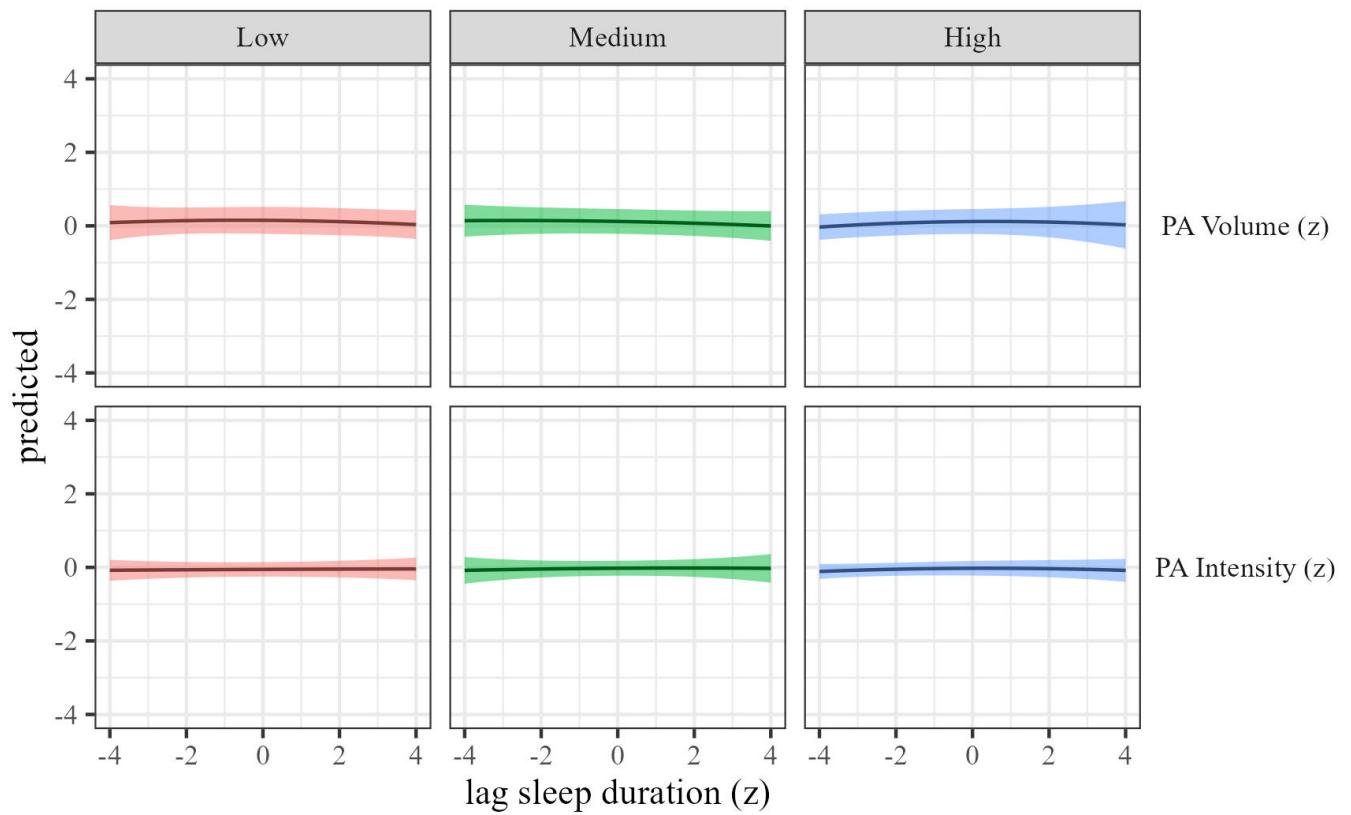


Figure 15. Physical activity by sleep duration moderated by SES

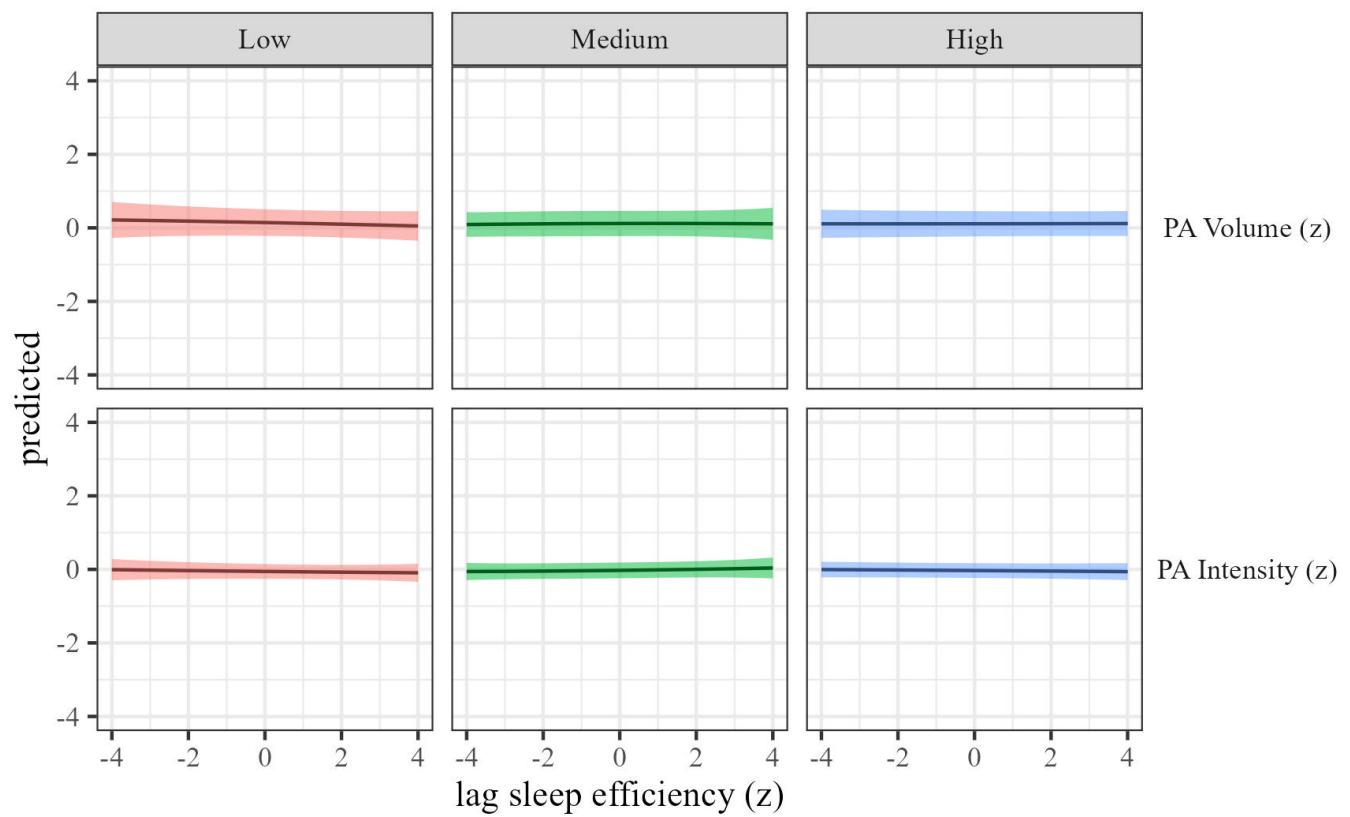


Figure 16. Physical activity by sleep efficiency moderated by SES

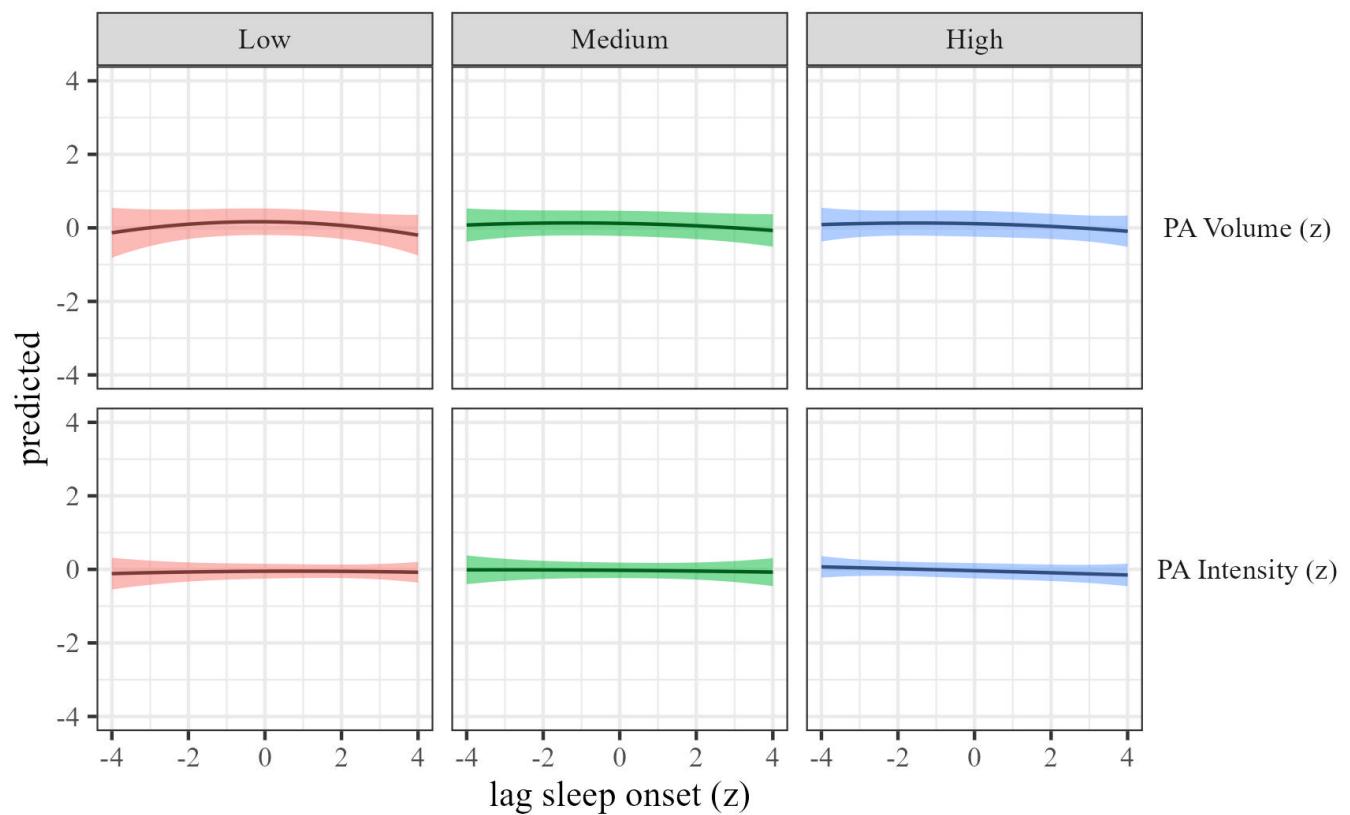


Figure 17. Physical activity by sleep onset moderated by SES

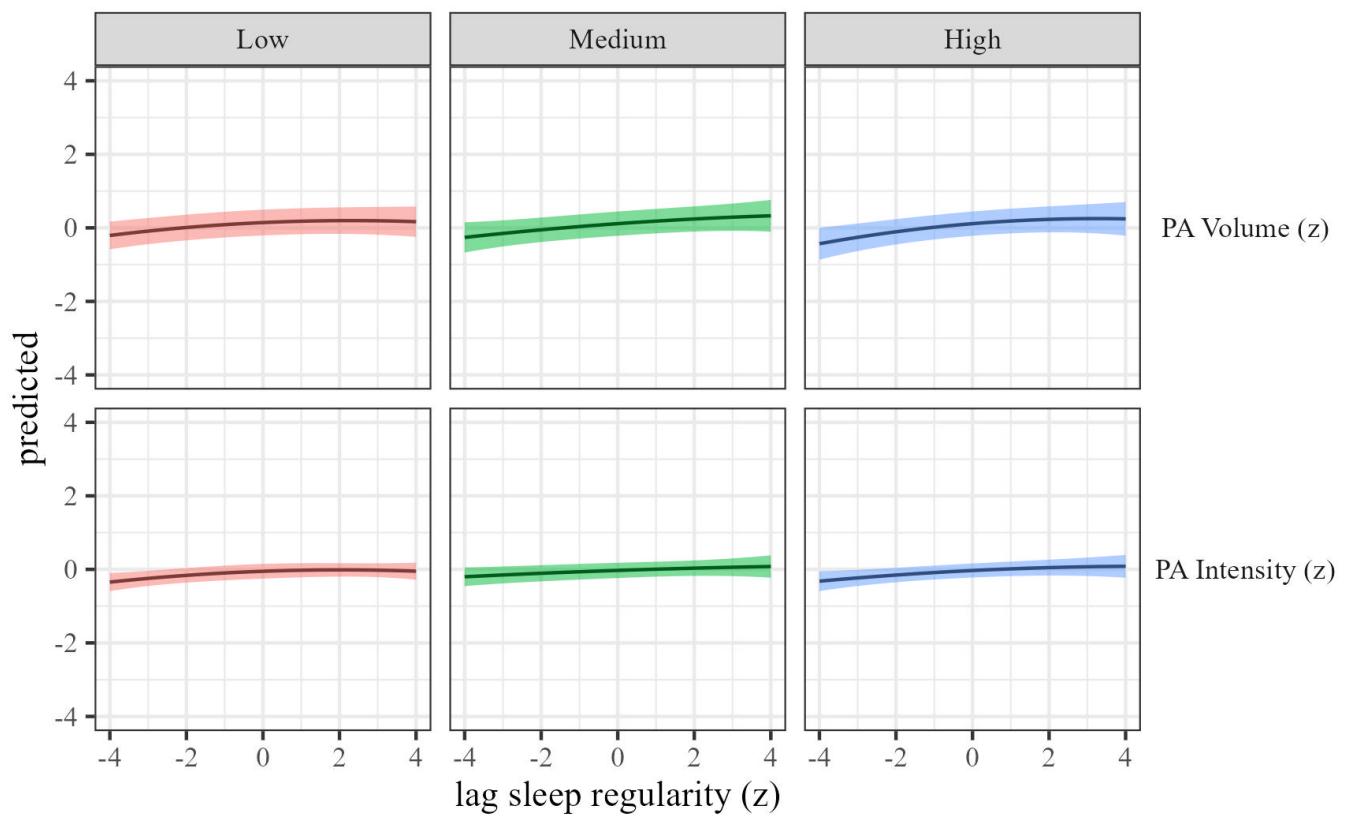


Figure 18. Physical activity by sleep regularity moderated by SES

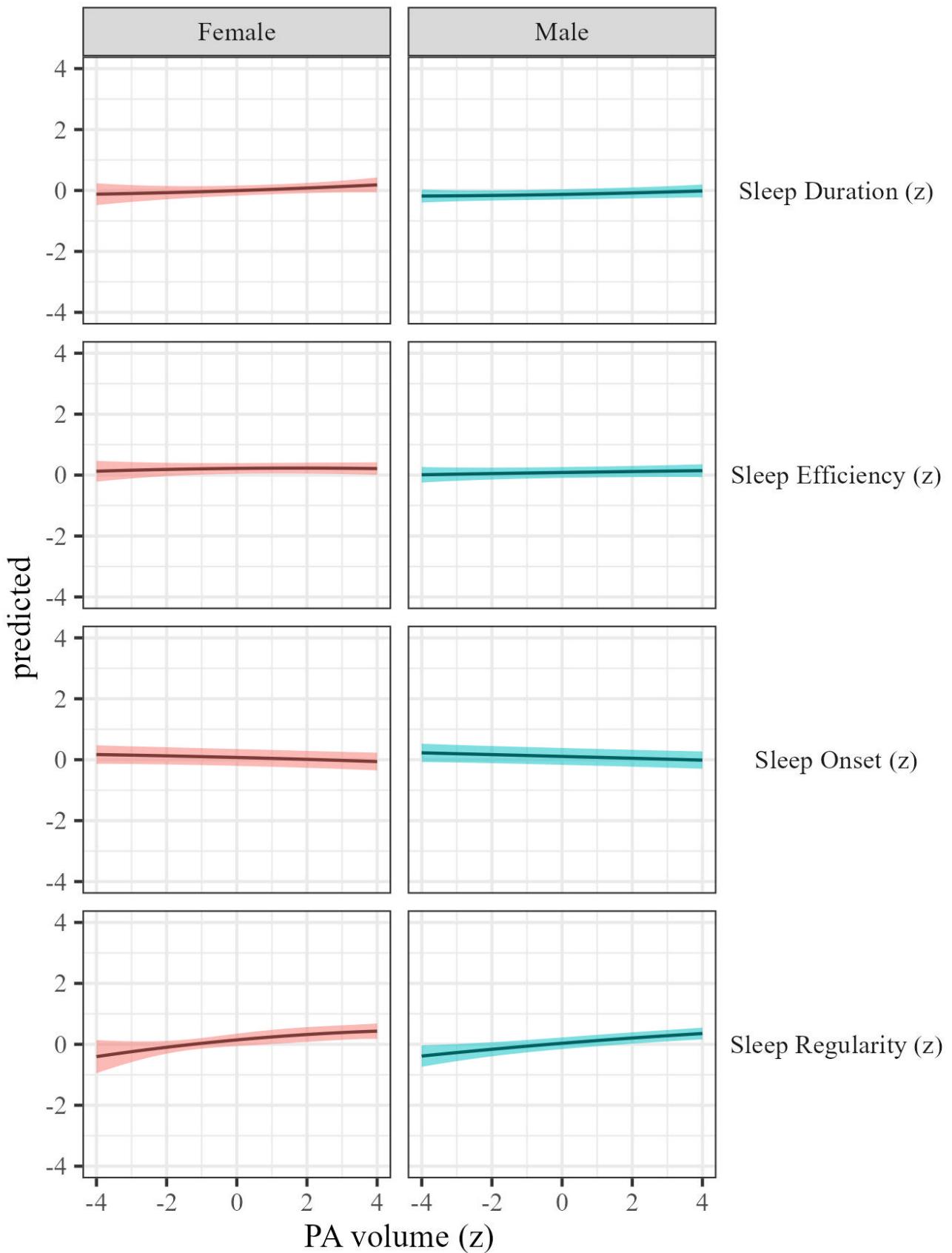


Figure 19. Sleep metrics on Physical activity volume by sex

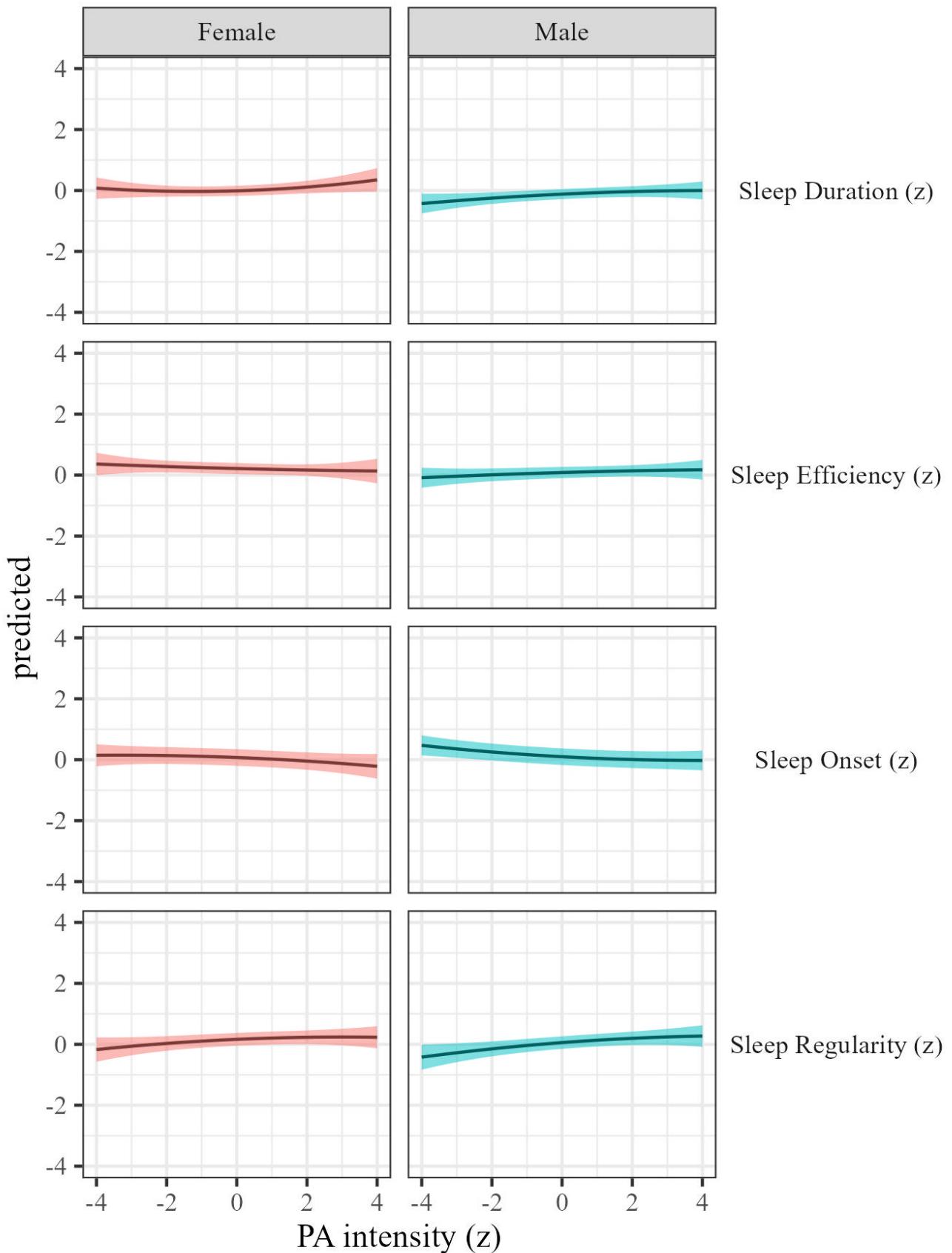


Figure 20. Sleep metrics on Physical activity intensity moderated by sex

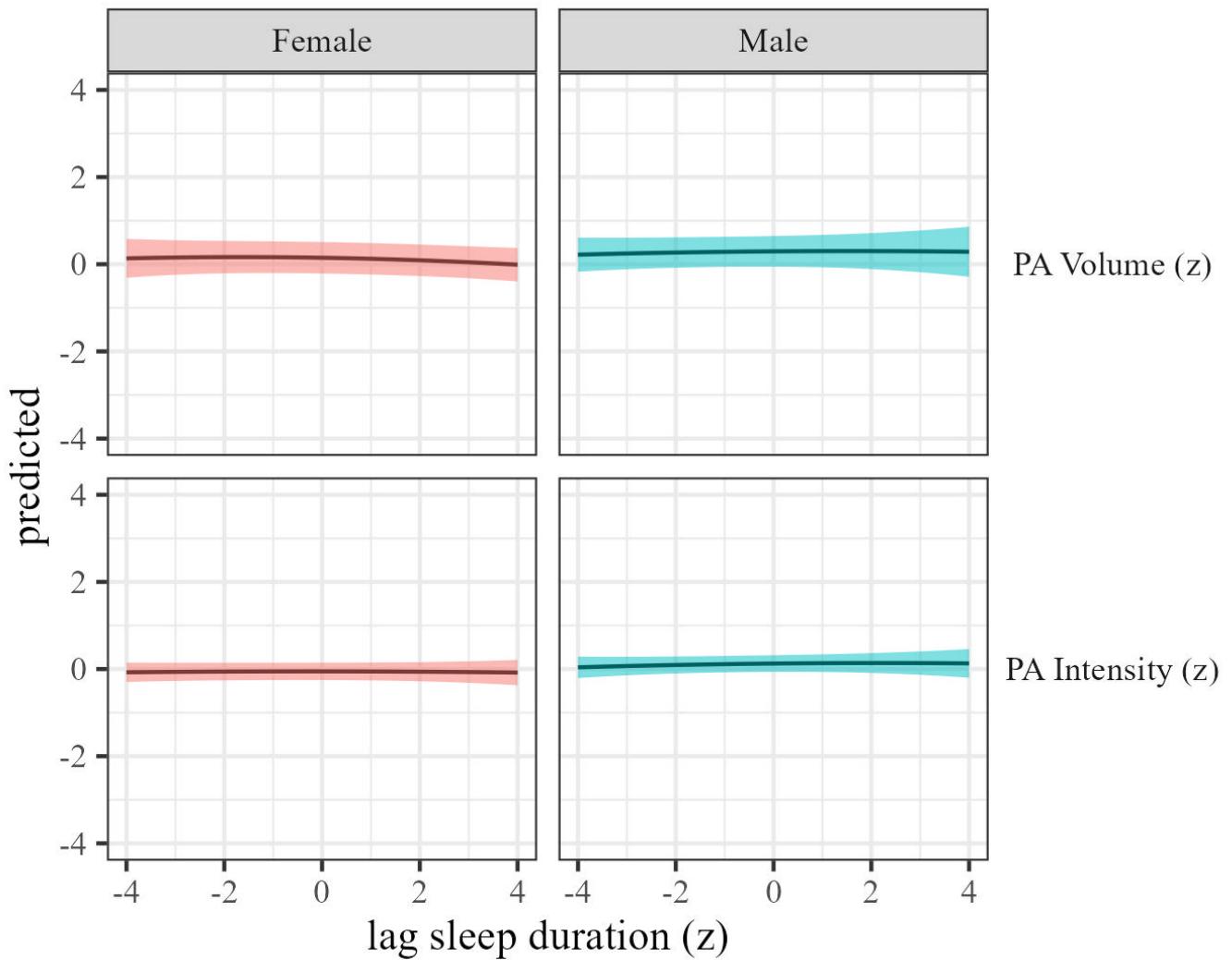


Figure 21. Physical activity by sleep duration moderated by sex

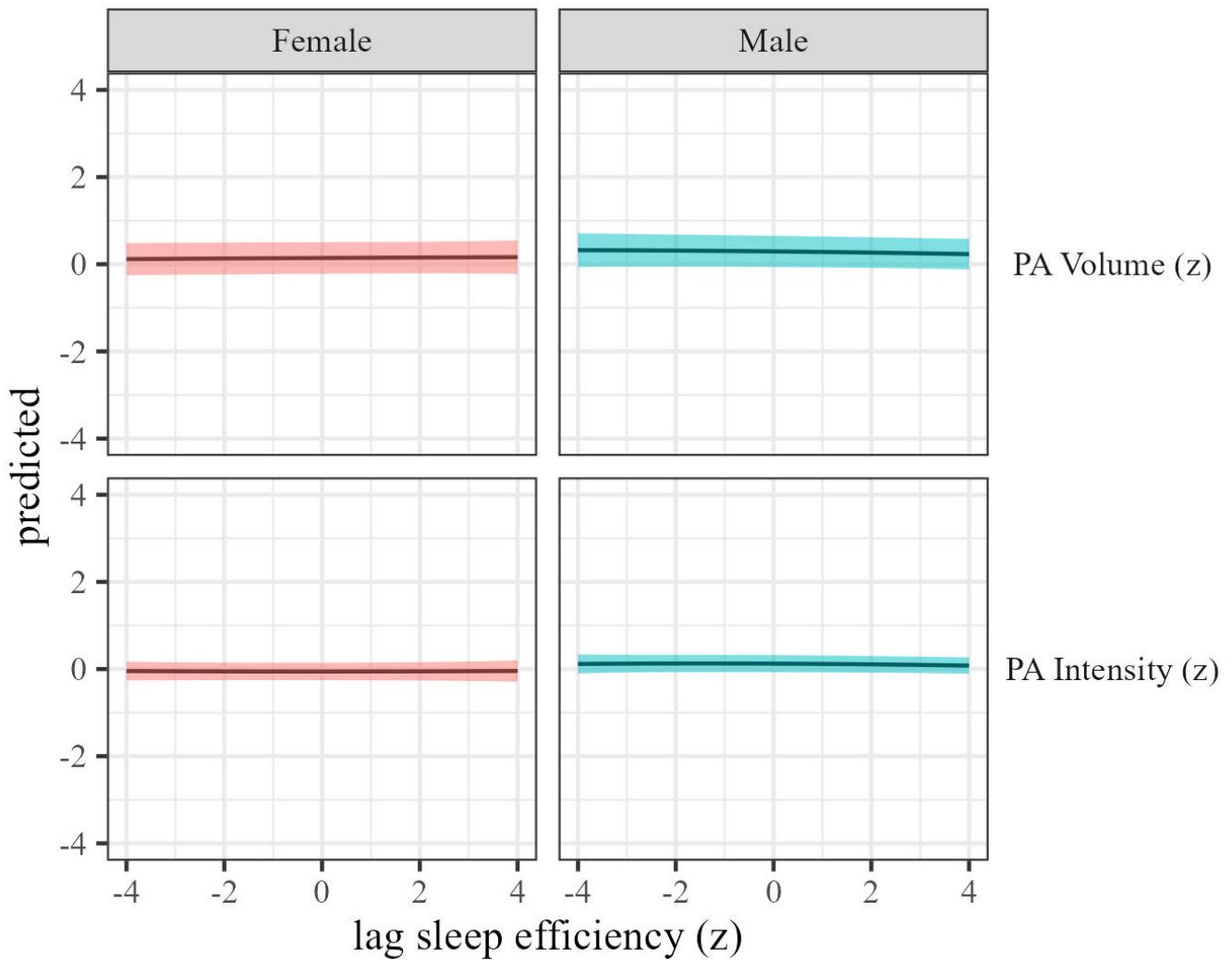


Figure 22. Physical activity by sleep efficiency moderated by sex

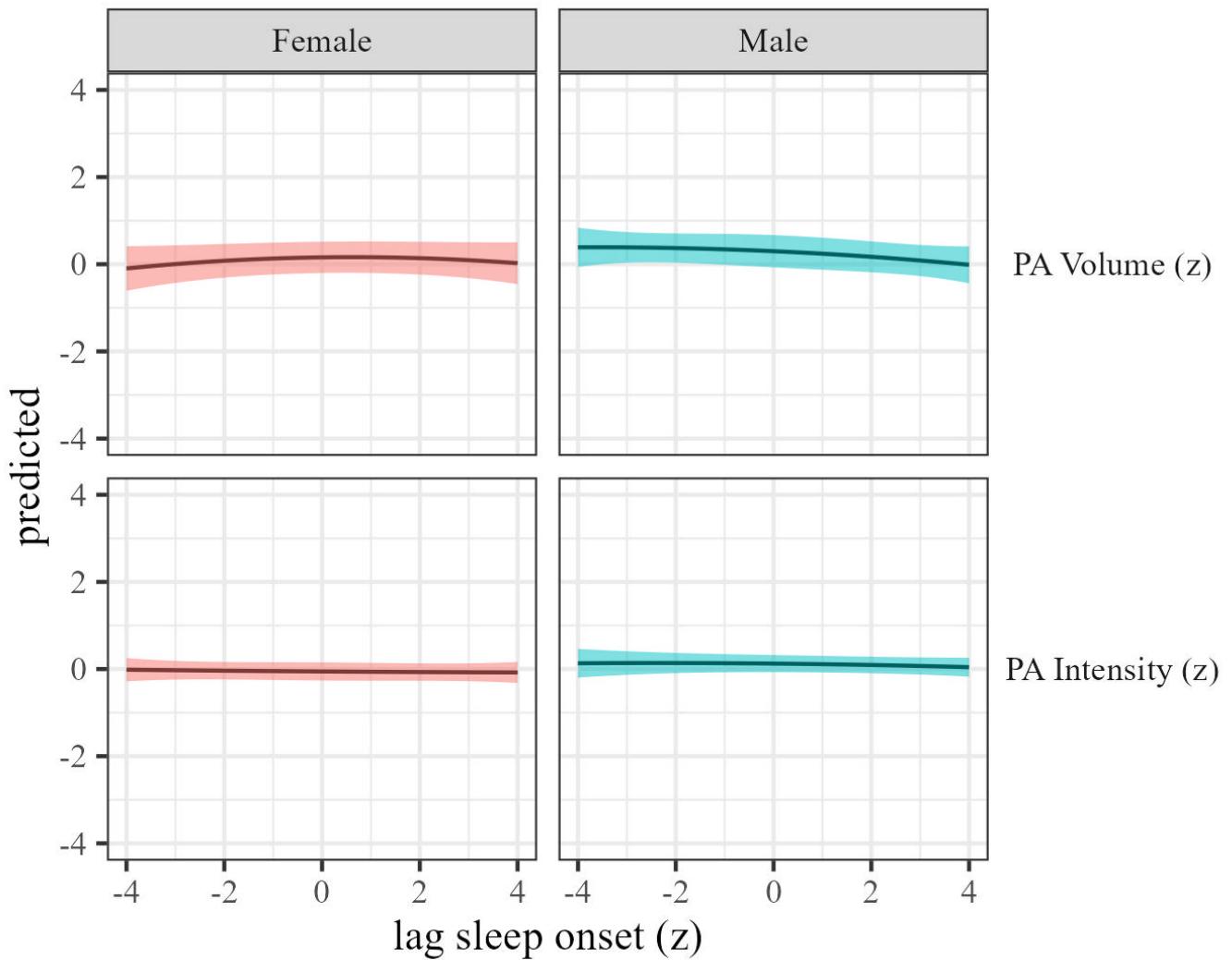


Figure 23. Physical activity by sleep onset moderated by sex

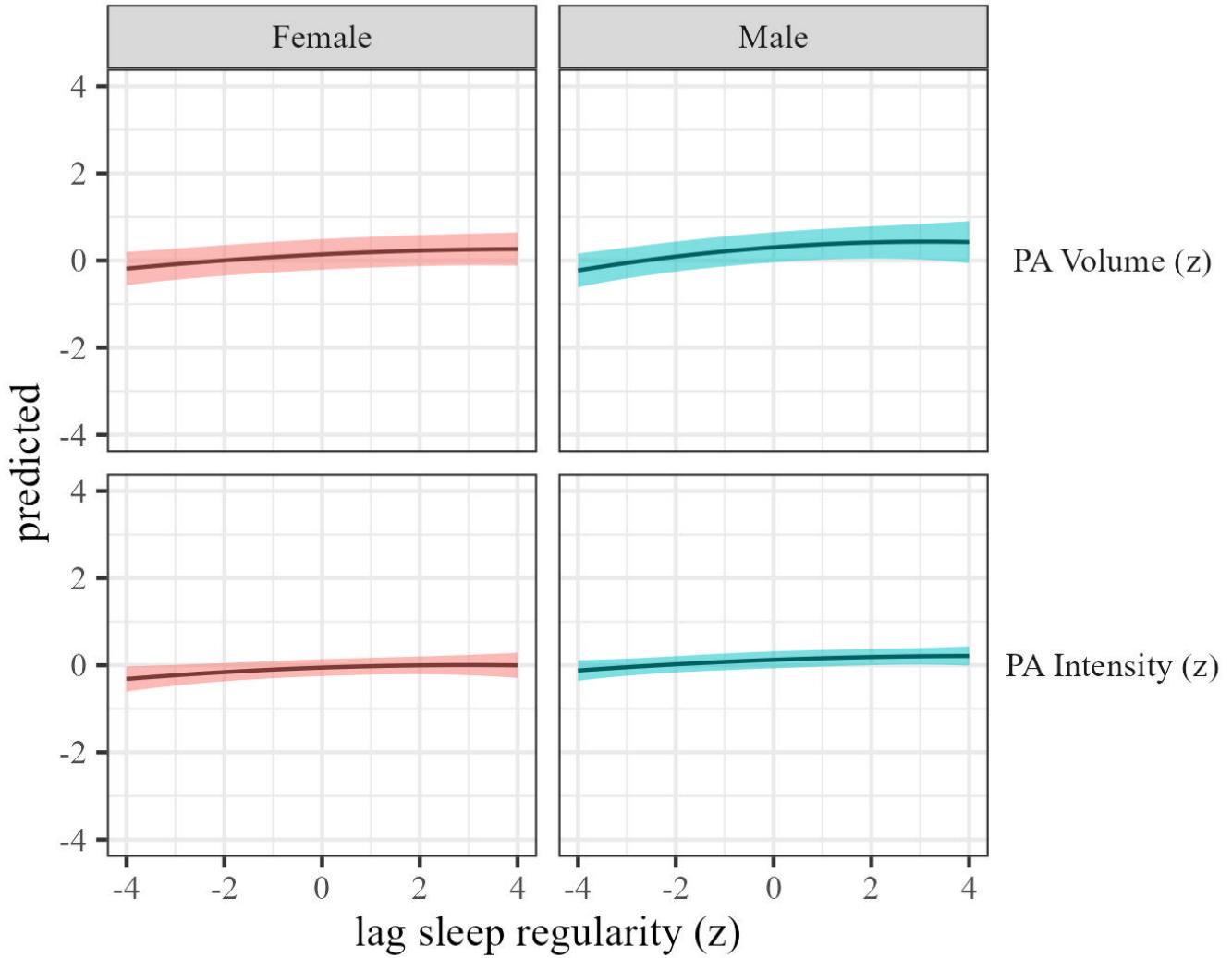


Figure 24. Physical activity by sleep regularity moderated by sex

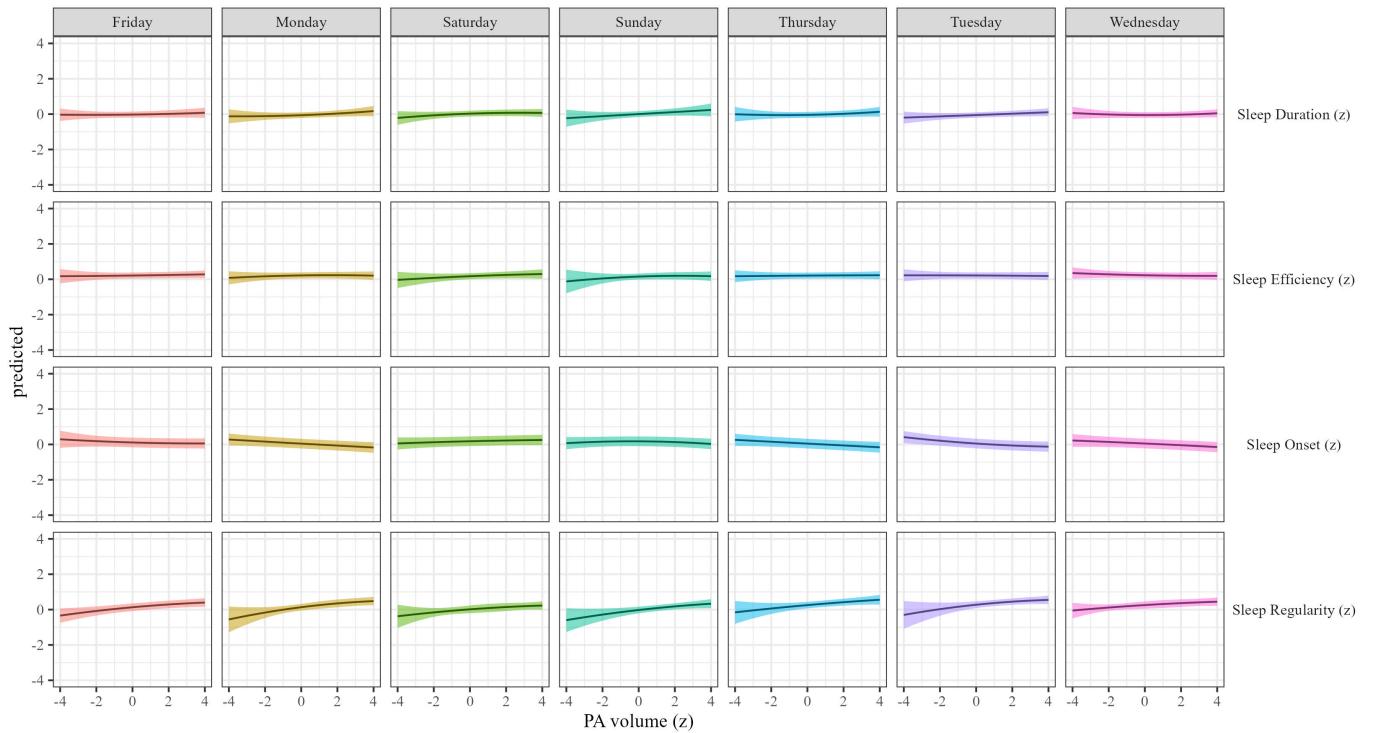


Figure 25. Sleep metrics on Physical activity volume by weekday

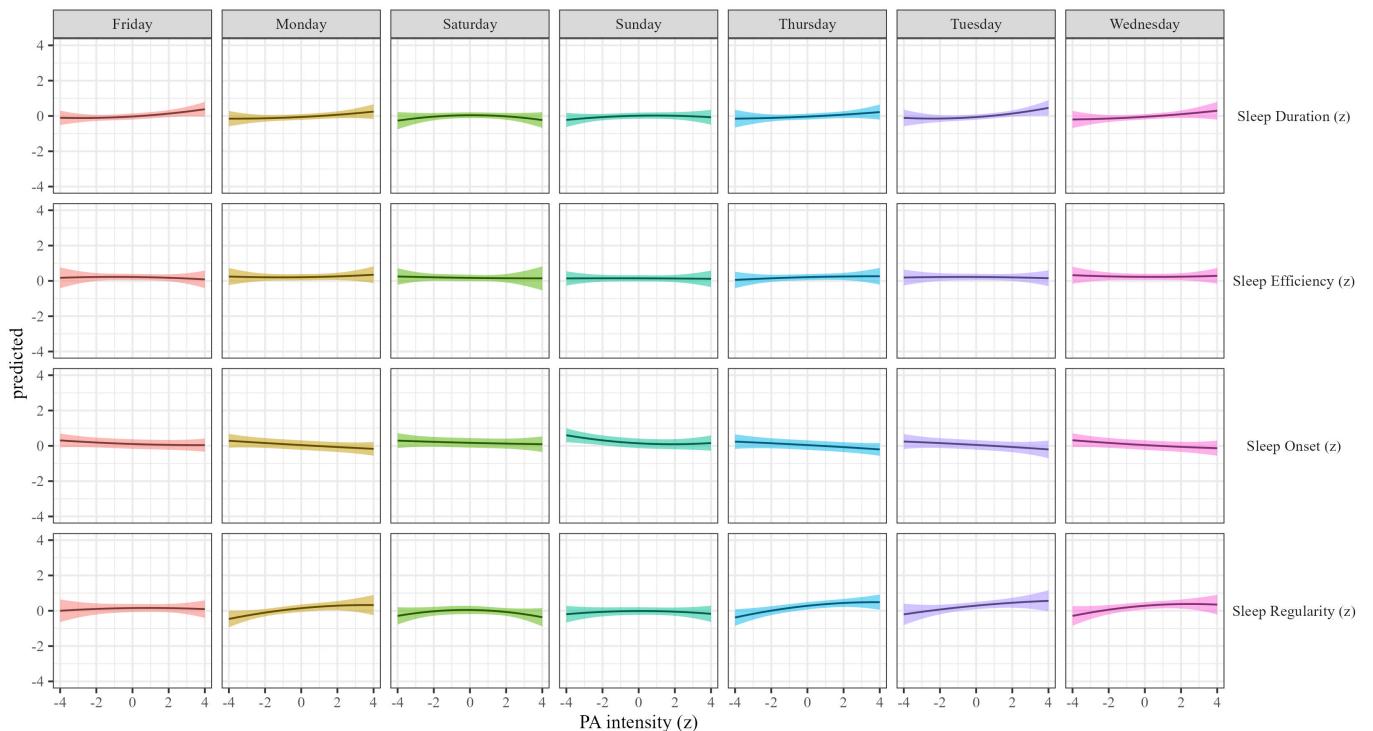


Figure 26. Sleep metrics on Physical activity intensity moderated by weekday

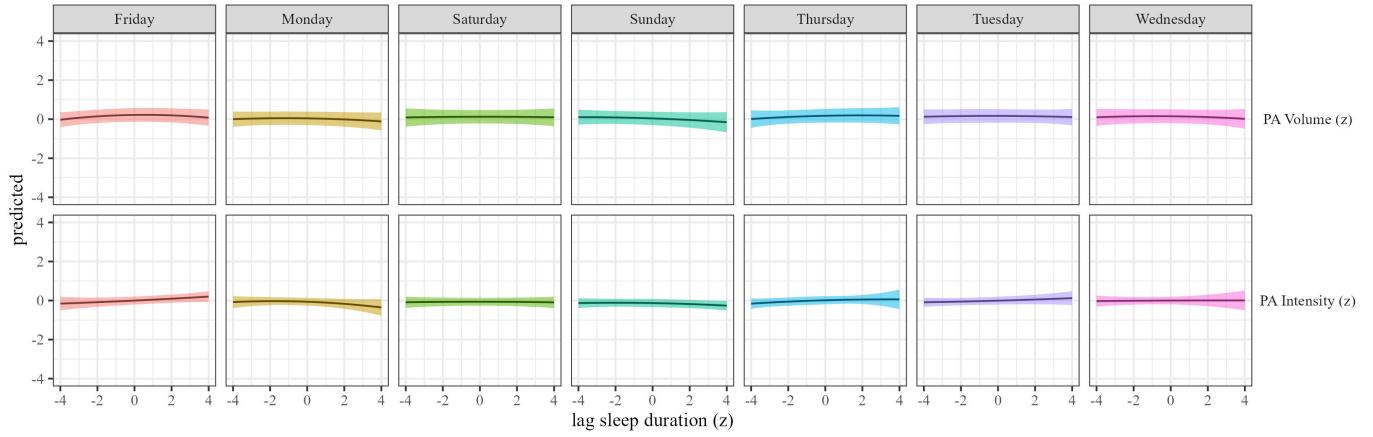


Figure 27. Physical activity by sleep duration moderated by weekday

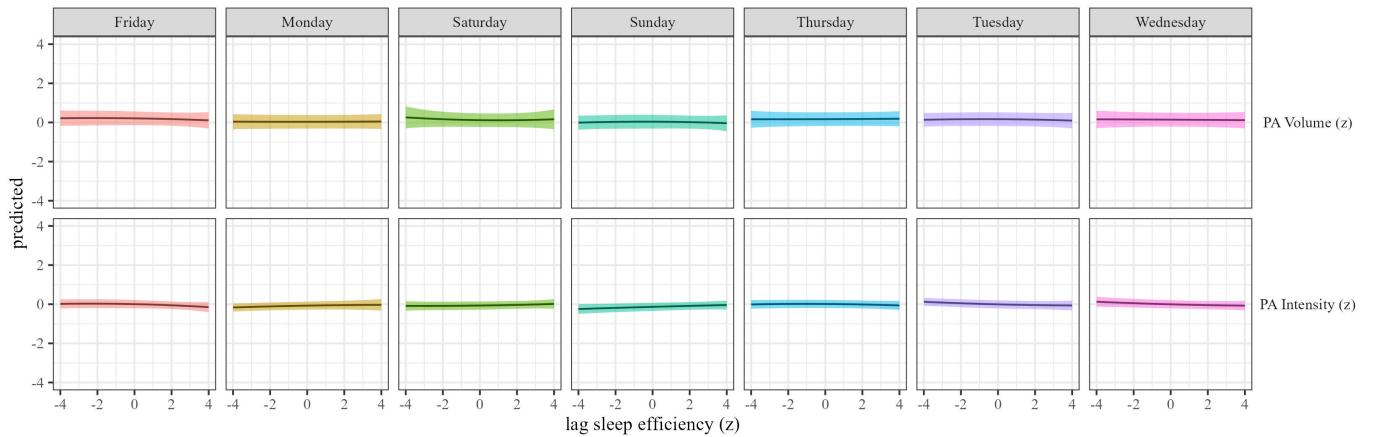


Figure 28. Physical activity by sleep efficiency moderated by weekday

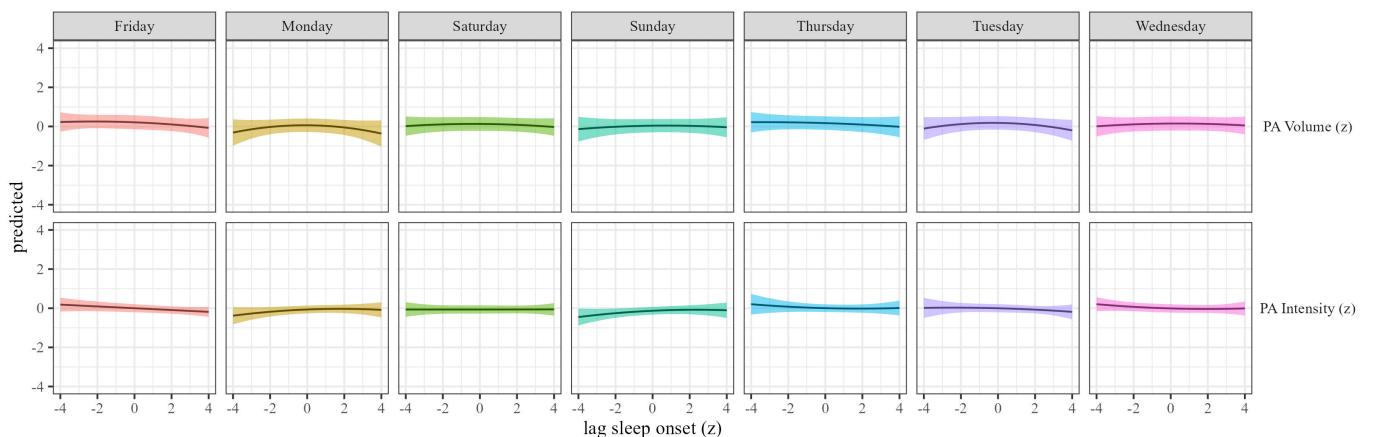


Figure 29. Physical activity by sleep onset moderated by weekday

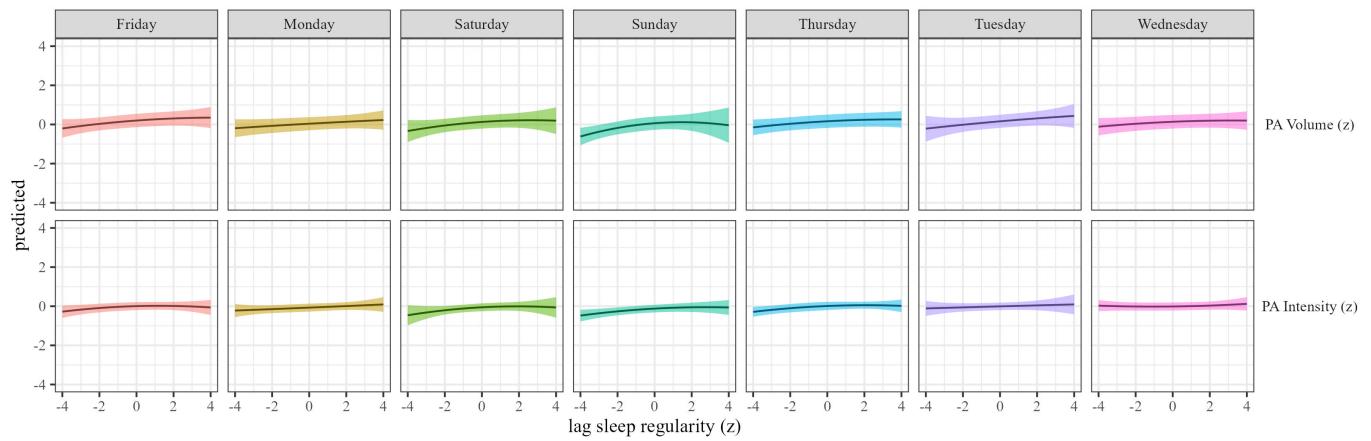


Figure 30. Physical activity by sleep regularity moderated by weekday

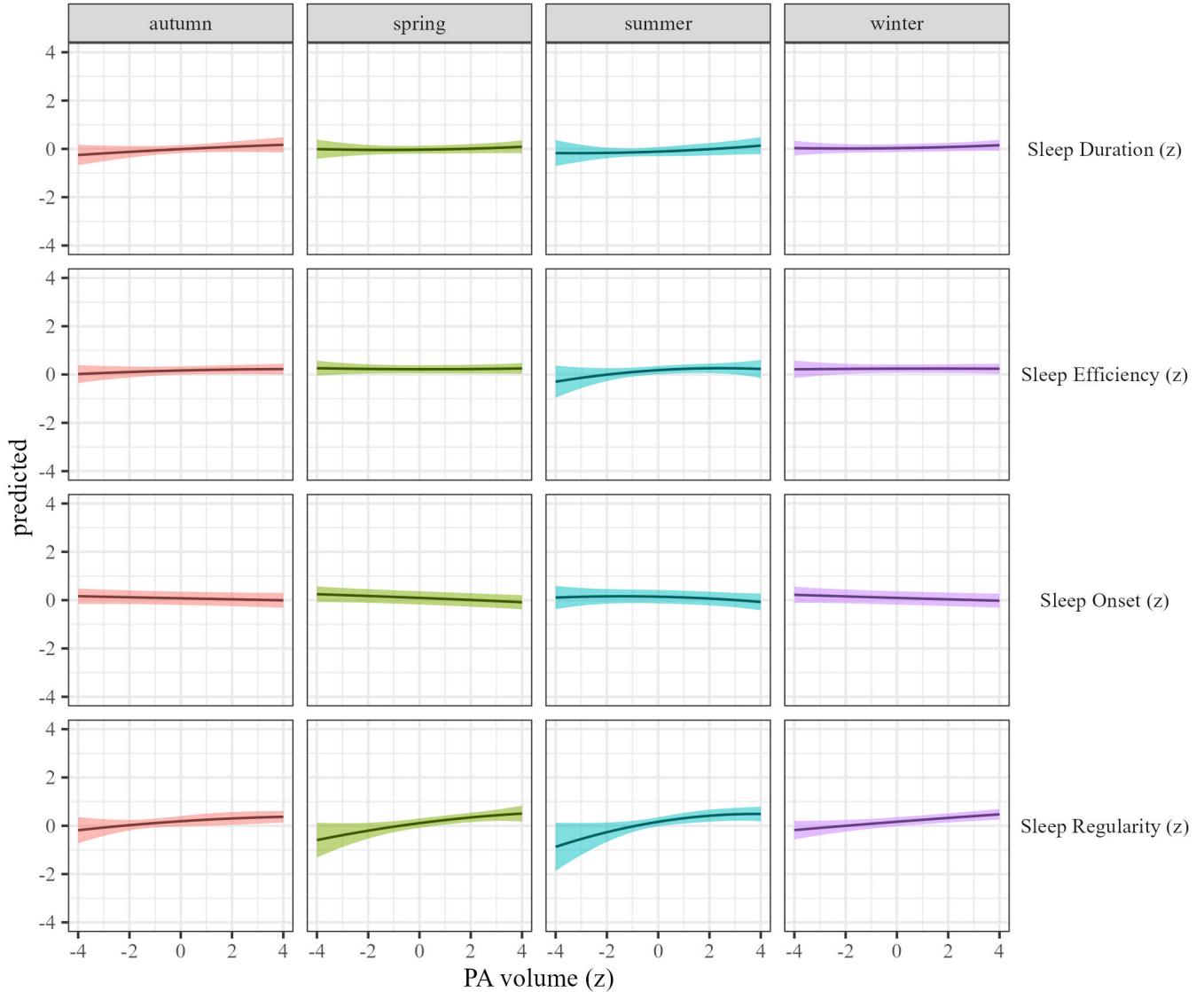


Figure 31. Sleep metrics on Physical activity volume by season

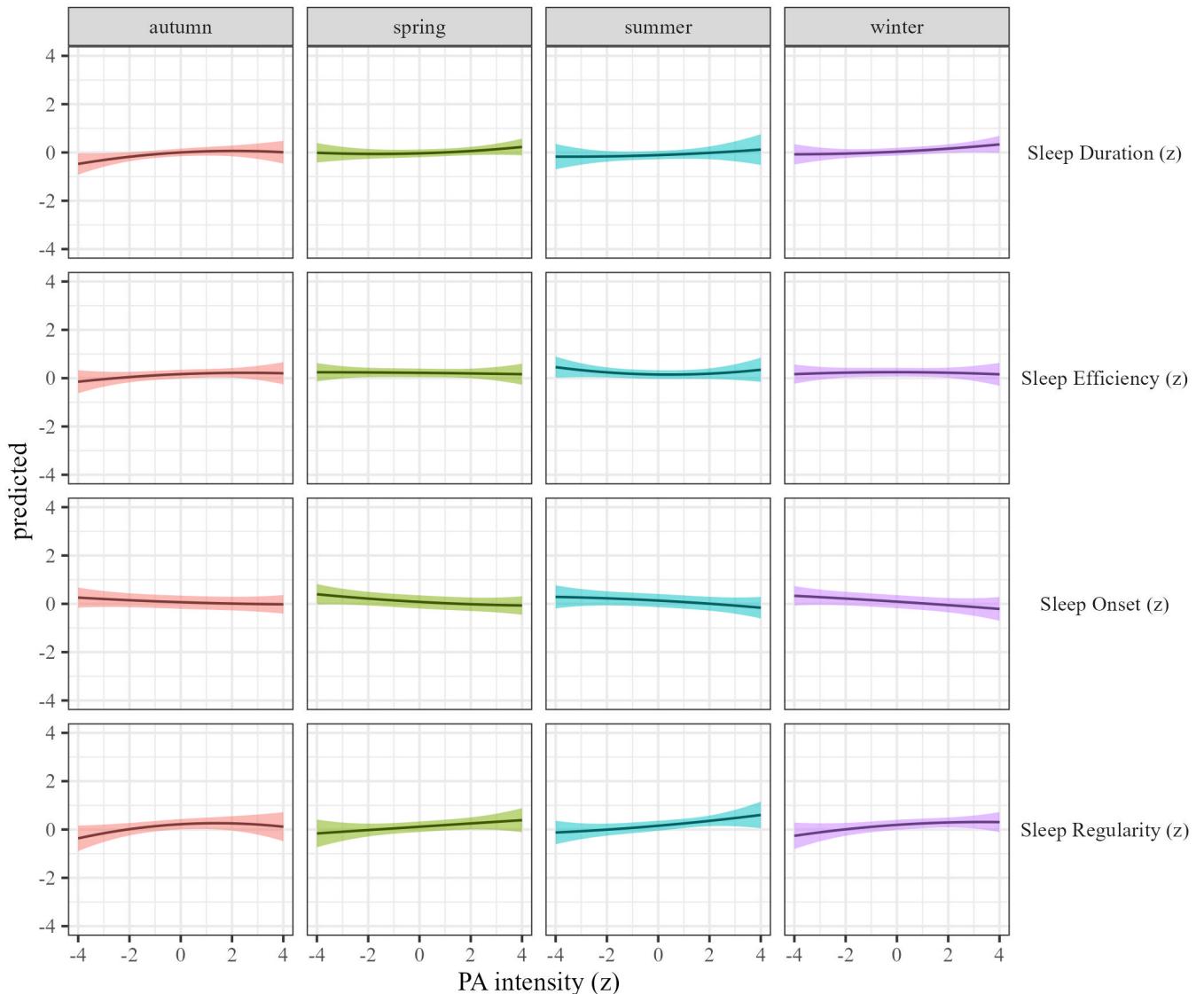


Figure 32. Sleep metrics on Physical activity intensity moderated by season

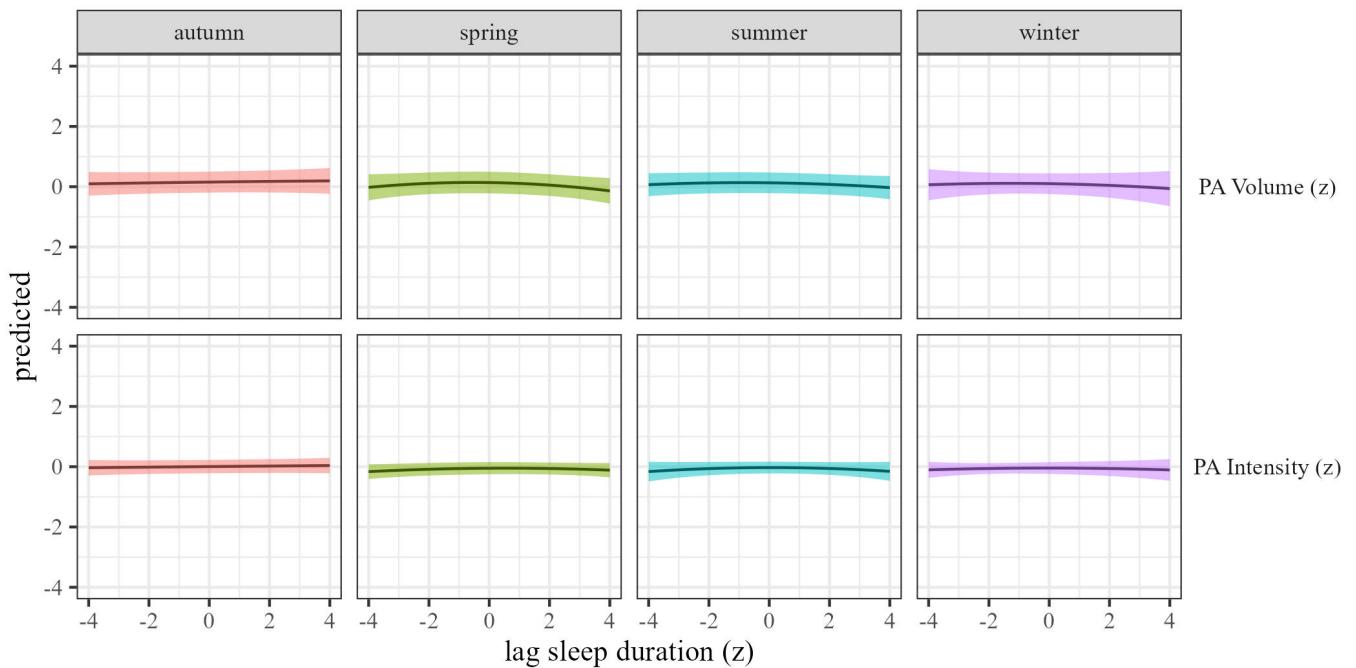


Figure 33. Physical activity by sleep duration moderated by season

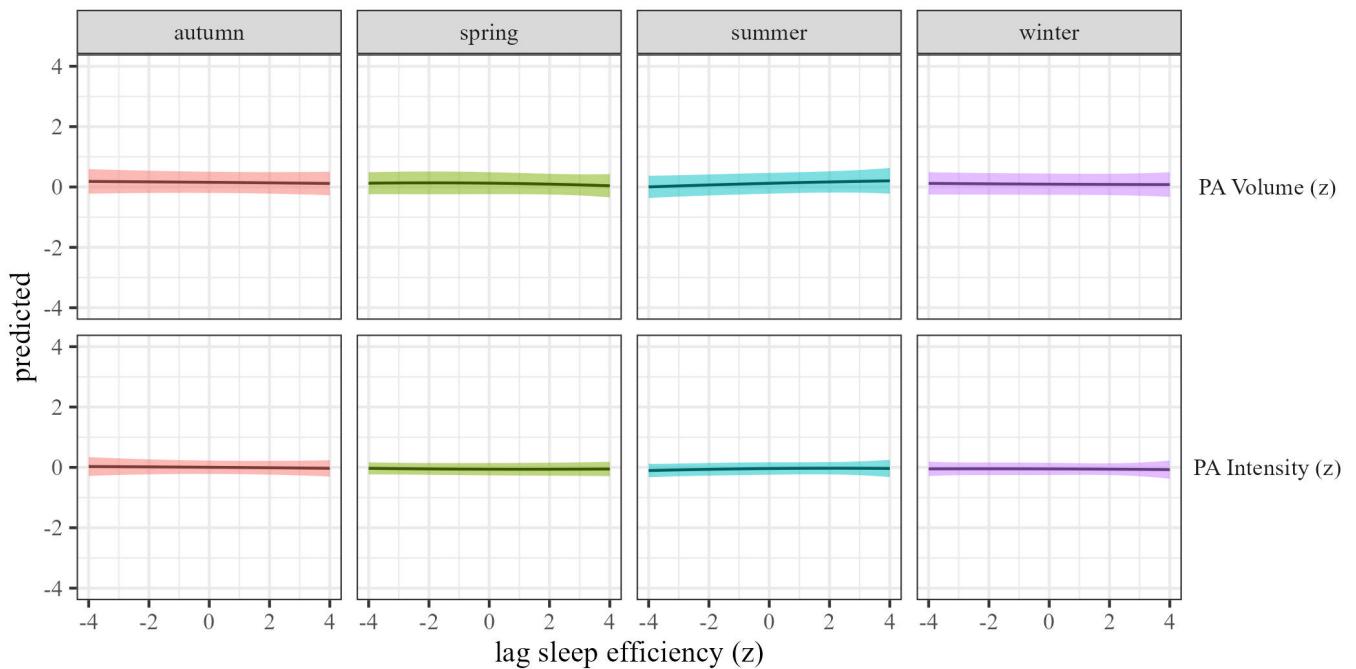


Figure 34. Physical activity by sleep efficiency moderated by season

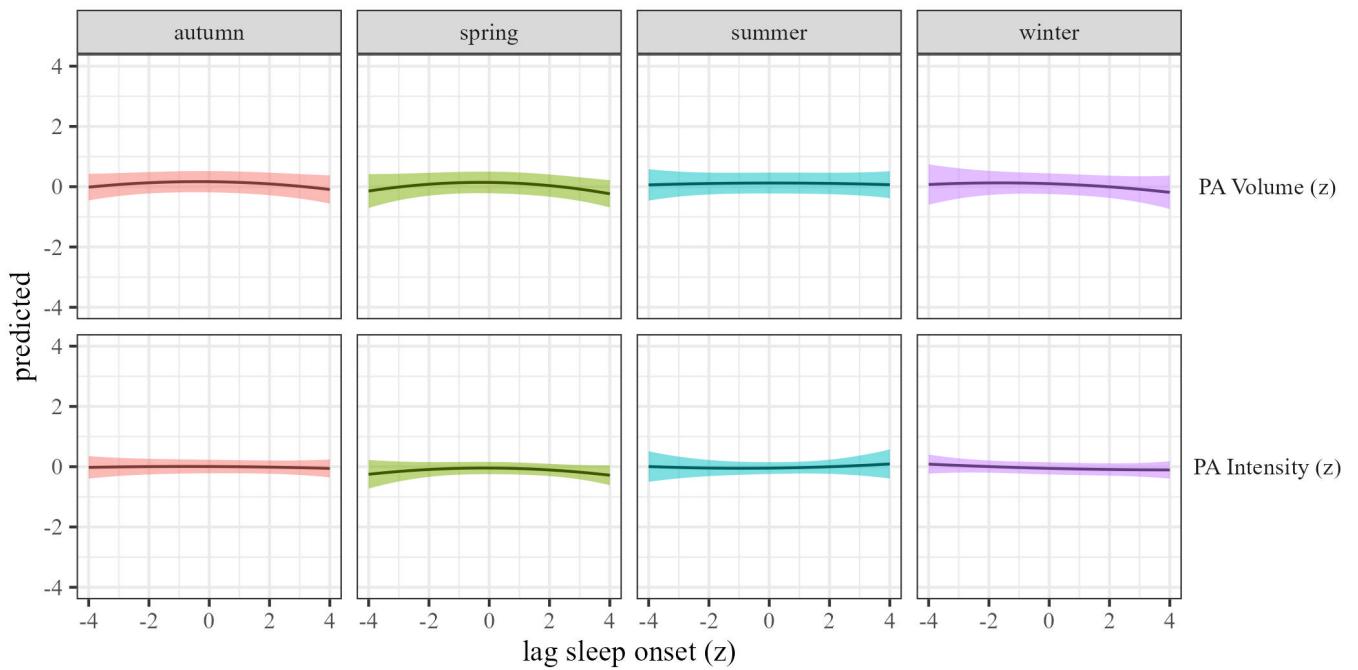


Figure 35. Physical activity by sleep onset moderated by season

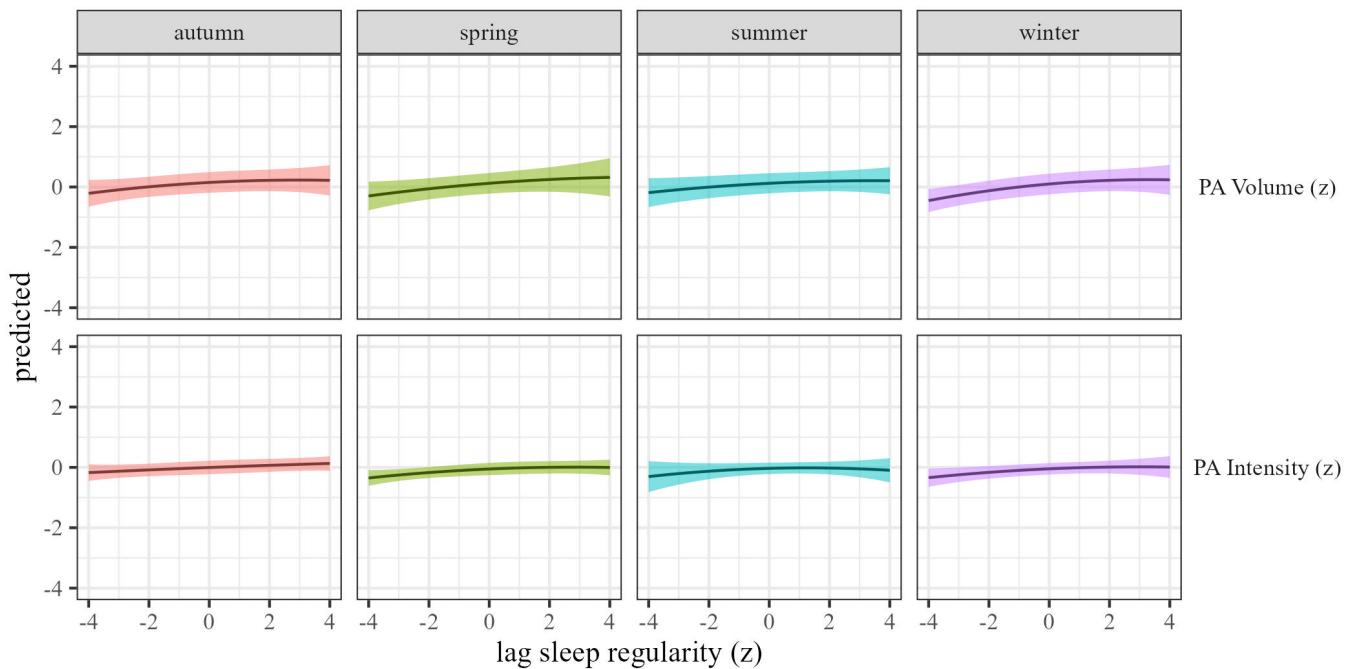


Figure 36. Physical activity by sleep regularity moderated by season

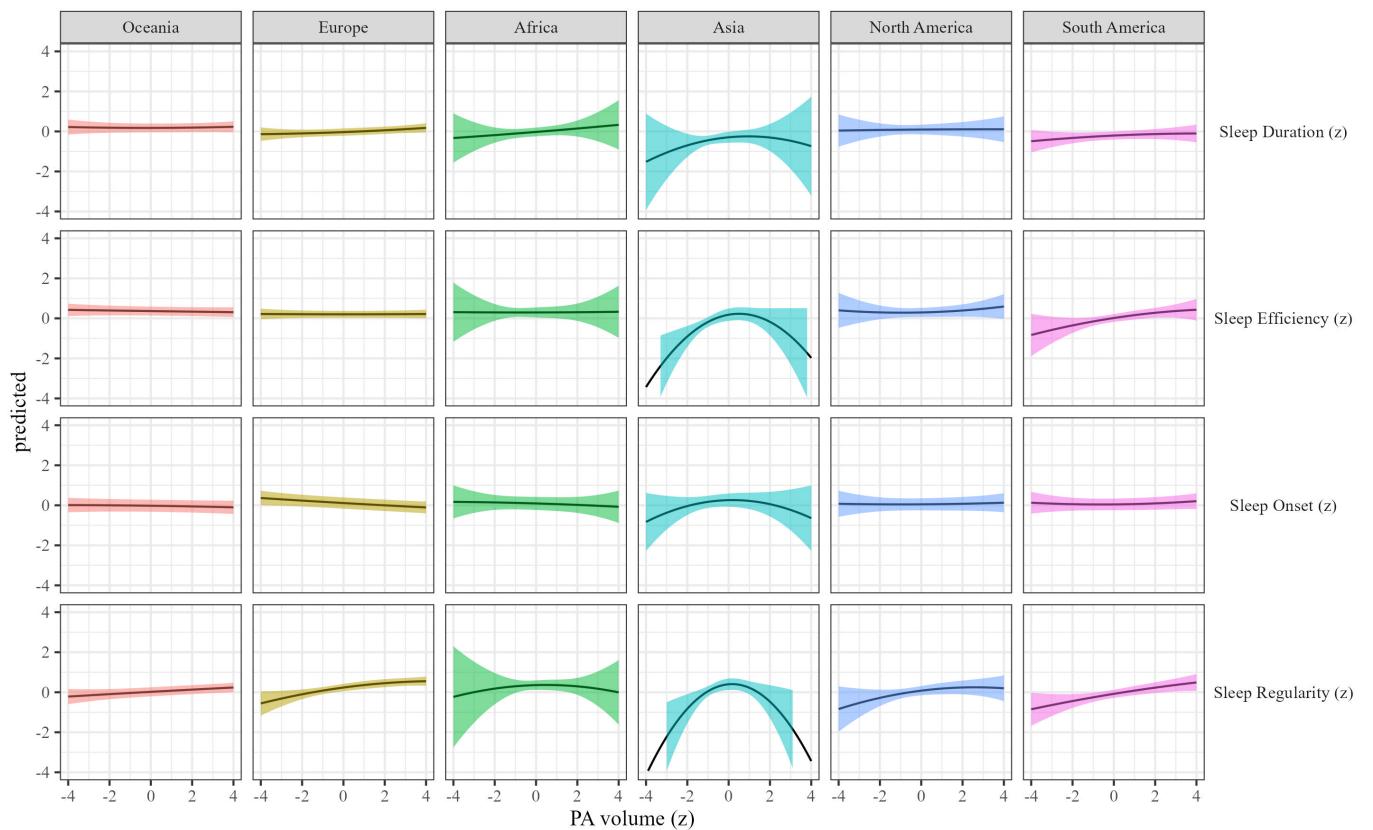


Figure 37. Sleep metrics on Physical activity volume by region

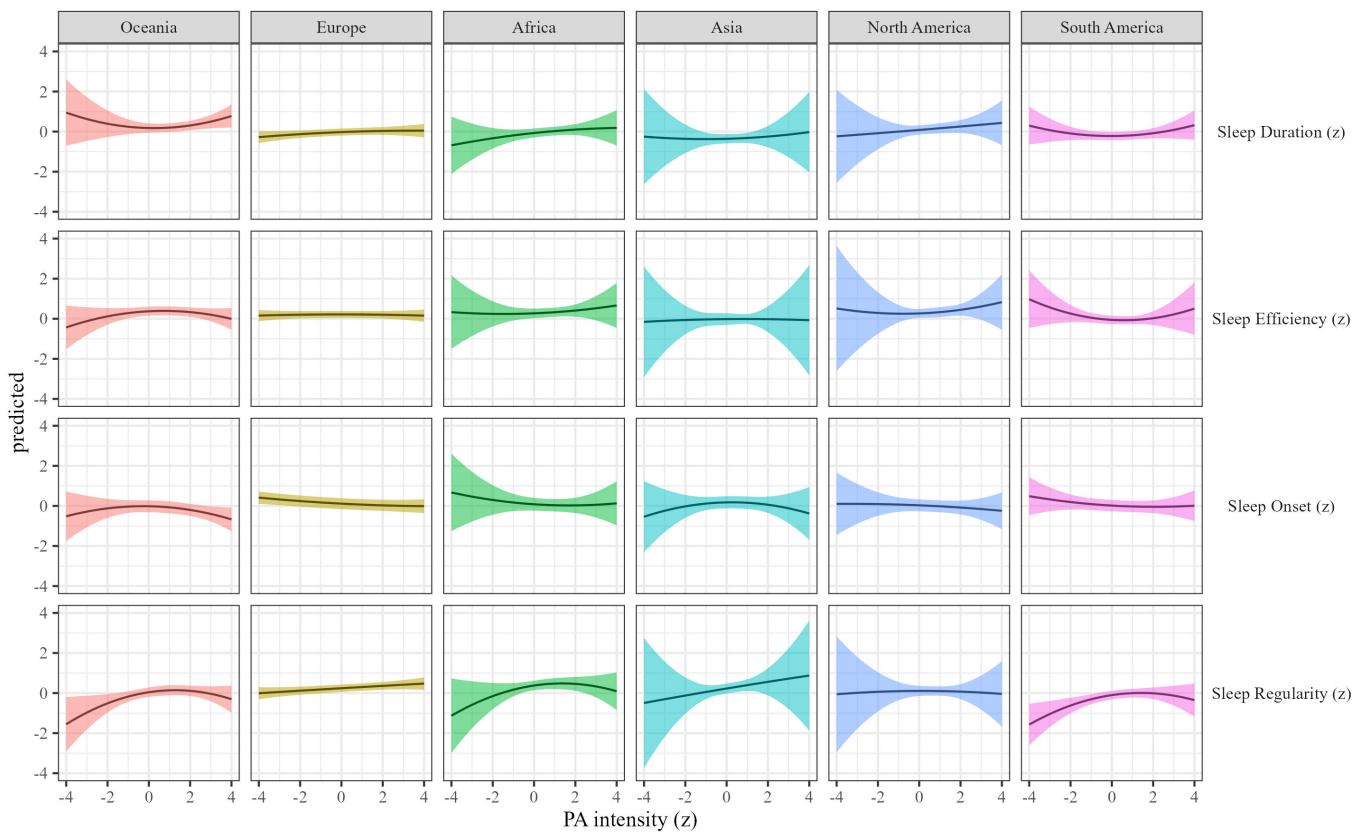


Figure 38. Sleep metrics on Physical activity intensity moderated by region

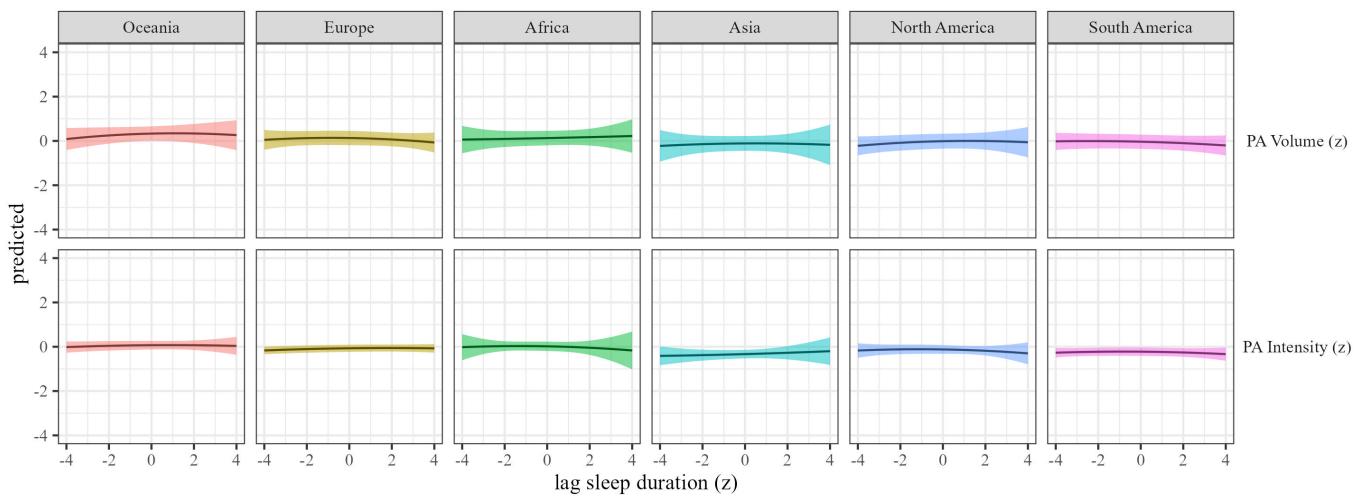


Figure 39. Physical activity by sleep duration moderated by region

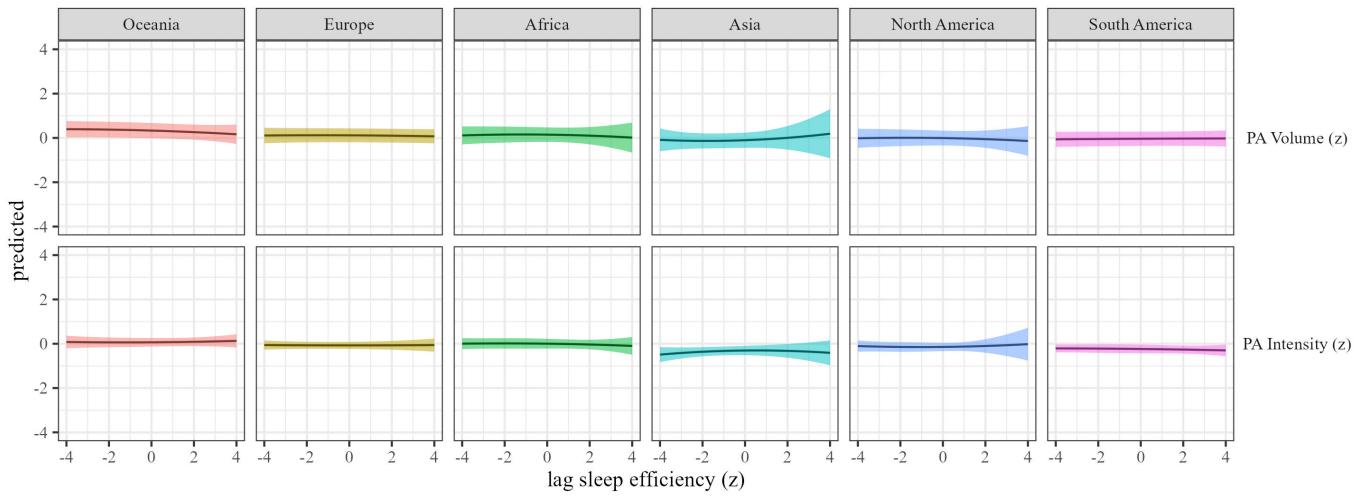


Figure 40. Physical activity by sleep efficiency moderated by region

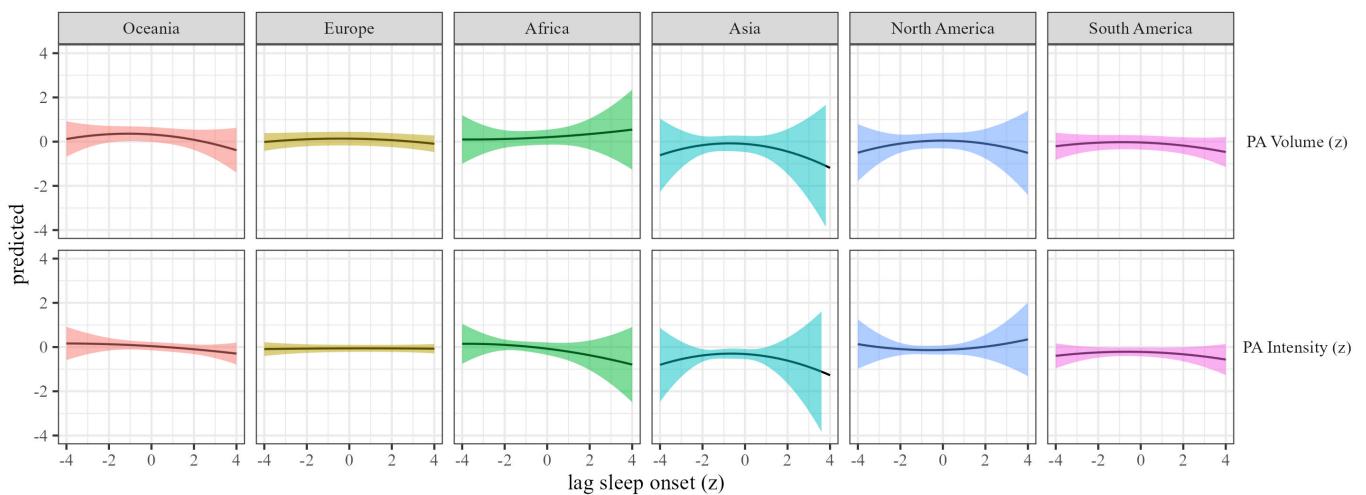


Figure 41. Physical activity by sleep onset moderated by region

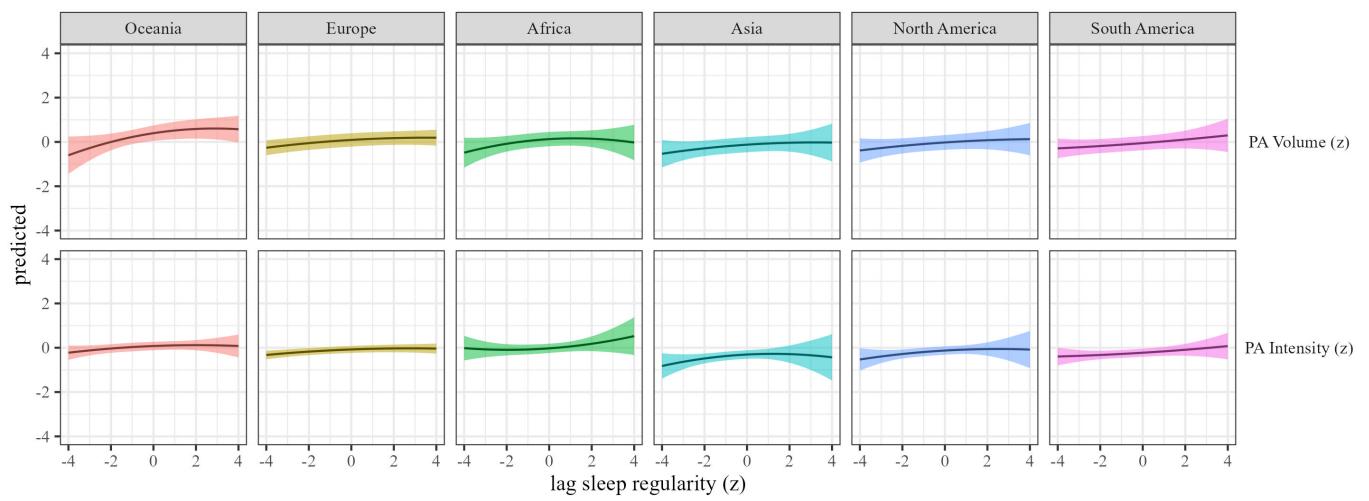


Figure 42. Physical activity by sleep regularity moderated by region

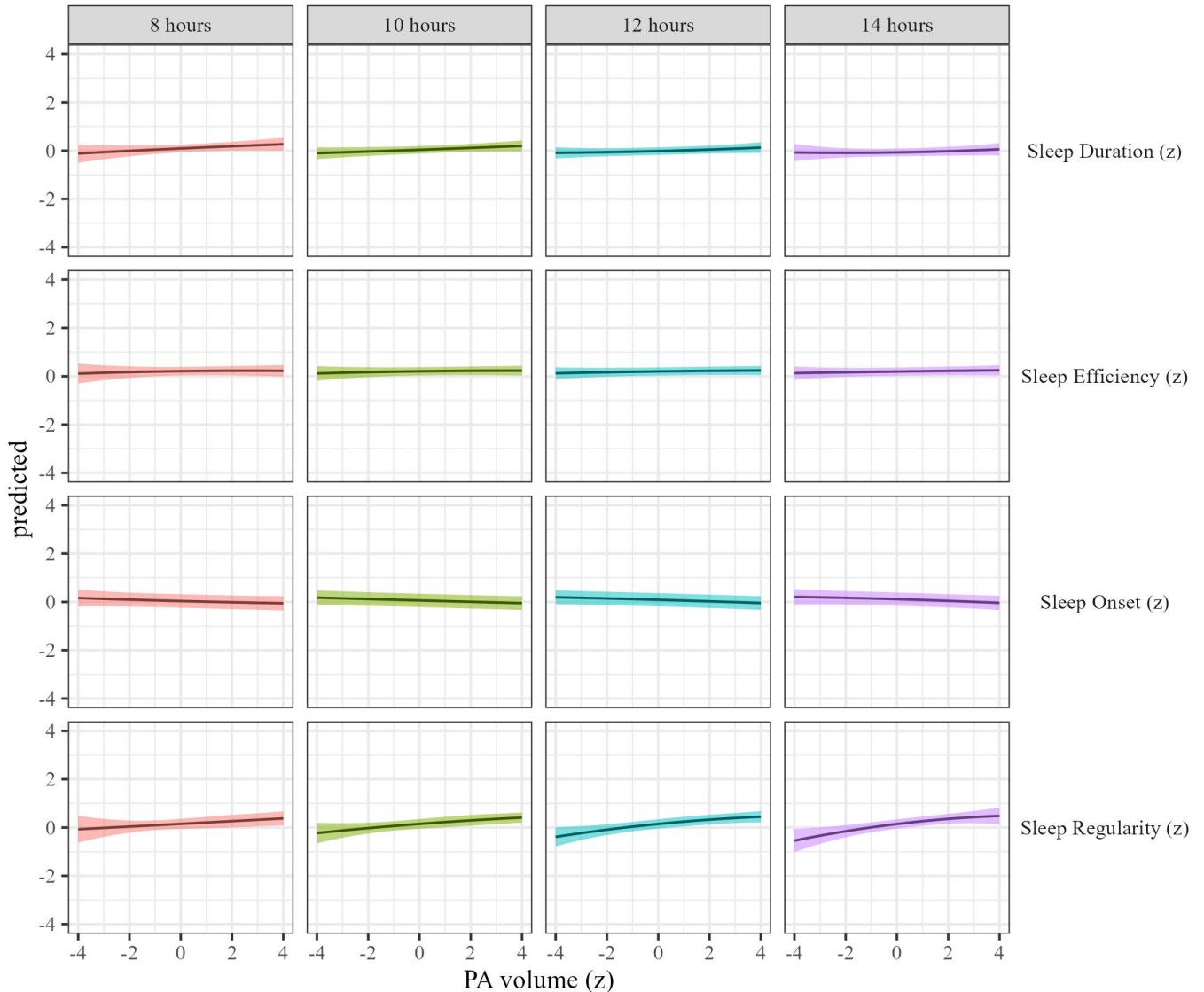


Figure 43. Sleep metrics on Physical activity volume by daylight hours

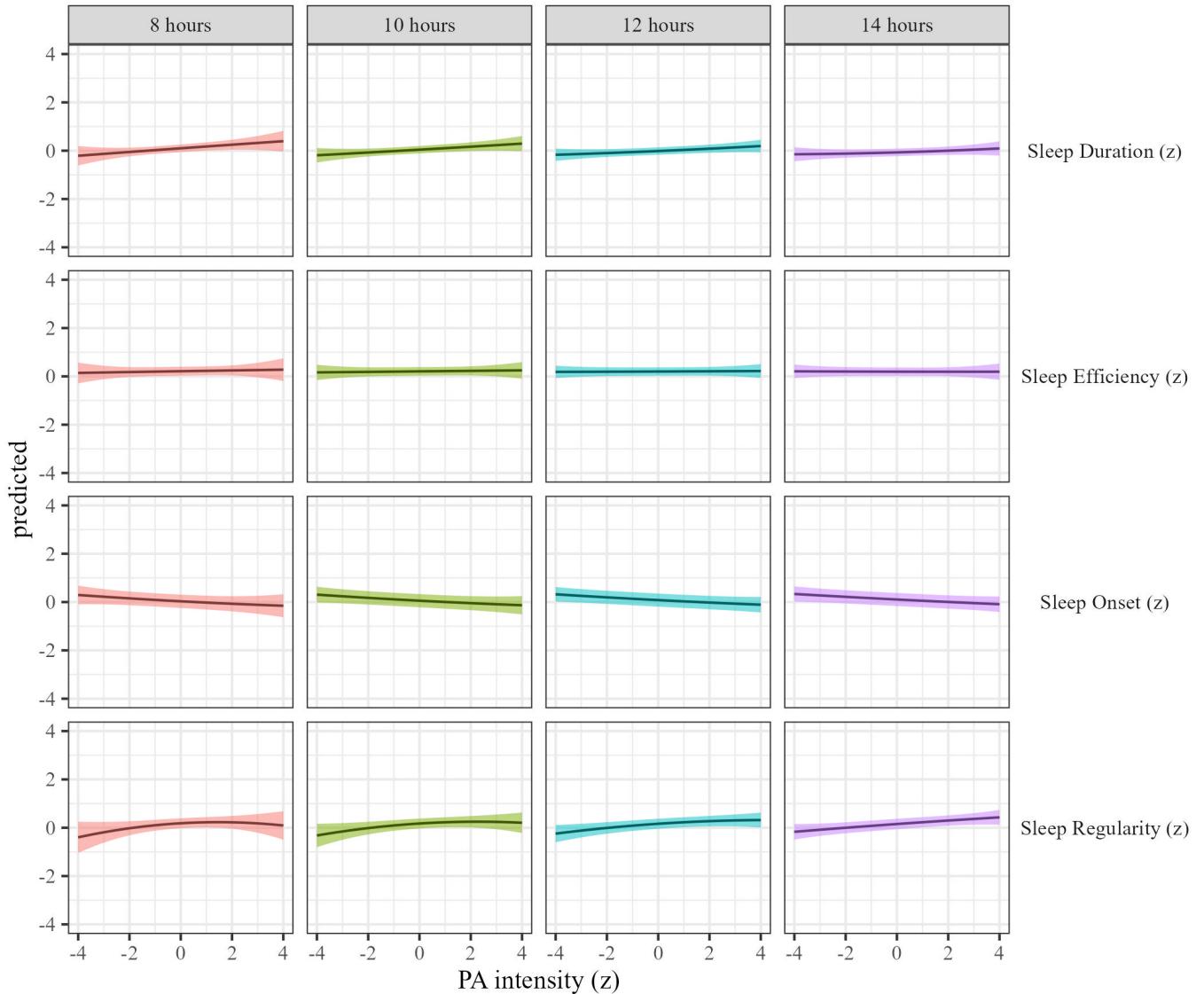


Figure 44. Sleep metrics on Physical activity intensity moderated by daylight hours

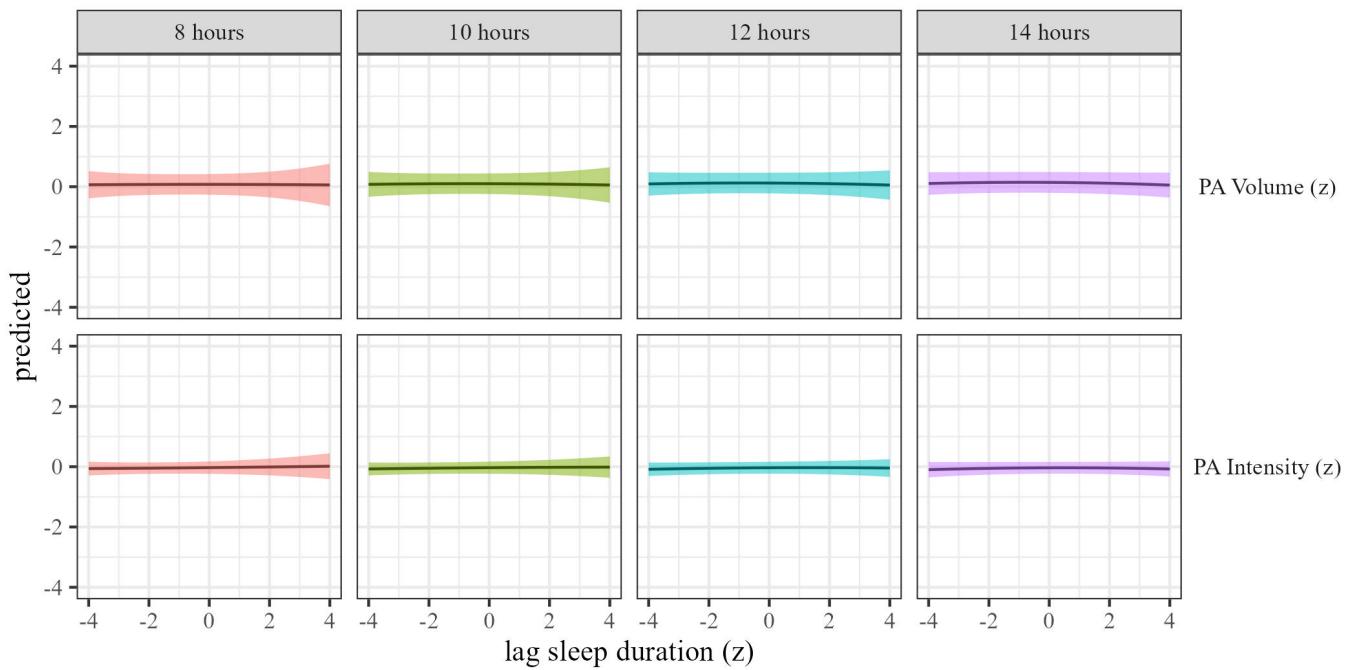


Figure 45. Physical activity by sleep duration moderated by daylight hours

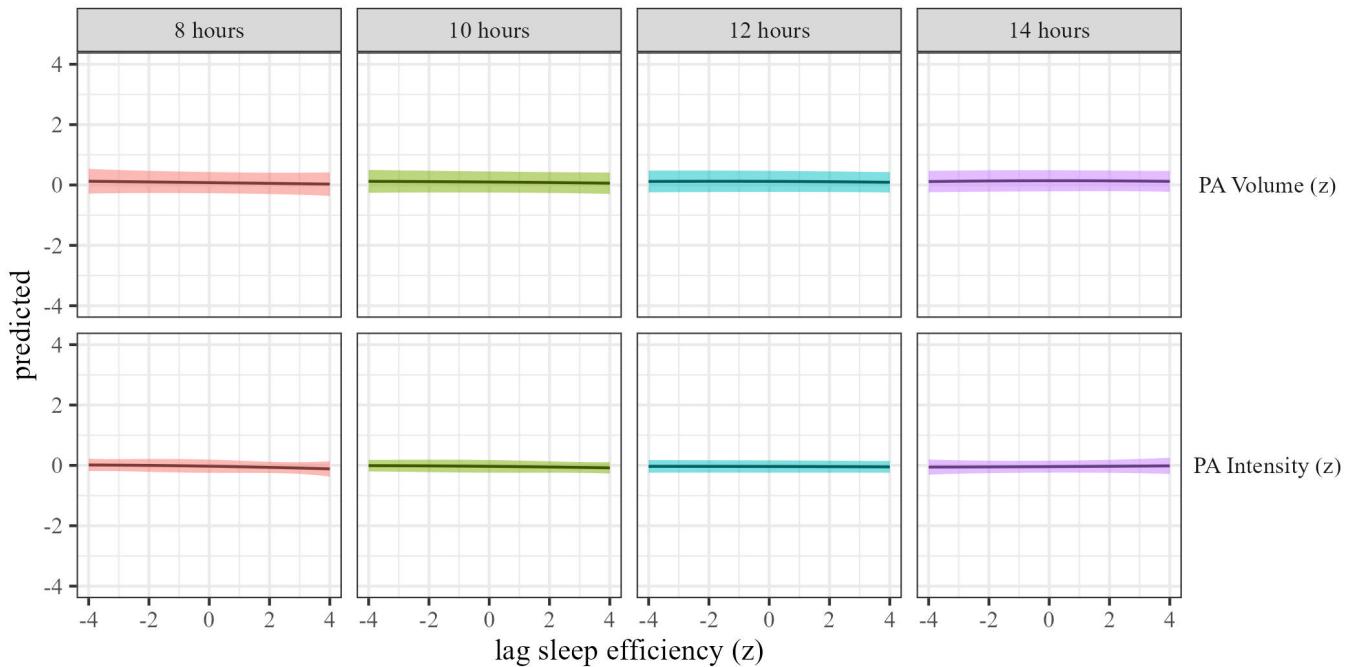


Figure 46. Physical activity by sleep efficiency moderated by daylight hours

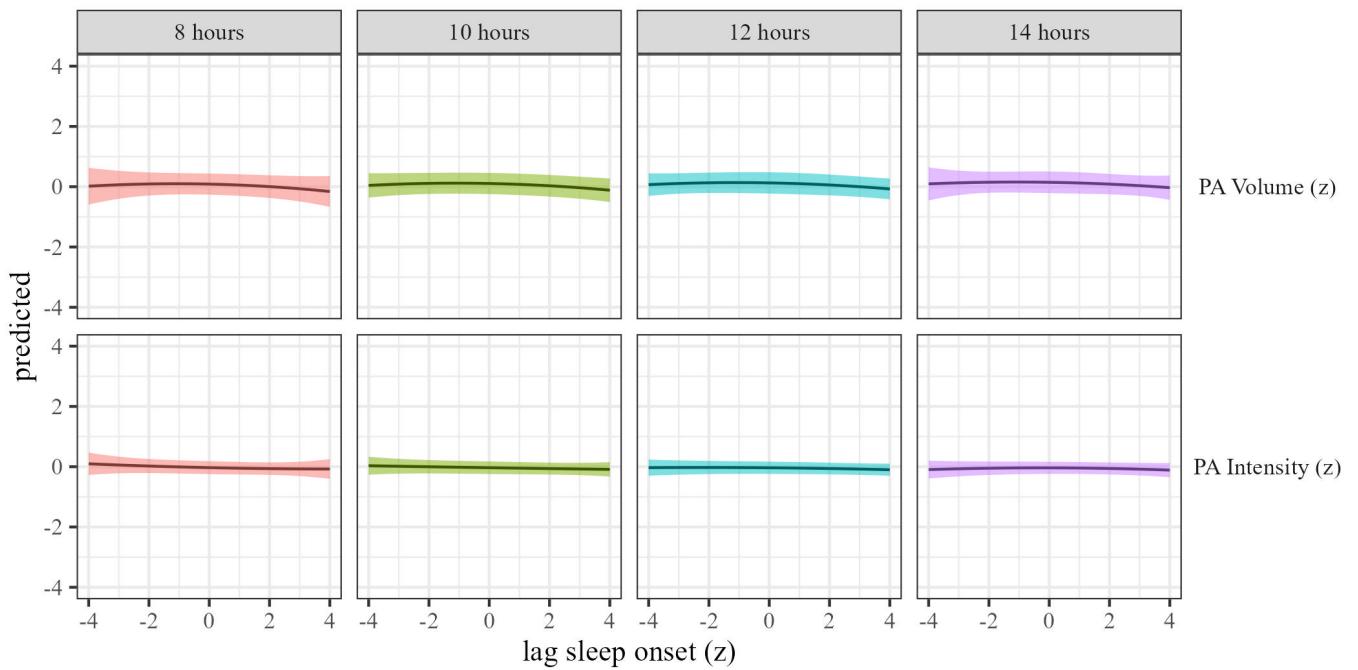


Figure 47. Physical activity by sleep onset moderated by daylight hours

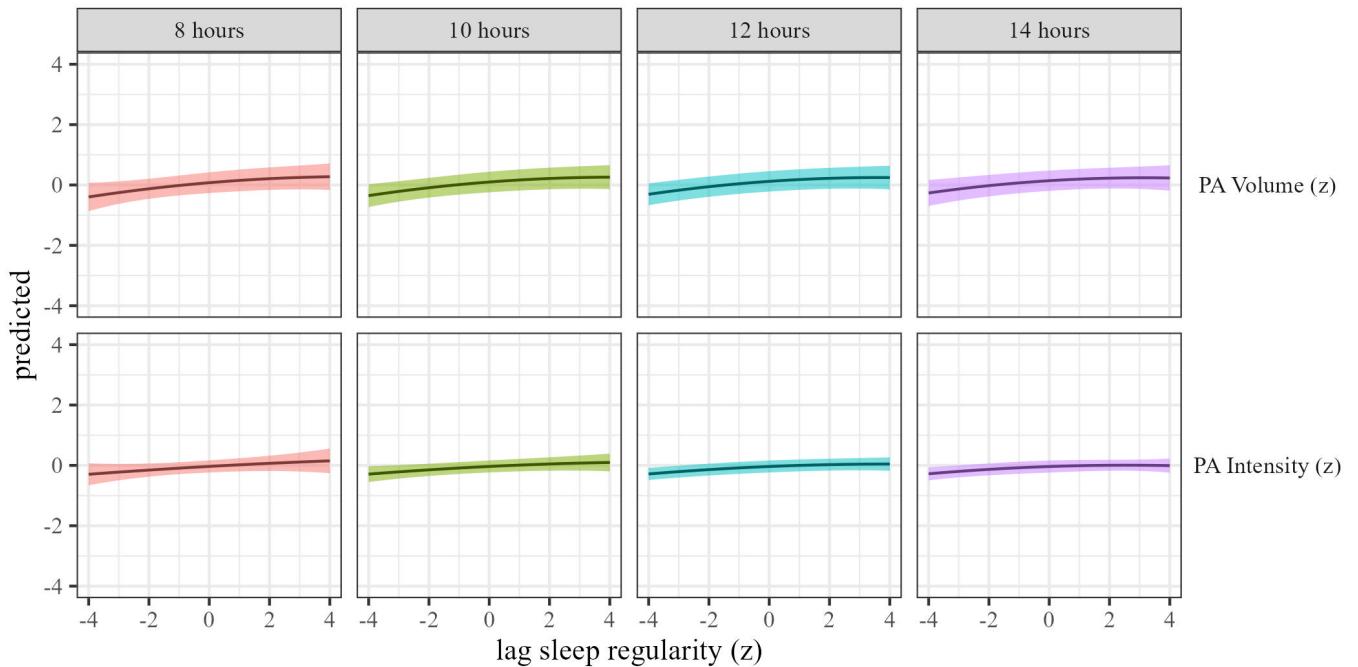


Figure 48. Physical activity by sleep regularity moderated by daylight hours

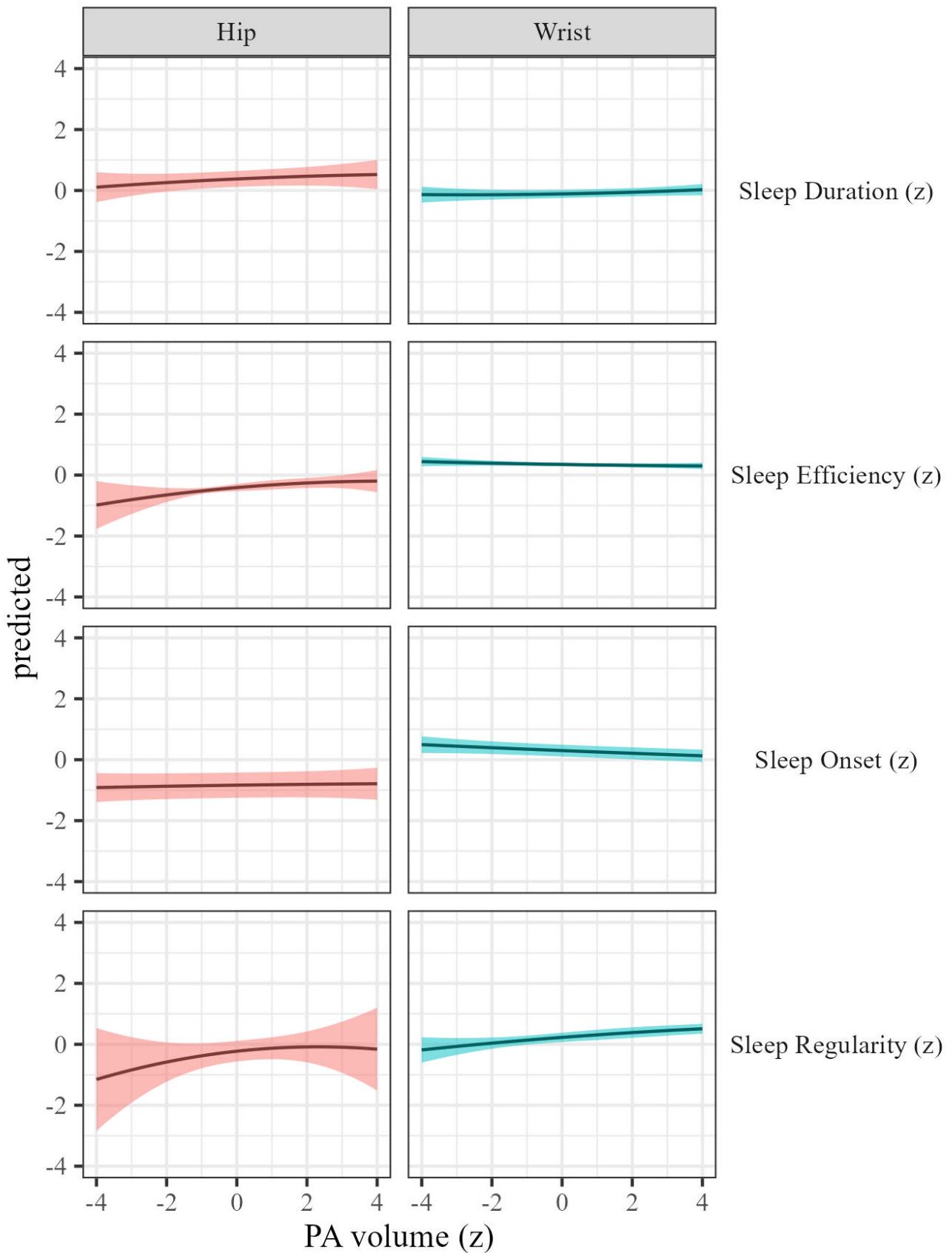


Figure 49. Sleep metrics on Physical activity volume by wear location

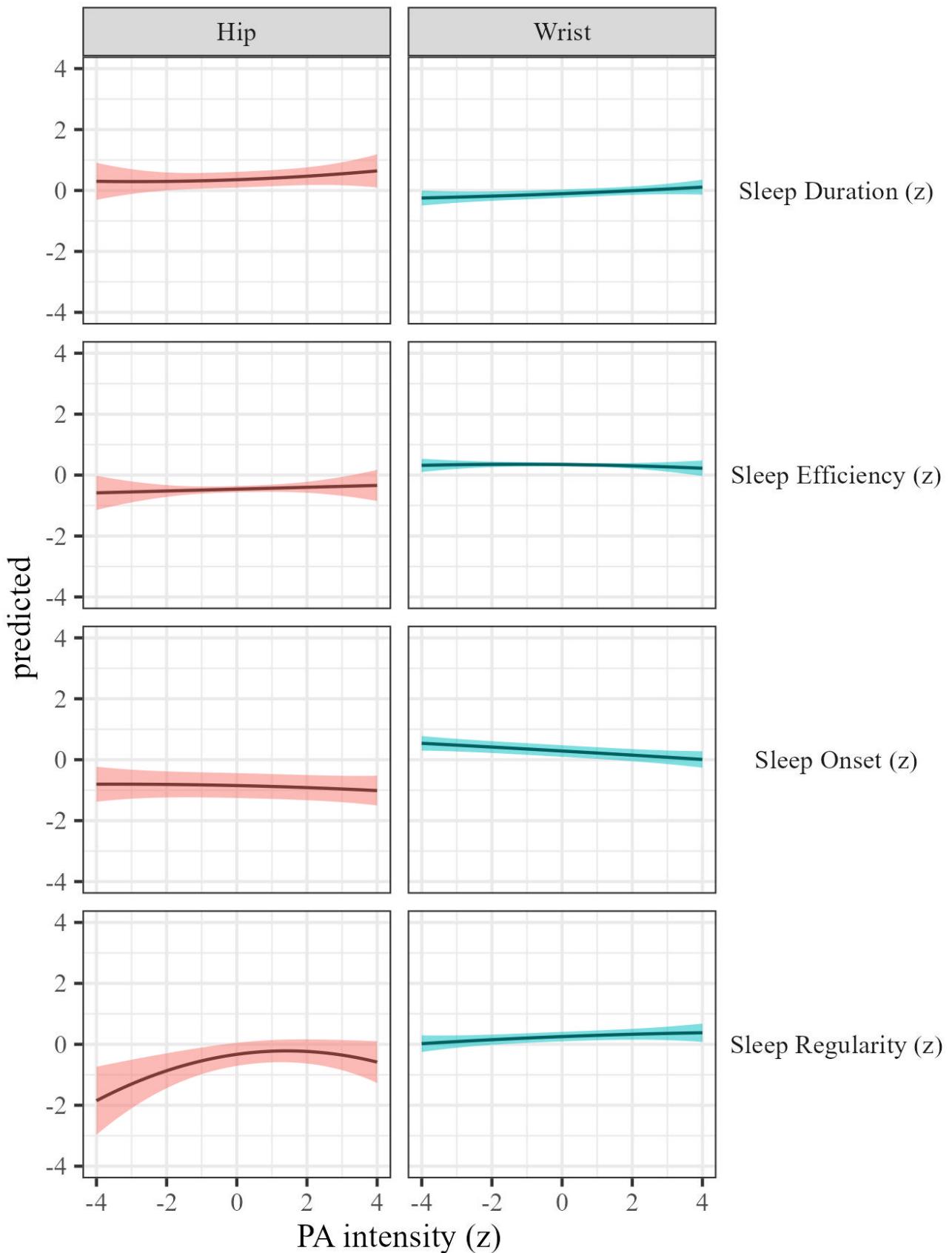


Figure 50. Sleep metrics on Physical activity intensity moderated by wear location

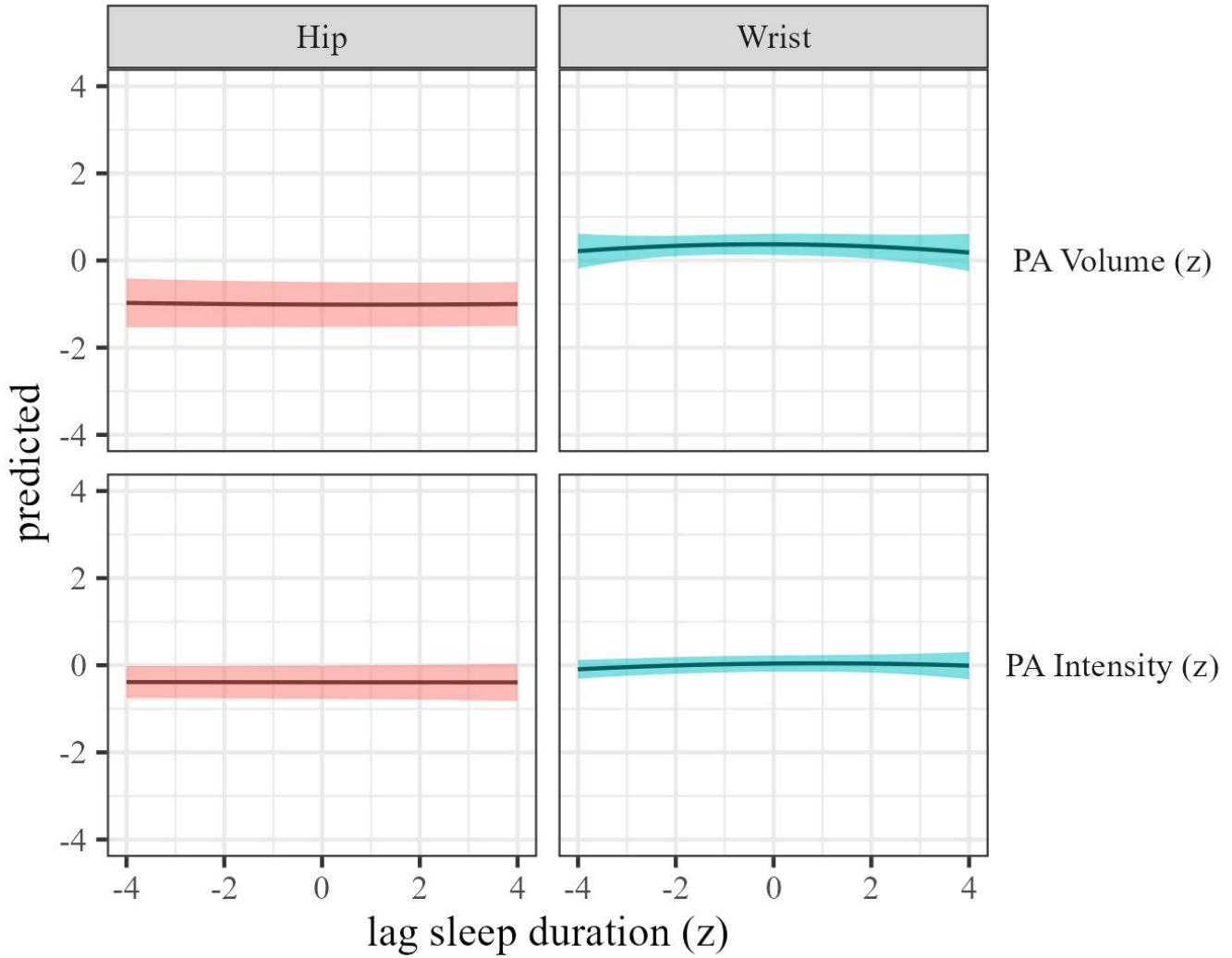


Figure 51. Physical activity by sleep duration moderated by wear location

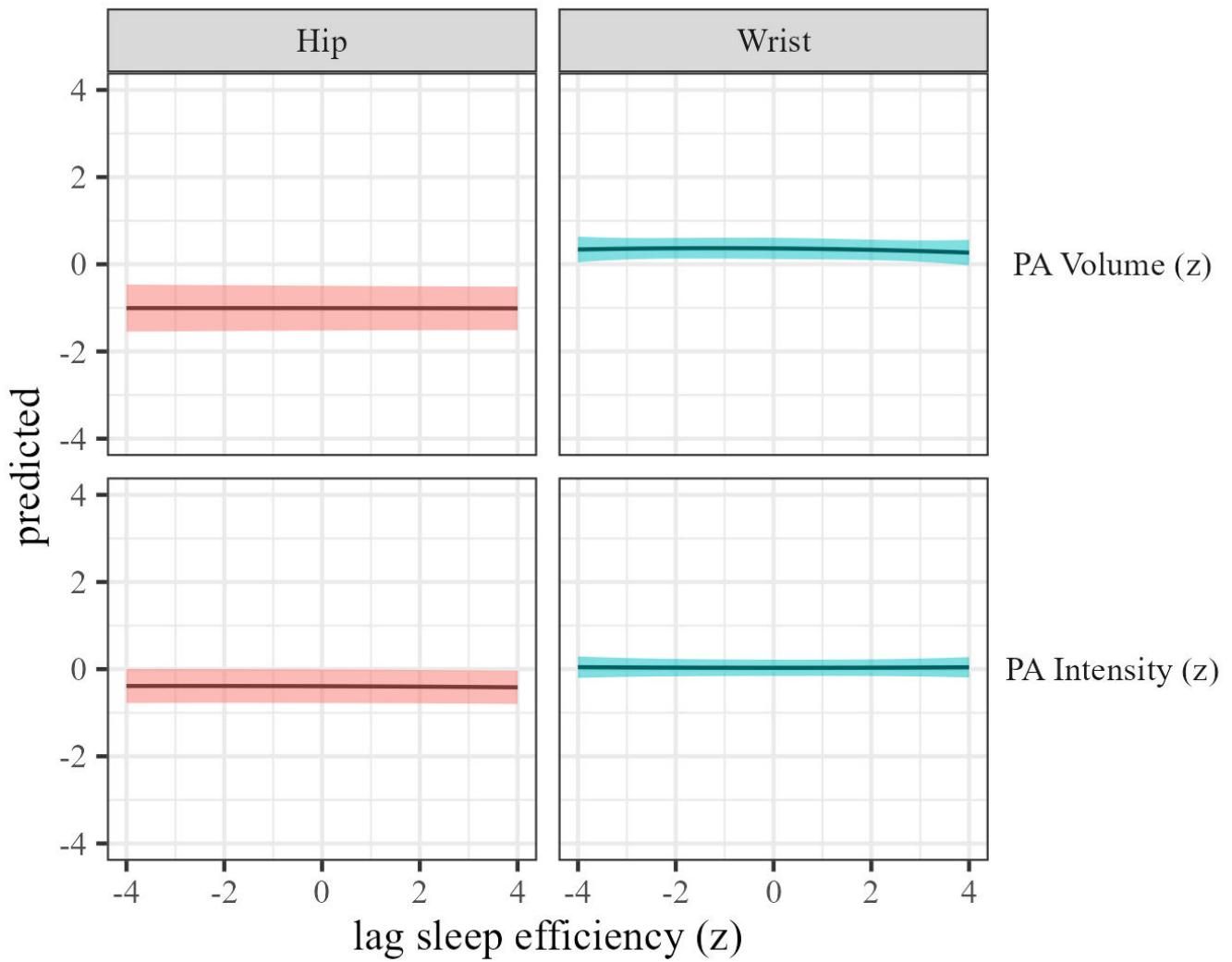


Figure 52. Physical activity by sleep efficiency moderated by wear location

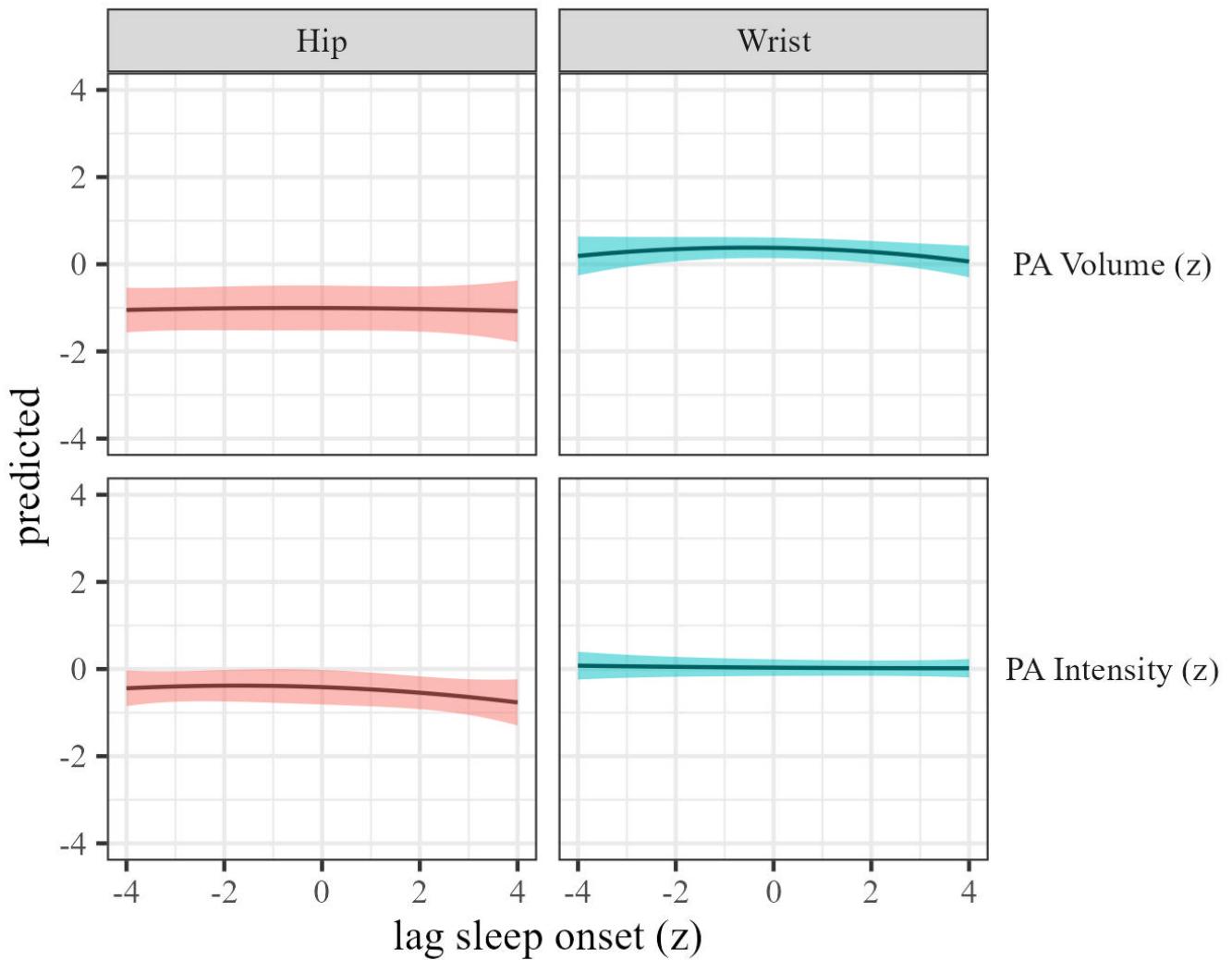


Figure 53. Physical activity by sleep onset moderated by wear location

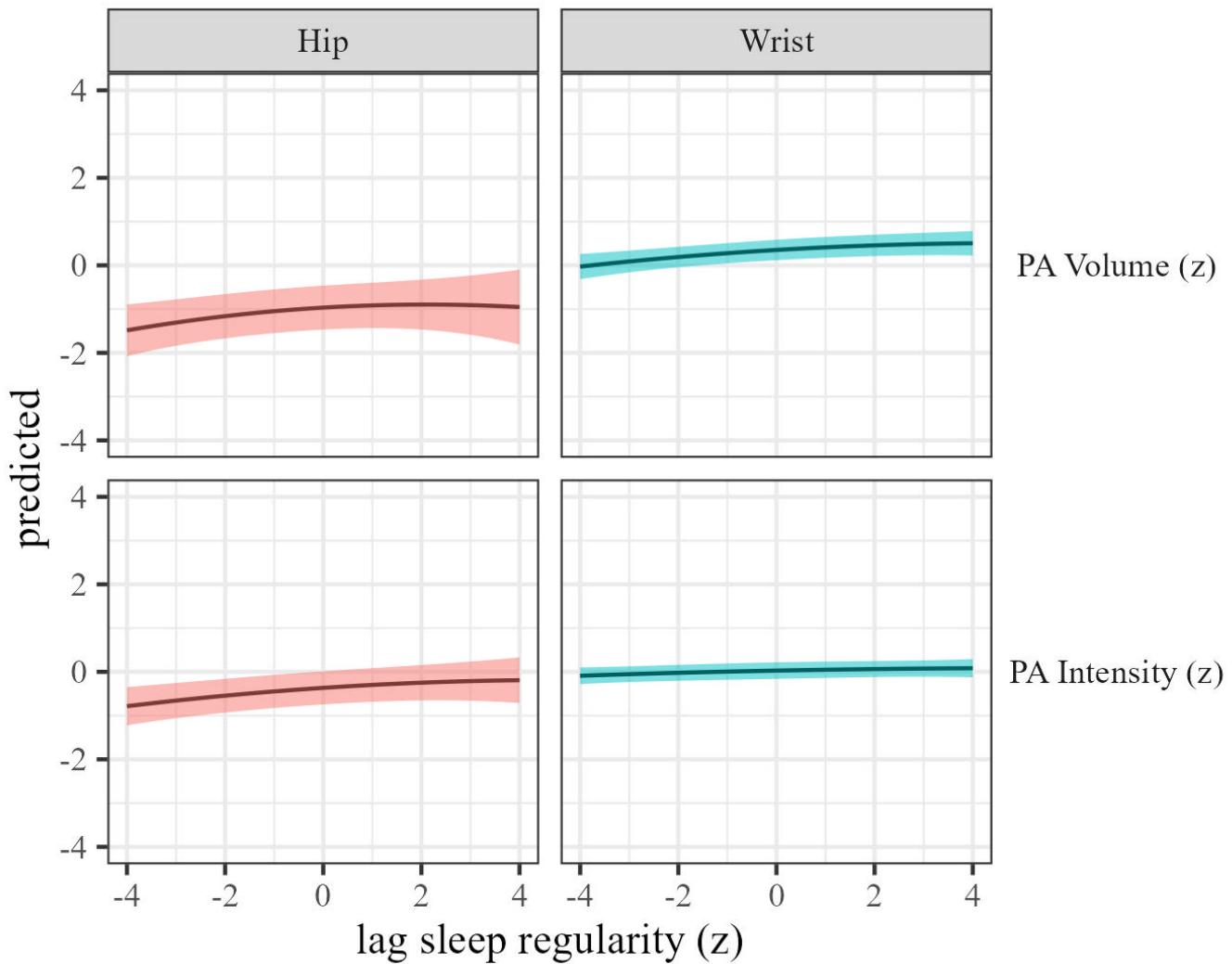


Figure 54. Physical activity by sleep regularity moderated by wear location