

## Multiverse analysis

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### Abstract

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

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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				
	$\beta$ [95% CI]	SE	t	p	$\beta$ [95% CI]	SE	t	p
<b>Sleep duration</b>								
(Intercept)	0.97 [0.64, 1.29]	0.17	5.79	< .001	0.87 [0.45, 1.29]	0.21	4.05	.008
Physical activity	0.22 [0.13, 0.30]	0.04	5.08	.014	0.05 [-0.35, 0.44]	0.20	0.23	.837
Age	0.00 [-0.01, 0.00]	0.00	-0.45	.652	0.00 [-0.01, 0.00]	0.00	-0.44	.667
Physical activity <sup>2</sup>	-0.03 [-0.04, -0.02]	0.01	-4.52	.001	0.04 [0.00, 0.08]	0.02	2.03	.090
Physical activity × age	0.00 [0.00, 0.00]	0.00	-2.04	.117	0.00 [0.00, 0.00]	0.00	0.31	.782
Age × Physical activity <sup>2</sup>	0.00 [0.00, 0.00]	0.00	2.39	.037	0.00 [0.00, 0.00]	0.00	-0.64	.562
<b>Sleep efficiency</b>								
(Intercept)	-0.31 [-0.82, 0.19]	0.26	-1.21	.323	-0.35 [-0.77, 0.08]	0.22	-1.59	.210
Physical activity	0.19 [-0.25, 0.62]	0.22	0.84	.488	-0.04 [-0.38, 0.31]	0.18	-0.22	.849
Age	0.00 [0.00, 0.01]	0.00	0.65	.534	0.00 [0.00, 0.01]	0.00	0.74	.464
Physical activity <sup>2</sup>	-0.03 [-0.09, 0.02]	0.03	-1.15	.363	0.01 [-0.08, 0.11]	0.05	0.26	.814
Physical activity × age	0.00 [-0.01, 0.00]	0.00	-1.16	.361	0.00 [-0.01, 0.01]	0.00	0.00	.997
Age × Physical activity <sup>2</sup>	0.00 [0.00, 0.00]	0.00	1.94	.113	0.00 [0.00, 0.00]	0.00	-1.05	.360
<b>Sleep onset</b>								
(Intercept)	-0.80 [-1.45, -0.14]	0.33	-2.39	.112	-0.97 [-1.36, -0.58]	0.20	-4.89	.005
Physical activity	0.35 [-0.33, 1.02]	0.34	1.01	.425	0.14 [-0.16, 0.45]	0.16	0.92	.455
Age	0.00 [0.00, 0.01]	0.00	0.39	.713	0.00 [0.00, 0.01]	0.00	0.43	.683
Physical activity <sup>2</sup>	-0.05 [-0.14, 0.04]	0.04	-1.17	.361	0.03 [-0.11, 0.17]	0.07	0.46	.686
Physical activity × age	-0.01 [-0.01, 0.00]	0.00	-1.56	.258	0.00 [-0.01, 0.00]	0.00	-0.91	.456
Age × Physical activity <sup>2</sup>	0.00 [0.00, 0.00]	0.00	1.75	.211	0.00 [0.00, 0.00]	0.00	-0.35	.759
<b>Sleep regularity</b>								

Table 1 continued

Term	Physical Activity Volume				Physical Activity Intensity			
	$\beta$ [95% CI]	SE	t	p	$\beta$ [95% CI]	SE	t	p
(Intercept)	-0.20 [-0.74, 0.34]	0.28	-0.72	.523	-0.19 [-0.68, 0.31]	0.25	-0.73	.515
Physical activity	0.01 [-0.22, 0.24]	0.12	0.08	.945	0.14 [0.07, 0.20]	0.03	3.95	.016
Age	0.00 [0.00, 0.00]	0.00	0.12	.905	0.00 [-0.01, 0.00]	0.00	-0.69	.493
Physical activity <sup>2</sup>	0.00 [-0.04, 0.04]	0.02	0.00	.998	-0.06 [-0.24, 0.11]	0.09	-0.71	.551
Physical activity × age	0.00 [0.00, 0.01]	0.00	1.65	.223	0.00 [0.00, 0.00]	0.00	-3.76	.003
Age × Physical activity <sup>2</sup>	0.00 [0.00, 0.00]	0.00	-2.53	.093	0.00 [0.00, 0.00]	0.00	0.40	.726

*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					
	$\beta$	[95% CI]	SE	t	p	$\beta$	[95% CI]	SE	t	p
Sleep duration										
(Intercept)	0.33	[0.08, 0.74]	0.21	1.56	.183	0.82	[0.39, 1.25]	0.22	3.73	.017
Sleep duration	-0.02	[-0.05, 0.01]	0.01	-1.43	.156	-0.01	[-0.03, 0.01]	0.01	-0.78	.440
Age	-0.02	[-0.02, -0.01]	0.00	-7.92	< .001	-0.02	[-0.02, -0.01]	0.00	-8.04	< .001
Sleep duration <sup>2</sup>	0.04	[0.02, 0.06]	0.01	4.69	.001	-0.01	[-0.15, 0.12]	0.07	-0.19	.864
Sleep duration × age	0.00	[0.00, 0.00]	0.00	0.20	.855	0.00	[0.00, 0.00]	0.00	0.92	.409
Age × Sleep duration <sup>2</sup>	0.00	[0.00, 0.00]	0.00	-4.87	< .001	0.00	[0.00, 0.00]	0.00	-0.09	.934
Sleep efficiency										
(Intercept)	0.36	[-0.05, 0.78]	0.21	1.71	.153	0.81	[0.31, 1.30]	0.25	3.17	.040
Sleep efficiency	0.00	[-0.06, 0.07]	0.03	0.10	.926	-0.01	[-0.15, 0.13]	0.07	-0.19	.866
Age	-0.02	[-0.02, -0.01]	0.00	-8.04	< .001	-0.02	[-0.02, -0.01]	0.00	-10.11	< .001
Sleep efficiency <sup>2</sup>	0.01	[-0.01, 0.02]	0.01	1.16	.284	0.00	[-0.04, 0.05]	0.02	0.02	.985
Sleep efficiency × age	0.00	[0.00, 0.00]	0.00	0.44	.682	0.00	[0.00, 0.00]	0.00	0.37	.742
Age × Sleep efficiency <sup>2</sup>	0.00	[0.00, 0.00]	0.00	-1.15	.258	0.00	[0.00, 0.00]	0.00	-0.14	.902
Sleep onset										
(Intercept)	0.34	[-0.07, 0.75]	0.21	1.61	.171	0.81	[0.37, 1.26]	0.23	3.57	.022
Sleep onset	-0.05	[-0.13, 0.04]	0.04	-1.11	.338	0.00	[-0.05, 0.05]	0.03	-0.09	.935
Age	-0.02	[-0.02, -0.01]	0.00	-8.11	< .001	-0.02	[-0.02, -0.01]	0.00	-10.85	< .001
Sleep onset <sup>2</sup>	-0.02	[-0.08, 0.05]	0.03	-0.50	.656	-0.01	[-0.05, 0.03]	0.02	-0.30	.778
Sleep onset × age	0.00	[0.00, 0.00]	0.00	0.33	.747	0.00	[0.00, 0.00]	0.00	-0.19	.849
Age × Sleep onset <sup>2</sup>	0.00	[0.00, 0.00]	0.00	0.42	.700	0.00	[0.00, 0.00]	0.00	0.53	.601
Sleep regularity										

Table 2 continued

Term	Physical Activity Volume				Physical Activity Intensity			
	$\beta$ [95% CI]	SE	t	p	$\beta$ [95% CI]	SE	t	p
(Intercept)	0.31 [-0.09, 0.72]	0.21	1.51	.190	0.80 [0.38, 1.23]	0.22	3.67	.017
Sleep regularity	0.13 [0.05, 0.21]	0.04	3.11	.070	0.07 [-0.03, 0.16]	0.05	1.42	.281
Age	-0.02 [-0.02, -0.01]	0.00	-8.45	< .001	-0.02 [-0.02, -0.01]	0.00	-9.72	< .001
Sleep regularity <sup>2</sup>	0.03 [-0.01, 0.07]	0.02	1.41	.260	0.00 [-0.05, 0.05]	0.03	0.05	.962
Sleep regularity × age	0.00 [0.00, 0.00]	0.00	-1.70	.191	0.00 [0.00, 0.00]	0.00	-1.10	.369
Age × Sleep regularity <sup>2</sup>	0.00 [0.00, 0.00]	0.00	-0.39	.725	0.00 [0.00, 0.00]	0.00	0.08	.942

*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				
	$\beta$ [95% CI]	SE	t	p	$\beta$ [95% CI]	SE	t	p
<b>Sleep duration</b>								
(Intercept)	0.48 [0.14, 0.81]	0.17	2.76	.037	0.53 [0.10, 0.97]	0.22	2.39	.092
Physical activity	0.22 [0.11, 0.33]	0.06	4.04	.006	0.01 [-0.33, 0.34]	0.17	0.04	.969
Physical activity <sup>2</sup>	-0.05 [-0.09, -0.01]	0.02	-2.19	.093	0.01 [-0.04, 0.07]	0.03	0.47	.652
Age	0.00 [-0.01, 0.00]	0.00	-1.39	.167	0.00 [-0.01, 0.00]	0.00	-1.27	.279
Physical activity × bmi	0.00 [-0.01, 0.00]	0.00	-1.57	.125	0.00 [0.00, 0.01]	0.00	1.40	.193
<b>Sleep efficiency</b>								
(Intercept)	0.11 [-0.16, 0.37]	0.14	0.79	.447	0.19 [-0.25, 0.64]	0.23	0.86	.450
Physical activity	0.12 [-0.27, 0.52]	0.20	0.62	.594	-0.08 [-0.37, 0.21]	0.15	-0.54	.638
Physical activity <sup>2</sup>	-0.02 [-0.09, 0.04]	0.03	-0.73	.527	0.02 [-0.02, 0.06]	0.02	1.09	.277
Age	0.00 [0.00, 0.01]	0.00	1.45	.191	0.00 [0.00, 0.01]	0.00	0.58	.577
Physical activity × bmi	0.00 [-0.01, 0.01]	0.00	-0.42	.705	0.00 [-0.01, 0.01]	0.00	0.45	.686
<b>Sleep onset</b>								
(Intercept)	-0.18 [-0.49, 0.13]	0.16	-1.11	.277	-0.18 [-0.58, 0.23]	0.21	-0.86	.419
Physical activity	0.34 [-0.42, 1.10]	0.39	0.87	.477	0.07 [-0.25, 0.39]	0.16	0.41	.719
Physical activity <sup>2</sup>	-0.05 [-0.17, 0.07]	0.06	-0.84	.488	0.06 [-0.12, 0.24]	0.09	0.63	.592
Age	0.00 [0.00, 0.01]	0.00	0.70	.533	0.00 [0.00, 0.00]	0.00	0.71	.482
Physical activity × bmi	-0.01 [-0.02, 0.01]	0.01	-1.04	.405	0.00 [-0.01, 0.01]	0.00	0.05	.961
<b>Sleep regularity</b>								
(Intercept)	0.20 [-0.26, 0.65]	0.23	0.85	.446	0.31 [-0.24, 0.87]	0.28	1.10	.352
Physical activity	-0.12 [-0.22, -0.02]	0.05	-2.35	.054	0.01 [-0.05, 0.08]	0.03	0.43	.669
Physical activity <sup>2</sup>	0.04 [-0.01, 0.09]	0.02	1.74	.163	-0.06 [-0.15, 0.04]	0.05	-1.19	.326

Table 3 continued

Term	Physical Activity Volume				Physical Activity Intensity					
	$\beta$	[95% CI]	SE	t	p	$\beta$	[95% CI]	SE	t	p
Age	0.00	[0.01, 0.00]	0.00	-0.23	.823	0.00	[0.00, 0.00]	0.00	-0.26	.799
Physical activity $\times$ bmi	0.01	[0.00, 0.02]	0.00	2.13	.137	0.00	[0.00, 0.01]	0.00	0.62	.567

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			
	$\beta$ [95% CI]	SE	t	p	$\beta$ [95% CI]	SE	t	p
Sleep duration								
(Intercept)	1.41 [0.86, 1.96]	0.28	5.03	.005	1.05 [0.53, 1.56]	0.26	3.99	.033
Sleep duration	-0.02 [-0.06, 0.02]	0.02	-0.99	.323	0.00 [-0.03, 0.04]	0.02	0.07	.945
Sleep duration <sup>2</sup>	0.04 [0.01, 0.07]	0.02	2.56	.029	-0.01 [-0.15, 0.13]	0.07	-0.15	.895
Age	-0.02 [-0.02, -0.01]	0.00	-8.32	< .001	-0.02 [-0.02, -0.01]	0.00	-12.17	< .001
Sleep duration × bmi	0.00 [0.00, 0.00]	0.00	0.24	.815	0.00 [0.00, 0.00]	0.00	0.09	.932
Sleep efficiency								
(Intercept)	1.46 [0.94, 1.98]	0.26	5.53	.002	1.04 [0.44, 1.64]	0.31	3.38	.055
Sleep efficiency	0.04 [-0.17, 0.25]	0.11	0.39	.731	-0.01 [-0.23, 0.20]	0.11	-0.12	.913
Sleep efficiency <sup>2</sup>	0.00 [-0.03, 0.03]	0.01	-0.06	.953	0.00 [-0.03, 0.03]	0.02	0.11	.918
Age	-0.02 [-0.02, -0.01]	0.00	-8.10	< .001	-0.02 [-0.02, -0.01]	0.00	-11.92	< .001
Sleep efficiency × bmi	0.00 [-0.01, 0.01]	0.00	-0.31	.785	0.00 [-0.01, 0.01]	0.00	0.23	.834
Sleep onset								
(Intercept)	1.49 [0.98, 1.99]	0.26	5.75	.001	1.04 [0.44, 1.65]	0.31	3.36	.056
Sleep onset	-0.01 [-0.10, 0.07]	0.04	-0.32	.760	0.00 [-0.07, 0.08]	0.04	0.07	.946
Sleep onset <sup>2</sup>	-0.03 [-0.07, 0.01]	0.02	-1.46	.161	-0.01 [-0.04, 0.02]	0.02	-0.57	.573
Age	-0.02 [-0.02, -0.01]	0.00	-8.12	< .001	-0.02 [-0.02, -0.01]	0.00	-11.81	< .001
Sleep onset × bmi	0.00 [0.00, 0.00]	0.00	-0.62	.550	0.00 [0.00, 0.00]	0.00	-0.22	.826
Sleep regularity								
(Intercept)	1.39 [0.87, 1.91]	0.27	5.24	.003	1.00 [0.47, 1.54]	0.27	3.67	.041
Sleep regularity	0.14 [-0.01, 0.30]	0.08	1.88	.171	0.09 [-0.05, 0.24]	0.07	1.29	.304
Sleep regularity <sup>2</sup>	0.01 [-0.06, 0.08]	0.04	0.39	.720	0.01 [-0.04, 0.06]	0.03	0.49	.654

Term	Physical Activity Volume				Physical Activity Intensity					
	$\beta$	[95% CI]	SE	t	p	$\beta$	[95% CI]	SE	t	p
Age	-0.02	[-0.02, -0.01]	0.00	-7.94	< .001	-0.02	[-0.02, -0.01]	0.00	-11.77	< .001
Sleep regularity × bmi	0.00	[0.01, 0.00]	0.00	-0.95	.410	0.00	[0.01, 0.00]	0.00	-1.04	.373

*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				
	$\beta$ [95% CI]	SE	t	p	$\beta$ [95% CI]	SE	t	p
<b>Sleep duration</b>								
(Intercept)	0.44 [0.15, 0.72]	0.14	3.02	.013	0.52 [-0.04, 1.07]	0.28	1.84	.178
Physical activity	0.15 [0.08, 0.21]	0.03	4.42	.003	0.05 [-0.23, 0.32]	0.14	0.33	.772
Physical activity <sup>2</sup>	-0.01 [-0.03, 0.00]	0.01	-1.70	.090	0.03 [-0.02, 0.08]	0.02	1.10	.353
Age	0.00 [-0.01, 0.00]	0.00	-1.26	.210	0.00 [-0.01, 0.00]	0.00	-1.28	.277
Physical activity × sesmedium	0.00 [-0.09, 0.10]	0.05	0.06	.958	0.03 [-0.01, 0.08]	0.03	1.36	.190
Physical activity × seshigh	0.04 [-0.03, 0.11]	0.03	1.22	.239	0.01 [-0.04, 0.06]	0.02	0.51	.612
<b>Sleep efficiency</b>								
(Intercept)	0.11 [-0.15, 0.38]	0.14	0.84	.421	0.24 [-0.23, 0.71]	0.24	1.01	.385
Physical activity	0.10 [-0.15, 0.35]	0.13	0.79	.510	-0.05 [-0.23, 0.13]	0.09	-0.52	.653
Physical activity <sup>2</sup>	-0.02 [-0.06, 0.01]	0.02	-1.18	.326	-0.01 [-0.05, 0.04]	0.02	-0.21	.846
Age	0.00 [0.00, 0.01]	0.00	1.41	.204	0.00 [0.00, 0.01]	0.00	0.55	.592
Physical activity × sesmedium	-0.01 [-0.08, 0.05]	0.03	-0.41	.688	0.01 [-0.04, 0.06]	0.03	0.46	.660
Physical activity × seshigh	0.00 [-0.11, 0.11]	0.06	0.04	.969	0.00 [-0.05, 0.05]	0.03	-0.15	.885
<b>Sleep onset</b>								
(Intercept)	-0.18 [-0.49, 0.13]	0.16	-1.15	.265	-0.14 [-0.61, 0.34]	0.24	-0.57	.599
Physical activity	0.12 [-0.26, 0.50]	0.19	0.63	.594	0.08 [-0.09, 0.25]	0.09	0.93	.445
Physical activity <sup>2</sup>	-0.01 [-0.06, 0.04]	0.02	-0.43	.702	0.03 [-0.06, 0.12]	0.04	0.74	.533
Age	0.00 [0.00, 0.01]	0.00	0.82	.465	0.00 [0.00, 0.00]	0.00	0.78	.441
Physical activity × sesmedium	0.01 [-0.06, 0.08]	0.04	0.22	.834	-0.03 [-0.10, 0.04]	0.03	-0.92	.419
Physical activity × seshigh	0.06 [-0.05, 0.18]	0.06	1.08	.364	0.00 [-0.04, 0.03]	0.02	-0.26	.798
<b>Sleep regularity</b>								

Table 5 continued

Term	Physical Activity Volume				Physical Activity Intensity			
	$\beta$ [95% CI]	SE	t	p	$\beta$ [95% CI]	SE	t	p
(Intercept)	0.25 [-0.26, 0.76]	0.26	0.95	.408	0.27 [-0.28, 0.83]	0.28	0.96	.409
Physical activity	0.11 [-0.03, 0.25]	0.07	1.60	.231	0.04 [-0.04, 0.13]	0.04	1.00	.398
Physical activity <sup>2</sup>	-0.03 [-0.05, -0.01]	0.01	-3.17	.008	-0.02 [-0.10, 0.07]	0.04	-0.45	.693
Age	0.00 [-0.01, 0.00]	0.00	-0.29	.778	0.00 [0.00, 0.00]	0.00	-0.25	.803
Physical activity $\times$ sesmedium	-0.01 [-0.07, 0.04]	0.03	-0.48	.634	0.01 [-0.03, 0.05]	0.02	0.60	.547
Physical activity $\times$ seshigh	-0.07 [-0.13, 0.00]	0.03	-2.06	.062	-0.01 [-0.07, 0.05]	0.03	-0.29	.783

*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				
	$\beta$ [95% CI]	SE	t	p	$\beta$ [95% CI]	SE	t	p
<b>Sleep duration</b>								
(Intercept)	1.45 [0.94, 1.97]	0.26	5.51	.002	1.06 [0.50, 1.61]	0.28	3.72	.043
Sleep duration	-0.03 [-0.08, 0.03]	0.03	-0.85	.457	0.00 [-0.06, 0.06]	0.03	0.08	.942
Sleep duration <sup>2</sup>	0.01 [-0.01, 0.04]	0.01	0.96	.400	-0.02 [-0.09, 0.06]	0.04	-0.48	.677
Age	-0.02 [-0.02, -0.01]	0.00	-8.26	< .001	-0.02 [-0.02, -0.01]	0.00	-12.11	< .001
Sleep duration × sesmedium	0.00 [-0.06, 0.06]	0.03	0.09	.930	0.00 [-0.08, 0.08]	0.04	-0.01	.992
Sleep duration × seshigh	0.02 [-0.02, 0.06]	0.02	1.08	.286	0.00 [-0.05, 0.05]	0.03	-0.06	.954
<b>Sleep efficiency</b>								
(Intercept)	1.45 [0.92, 1.98]	0.27	5.35	.003	1.04 [0.44, 1.63]	0.30	3.41	.054
Sleep efficiency	0.02 [-0.02, 0.07]	0.02	0.99	.335	-0.01 [-0.08, 0.06]	0.03	-0.32	.769
Sleep efficiency <sup>2</sup>	0.01 [-0.01, 0.03]	0.01	1.40	.215	0.00 [-0.04, 0.04]	0.02	-0.01	.996
Age	-0.02 [-0.02, -0.01]	0.00	-8.06	< .001	-0.02 [-0.02, -0.01]	0.00	-11.97	< .001
Sleep efficiency × sesmedium	0.00 [-0.06, 0.06]	0.03	0.05	.964	0.04 [0.00, 0.08]	0.02	1.81	.072
Sleep efficiency × seshigh	-0.03 [-0.10, 0.04]	0.03	-0.91	.379	-0.01 [-0.05, 0.04]	0.02	-0.34	.733
<b>Sleep onset</b>								
(Intercept)	1.48 [0.94, 2.02]	0.28	5.36	.003	1.04 [0.41, 1.66]	0.32	3.25	.061
Sleep onset	-0.03 [-0.08, 0.02]	0.02	-1.18	.282	0.00 [-0.04, 0.04]	0.02	-0.10	.921
Sleep onset <sup>2</sup>	-0.02 [-0.06, 0.02]	0.02	-1.05	.367	0.00 [-0.02, 0.02]	0.01	0.09	.930
Age	-0.02 [-0.02, -0.01]	0.00	-8.20	< .001	-0.02 [-0.02, -0.01]	0.00	-12.02	< .001
Sleep onset × sesmedium	0.00 [-0.04, 0.04]	0.02	-0.07	.941	0.00 [-0.04, 0.03]	0.02	-0.21	.837
Sleep onset × seshigh	-0.02 [-0.06, 0.02]	0.02	-0.87	.386	0.00 [-0.06, 0.06]	0.03	-0.05	.965
Sleep regularity								

Term	Physical Activity Volume				Physical Activity Intensity			
	$\beta$ [95% CI]	SE	t	p	$\beta$ [95% CI]	SE	t	p
(Intercept)	1.37 [0.86, 1.87]	0.26	5.30	.003	1.00 [0.46, 1.55]	0.28	3.59	.045
Sleep regularity	0.08 [0.02, 0.13]	0.03	2.85	.050	0.03 [-0.04, 0.10]	0.04	0.86	.464
Sleep regularity <sup>2</sup>	0.02 [-0.03, 0.07]	0.03	0.69	.547	0.00 [-0.03, 0.04]	0.02	0.08	.945
Age	-0.02 [-0.02, -0.01]	0.00	-8.05	< .001	-0.02 [-0.02, -0.01]	0.00	-11.76	< .001
Sleep regularity × sesmedium	0.01 [-0.04, 0.05]	0.02	0.23	.825	0.01 [-0.06, 0.08]	0.04	0.25	.819
Sleep regularity × seshigh	0.02 [0.03, 0.07]	0.02	0.77	.460	0.01 [-0.05, 0.07]	0.03	0.36	.738

*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			
	$\beta$	[95% CI]	SE	t	p	$\beta$	[95% CI]	SE	t	p
<b>Sleep duration</b>										
(Intercept)	0.43	[0.15, 0.72]	0.15	2.96	.016	0.50	[-0.06, 1.07]	0.29	1.76	.191
Physical activity	0.16	[0.10, 0.23]	0.03	4.99	.009	0.06	[-0.21, 0.33]	0.14	0.44	.703
Physical activity <sup>2</sup>	-0.01	[-0.02, 0.00]	0.01	-2.43	.015	0.04	[-0.01, 0.09]	0.03	1.69	.204
Age	0.00	[-0.01, 0.00]	0.00	-1.29	.201	0.00	[-0.01, 0.00]	0.00	-1.26	.285
Physical activity $\times$ sexmale	0.00	[-0.07, 0.07]	0.04	-0.01	.994	0.01	[-0.06, 0.07]	0.03	0.19	.858
<b>Sleep efficiency</b>										
(Intercept)	0.11	[-0.16, 0.38]	0.14	0.81	.440	0.25	[-0.22, 0.71]	0.24	1.04	.375
Physical activity	0.07	[-0.23, 0.37]	0.15	0.45	.696	-0.08	[-0.24, 0.08]	0.08	-0.96	.435
Physical activity <sup>2</sup>	-0.02	[-0.06, 0.02]	0.02	-0.82	.492	-0.01	[-0.08, 0.06]	0.03	-0.24	.832
Age	0.00	[0.00, 0.01]	0.00	1.50	.177	0.00	[0.00, 0.01]	0.00	0.60	.562
Physical activity $\times$ sexmale	0.05	[-0.03, 0.13]	0.04	1.31	.266	0.06	[0.04, 0.17]	0.05	1.19	.339
<b>Sleep onset</b>										
(Intercept)	-0.17	[-0.48, 0.14]	0.16	-1.10	.285	-0.14	[-0.60, 0.31]	0.23	-0.62	.562
Physical activity	0.18	[-0.30, 0.66]	0.24	0.75	.533	0.08	[-0.10, 0.27]	0.09	0.89	.464
Physical activity <sup>2</sup>	-0.02	[-0.08, 0.03]	0.03	-0.90	.461	0.05	[-0.08, 0.17]	0.06	0.70	.554
Age	0.00	[0.00, 0.01]	0.00	0.82	.466	0.00	[0.00, 0.00]	0.00	0.64	.529
Physical activity $\times$ sexmale	-0.07	[-0.20, 0.06]	0.07	-1.08	.381	-0.04	[-0.13, 0.05]	0.05	-0.82	.487
<b>Sleep regularity</b>										
(Intercept)	0.25	[-0.27, 0.76]	0.26	0.93	.419	0.28	[-0.28, 0.84]	0.29	0.99	.398
Physical activity	0.06	[-0.11, 0.22]	0.09	0.66	.572	0.02	[-0.07, 0.10]	0.04	0.36	.749
Physical activity <sup>2</sup>	-0.02	[-0.04, 0.00]	0.01	-1.97	.140	-0.03	[-0.11, 0.05]	0.04	-0.69	.557

Term	Physical Activity Volume				Physical Activity Intensity					
	$\beta$	[95% CI]	SE	t	p	$\beta$	[95% CI]	SE	t	p
Age	0.00	[0.01, 0.00]	0.00	-0.24	.818	0.00	[0.00, 0.00]	0.00	-0.16	.876
Physical activity $\times$ sexmale	0.05	[-0.01, 0.11]	0.03	1.67	.149	0.06	[0.00, 0.11]	0.03	1.93	.131

*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					
	$\beta$	[95% CI]	SE	t	p	$\beta$	[95% CI]	SE	t	p
Sleep duration										
(Intercept)	1.45	[0.95, 1.95]	0.25	5.68	.001	1.04	[0.49, 1.59]	0.28	3.69	.043
Sleep duration	-0.03	[-0.06, 0.00]	0.02	-1.88	.112	0.00	[-0.05, 0.05]	0.02	-0.06	.956
Sleep duration <sup>2</sup>	0.02	[0.00, 0.04]	0.01	1.69	.188	-0.01	[-0.09, 0.07]	0.04	-0.20	.862
Age	-0.02	[-0.02, -0.01]	0.00	-8.25	<.001	-0.02	[-0.02, -0.01]	0.00	-12.13	<.001
Sleep duration × sexmale	0.02	[-0.01, 0.06]	0.02	1.30	.218	0.01	[-0.05, 0.06]	0.03	0.24	.828
Sleep efficiency										
(Intercept)	1.45	[0.92, 1.98]	0.27	5.38	.003	1.04	[0.43, 1.64]	0.31	3.36	.056
Sleep efficiency	0.03	[0.00, 0.06]	0.02	2.03	.042	0.00	[-0.08, 0.09]	0.04	0.03	.981
Sleep efficiency <sup>2</sup>	0.01	[0.00, 0.02]	0.00	1.85	.065	0.00	[-0.03, 0.03]	0.01	0.02	.986
Age	-0.02	[-0.02, -0.01]	0.00	-8.12	<.001	-0.02	[-0.02, -0.01]	0.00	-11.99	<.001
Sleep efficiency × sexmale	-0.03	[-0.08, 0.01]	0.02	-1.42	.161	0.00	[-0.07, 0.07]	0.03	0.02	.988
Sleep onset										
(Intercept)	1.46	[0.93, 1.99]	0.27	5.39	.003	1.03	[0.43, 1.63]	0.30	3.38	.055
Sleep onset	-0.01	[-0.05, 0.03]	0.02	-0.54	.614	-0.02	[-0.08, 0.04]	0.03	-0.58	.606
Sleep onset <sup>2</sup>	0.00	[-0.02, 0.02]	0.01	-0.12	.910	0.00	[-0.03, 0.04]	0.02	0.10	.926
Age	-0.02	[-0.02, -0.01]	0.00	-8.10	<.001	-0.02	[-0.02, -0.01]	0.00	-11.87	<.001
Sleep onset × sexmale	-0.04	[-0.07, -0.01]	0.02	-2.75	.006	0.03	[-0.01, 0.06]	0.02	1.47	.183
Sleep regularity										
(Intercept)	1.36	[0.84, 1.88]	0.26	5.15	.003	1.00	[0.44, 1.55]	0.28	3.53	.047
Sleep regularity	0.08	[0.04, 0.13]	0.02	3.57	.035	0.03	[0.00, 0.06]	0.02	1.97	.118
Sleep regularity <sup>2</sup>	0.03	[0.01, 0.05]	0.01	2.78	.026	0.00	[-0.02, 0.03]	0.01	0.30	.784

Table 8 continued

Term	Physical Activity Volume				Physical Activity Intensity					
	$\beta$	[95% CI]	SE	t	p	$\beta$	[95% CI]	SE	t	p
Age	-0.02	[-0.02, -0.01]	0.00	-8.00	< .001	-0.02	[-0.02, -0.01]	0.00	-11.78	< .001
Sleep regularity × sexmale	0.01	[0.03, 0.04]	0.02	0.31	.760	0.02	[-0.03, 0.06]	0.02	0.63	.569

*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				
	$\beta$ [95% CI]	SE	t	p	$\beta$ [95% CI]	SE	t	p
Sleep duration								
(Intercept)	0.38 [0.08, 0.68]	0.15	2.50	.039	0.46 [-0.10, 1.02]	0.29	1.62	.218
Physical activity	0.13 [0.05, 0.22]	0.04	3.03	.028	0.07 [-0.20, 0.34]	0.14	0.49	.671
Weekday xmonday	0.02 [-0.04, 0.09]	0.03	0.72	.476	0.01 [-0.07, 0.09]	0.04	0.32	.753
Weekday xsaturday	0.10 [0.04, 0.16]	0.03	3.13	.003	0.10 [0.03, 0.17]	0.03	2.86	.004
Weekday xsunday	0.10 [0.04, 0.17]	0.03	3.28	.001	0.09 [0.01, 0.17]	0.04	2.20	.041
Weekday xthursday	-0.01 [-0.07, 0.05]	0.03	-0.28	.777	0.00 [-0.07, 0.07]	0.03	-0.07	.948
Weekday xtuesday	-0.01 [-0.08, 0.06]	0.03	-0.23	.819	-0.03 [-0.10, 0.04]	0.04	-0.85	.397
Weekday xwednesday	0.02 [-0.05, 0.08]	0.03	0.50	.614	-0.01 [-0.09, 0.07]	0.04	-0.27	.792
Physical activity <sup>2</sup>	-0.01 [-0.03, 0.01]	0.01	-1.12	.261	0.03 [-0.01, 0.07]	0.02	1.63	.138
Age	0.00 [-0.01, 0.00]	0.00	-1.20	.232	0.00 [-0.01, 0.00]	0.00	-1.18	.310
Physical activity × weekday xmonday	0.03 [-0.05, 0.11]	0.04	0.78	.442	0.01 [0.05, 0.06]	0.03	0.26	.797
Physical activity × weekday xsaturday	0.03 [-0.05, 0.11]	0.04	0.74	.465	-0.04 [-0.09, 0.02]	0.03	-1.34	.185
Physical activity × weekday xsunday	0.07 [-0.01, 0.16]	0.04	1.69	.109	-0.02 [-0.08, 0.05]	0.03	-0.45	.665
Physical activity × weekday xtuesday	0.03 [-0.06, 0.13]	0.05	0.70	.500	0.01 [-0.05, 0.07]	0.03	0.25	.806
Physical activity × weekday xtuesday	0.04 [-0.05, 0.12]	0.05	0.78	.451	0.01 [-0.06, 0.07]	0.03	0.23	.825
Physical activity × weekday xwednesday	0.03 [-0.06, 0.12]	0.05	0.62	.545	0.01 [-0.06, 0.09]	0.04	0.38	.717
Weekday xmonday × Physical activity <sup>2</sup>	0.00 [-0.02, 0.02]	0.01	0.01	.994	0.00 [-0.05, 0.05]	0.03	-0.08	.942
Weekday xsaturday × Physical activity <sup>2</sup>	-0.02 [-0.04, 0.01]	0.01	-1.33	.185	-0.02 [-0.09, 0.06]	0.04	-0.47	.665
Weekday xsunday × Physical activity <sup>2</sup>	-0.01 [-0.04, 0.01]	0.01	-0.97	.336	-0.01 [-0.05, 0.03]	0.02	-0.50	.617
Weekday xthursday × Physical activity <sup>2</sup>	-0.01 [-0.03, 0.02]	0.01	-0.39	.695	-0.01 [-0.06, 0.03]	0.02	-0.50	.622
Weekday xtuesday × Physical activity <sup>2</sup>	-0.01 [-0.03, 0.02]	0.01	-0.58	.564	0.01 [-0.03, 0.06]	0.02	0.59	.558

Table 9 continued

TITLE

Term	Physical Activity Volume				Physical Activity Intensity			
	$\beta$ [95% CI]	SE	t	p	$\beta$ [95% CI]	SE	t	p
Weekday xwednesday $\times$ Physical activity <sup>2</sup>	-0.01 [-0.04, 0.02]	0.02	-0.73	.478	0.00 [-0.05, 0.05]	0.03	0.16	.879
Sleep efficency (Intercept)	0.08 [-0.17, 0.34]	0.13	0.63	.540	0.24 [-0.23, 0.71]	0.24	0.99	.394
Physical activity	0.07 [-0.18, 0.32]	0.13	0.55	.635	-0.06 [-0.21, 0.10]	0.08	-0.72	.541
Weekday xmunday	0.03 [-0.03, 0.10]	0.03	1.06	.296	0.00 [-0.07, 0.06]	0.03	-0.11	.913
Weekday xsaturday	-0.03 [-0.08, 0.03]	0.03	-1.00	.319	-0.05 [-0.12, 0.01]	0.03	-1.68	.092
Weekday xsunday	-0.03 [-0.08, 0.03]	0.03	-0.84	.405	-0.08 [-0.14, -0.01]	0.03	-2.36	.019
Weekday xthursday	-0.02 [-0.08, 0.05]	0.04	-0.46	.654	-0.02 [-0.08, 0.05]	0.03	-0.46	.643
Weekday xtuesday	0.00 [-0.06, 0.06]	0.03	-0.02	.986	-0.01 [-0.09, 0.07]	0.04	-0.23	.824
Weekday xwednesday	0.03 [-0.03, 0.09]	0.03	0.97	.338	0.01 [-0.05, 0.07]	0.03	0.31	.756
Physical activity <sup>2</sup>	-0.01 [-0.05, 0.03]	0.02	-0.46	.681	-0.01 [-0.05, 0.04]	0.02	-0.35	.742
Age	0.00 [0.00, 0.01]	0.00	1.53	.171	0.00 [0.00, 0.01]	0.00	0.62	.549
Physical activity $\times$ weekday xmonday	0.02 [-0.05, 0.09]	0.04	0.59	.558	0.04 [-0.02, 0.09]	0.03	1.36	.175
Physical activity $\times$ weekday xsaturday	0.08 [0.00, 0.16]	0.04	1.96	.066	-0.01 [-0.08, 0.07]	0.04	-0.17	.870
Physical activity $\times$ weekday xsunday	0.07 [0.01, 0.14]	0.03	2.12	.034	0.02 [-0.04, 0.08]	0.03	0.61	.556
Physical activity $\times$ weekday xthursday	0.03 [-0.08, 0.15]	0.06	0.54	.617	0.02 [-0.03, 0.08]	0.03	0.79	.439
Physical activity $\times$ weekday xtuesday	0.00 [-0.07, 0.07]	0.03	-0.07	.944	0.01 [-0.04, 0.06]	0.03	0.31	.756
Physical activity $\times$ weekday xwednesday	0.00 [-0.09, 0.10]	0.05	0.08	.938	-0.01 [-0.06, 0.04]	0.03	-0.33	.740
Weekday xmunday $\times$ Physical activity <sup>2</sup>	-0.01 [-0.03, 0.01]	0.01	-0.69	.491	0.01 [-0.02, 0.05]	0.02	0.71	.481
Weekday xsaturday $\times$ Physical activity <sup>2</sup>	-0.02 [-0.05, 0.00]	0.01	-1.93	.060	0.00 [-0.04, 0.04]	0.02	-0.01	.995
Weekday xsunday $\times$ Physical activity <sup>2</sup>	-0.03 [-0.06, 0.00]	0.01	-1.98	.059	0.01 [-0.03, 0.05]	0.02	0.41	.685
Weekday xthursday $\times$ Physical activity <sup>2</sup>	-0.01 [-0.04, 0.02]	0.02	-0.70	.500	-0.01 [-0.06, 0.04]	0.03	-0.38	.716
Weekday xtuesday $\times$ Physical activity <sup>2</sup>	0.00 [-0.02, 0.02]	0.01	0.35	.724	0.01 [-0.03, 0.04]	0.02	0.35	.729

Table 9 continued

TITLE

Term	Physical Activity Volume				Physical Activity Intensity			
	$\beta$ [95% CI]	SE	t	p	$\beta$ [95% CI]	SE	t	p
Weekday xwednesday $\times$ Physical activity <sup>2</sup>	-0.01 [-0.03, 0.02]	0.01	-0.55	.588	0.01 [-0.03, 0.04]	0.02	0.27	.788
Sleep onset								
(Intercept)	-0.16 [-0.45, 0.12]	0.14	-1.14	.257	-0.11 [-0.56, 0.35]	0.23	-0.46	.665
Physical activity	0.12 [-0.27, 0.52]	0.20	0.61	.601	0.06 [-0.03, 0.15]	0.05	1.36	.278
Weekday xmunday	-0.01 [-0.14, 0.12]	0.07	-0.11	.918	-0.04 [-0.11, 0.03]	0.04	-1.02	.324
Weekday xsaturday	0.10 [0.01, 0.18]	0.04	2.20	.093	0.08 [0.01, 0.14]	0.03	2.33	.026
Weekday xsunday	0.13 [0.00, 0.25]	0.06	1.94	.158	0.07 [0.00, 0.14]	0.04	1.98	.068
Weekday xthursday	-0.04 [-0.11, 0.03]	0.04	-1.05	.330	-0.07 [-0.13, -0.01]	0.03	-2.36	.020
Weekday xtuesday	-0.05 [-0.10, 0.00]	0.03	-2.00	.046	-0.08 [-0.17, 0.01]	0.04	-1.77	.123
Weekday xtuesday	-0.02 [-0.11, 0.07]	0.05	-0.46	.673	-0.07 [-0.15, 0.02]	0.04	-1.50	.180
Physical activity <sup>2</sup>	-0.01 [-0.06, 0.03]	0.02	-0.60	.600	0.02 [-0.05, 0.09]	0.04	0.61	.595
Age	0.00 [0.00, 0.01]	0.00	0.78	.487	0.00 [0.00, 0.00]	0.00	0.69	.493
Physical activity $\times$ weekday xmonday	-0.01 [-0.08, 0.05]	0.03	-0.31	.758	0.01 [-0.10, 0.12]	0.06	0.23	.837
Physical activity $\times$ weekday xsaturday	0.05 [-0.02, 0.12]	0.03	1.44	.165	0.04 [-0.03, 0.10]	0.03	1.13	.309
Physical activity $\times$ weekday xsunday	0.04 [-0.04, 0.11]	0.04	1.03	.323	0.01 [-0.07, 0.09]	0.04	0.24	.823
Physical activity $\times$ weekday xtursday	0.05 [-0.07, 0.16]	0.06	0.85	.448	0.00 [-0.10, 0.11]	0.05	0.03	.982
Physical activity $\times$ weekday xtuesday	0.02 [-0.05, 0.08]	0.03	0.47	.643	-0.01 [-0.06, 0.04]	0.03	-0.44	.664
Physical activity $\times$ weekday xwednesday	0.05 [-0.06, 0.16]	0.06	0.90	.418	0.01 [-0.06, 0.09]	0.04	0.36	.739
Weekday xmunday $\times$ Physical activity <sup>2</sup>	0.00 [-0.02, 0.02]	0.01	0.17	.869	0.01 [-0.04, 0.06]	0.02	0.50	.637
Weekday xsaturday $\times$ Physical activity <sup>2</sup>	0.00 [-0.03, 0.02]	0.01	-0.30	.768	0.02 [-0.04, 0.07]	0.03	0.68	.530
Weekday xsunday $\times$ Physical activity <sup>2</sup>	-0.02 [-0.05, 0.00]	0.01	-1.89	.064	0.02 [-0.03, 0.07]	0.03	0.77	.481
Weekday xtursday $\times$ Physical activity <sup>2</sup>	-0.01 [-0.04, 0.02]	0.01	-0.90	.394	0.01 [-0.04, 0.07]	0.03	0.53	.622
Weekday xtuesday $\times$ Physical activity <sup>2</sup>	0.00 [-0.02, 0.01]	0.01	-0.52	.604	0.02 [-0.04, 0.07]	0.03	0.61	.573

Table 9 continued

TITLE

Term	Physical Activity Volume				Physical Activity Intensity			
	$\beta$ [95% CI]	SE	t	p	$\beta$ [95% CI]	SE	t	p
Weekday xwednesday $\times$ Physical activity <sup>2</sup>	-0.01 [-0.06, 0.03]	0.02	-0.58	.598	0.02 [-0.04, 0.09]	0.03	0.71	.524
Sleep regularity								
(Intercept)	0.22 [-0.28, 0.73]	0.26	0.86	.449	0.28 [-0.31, 0.88]	0.30	0.94	.424
Physical activity	0.07 [-0.08, 0.22]	0.08	0.91	.442	0.00 [-0.08, 0.09]	0.04	0.06	.955
Weekday xmunday	0.01 [-0.04, 0.07]	0.03	0.50	.616	-0.01 [-0.08, 0.06]	0.03	-0.33	.741
Weekday xsaturday	-0.11 [-0.16, -0.05]	0.03	-3.91	< .001	-0.12 [-0.19, -0.06]	0.03	-3.74	< .001
Weekday xsunday	-0.13 [-0.19, -0.06]	0.03	-3.61	.003	-0.18 [-0.24, -0.12]	0.03	-5.81	< .001
Weekday xthursday	0.16 [0.09, 0.23]	0.04	4.42	.002	0.15 [0.09, 0.22]	0.03	4.81	< .001
Weekday xtuesday	0.15 [0.09, 0.22]	0.03	4.77	< .001	0.14 [0.06, 0.21]	0.04	3.66	.001
Weekday xwednesday	0.15 [0.09, 0.20]	0.03	5.03	< .001	0.15 [0.06, 0.25]	0.05	3.33	.013
Physical activity <sup>2</sup>	-0.01 [-0.04, 0.01]	0.01	-1.33	.229	-0.02 [-0.06, 0.01]	0.02	-1.24	.267
Age	0.00 [-0.01, 0.00]	0.00	-0.32	.760	0.00 [0.00, 0.00]	0.00	-0.38	.707
Physical activity $\times$ weekday xmonday	0.06 [-0.01, 0.12]	0.03	1.71	.087	0.08 [0.03, 0.12]	0.02	3.10	.002
Physical activity $\times$ weekday xsaturday	0.04 [-0.02, 0.11]	0.03	1.23	.220	-0.01 [-0.11, 0.08]	0.05	-0.25	.815
Physical activity $\times$ weekday xsunday	0.09 [0.03, 0.16]	0.03	2.74	.006	-0.02 [-0.09, 0.06]	0.04	-0.50	.640
Physical activity $\times$ weekday xtuesday	-0.01 [-0.09, 0.06]	0.04	-0.35	.727	0.06 [-0.01, 0.14]	0.04	1.73	.146
Physical activity $\times$ weekday xwednesday	-0.04 [-0.10, 0.03]	0.03	-1.11	.268	0.06 [0.00, 0.12]	0.03	1.85	.096
Physical activity $\times$ weekday xtuesday	-0.08 [-0.15, -0.01]	0.04	-2.17	.035	0.05 [-0.03, 0.12]	0.04	1.24	.266
Weekday xmunday $\times$ Physical activity <sup>2</sup>	-0.01 [-0.03, 0.01]	0.01	-1.05	.294	0.00 [-0.05, 0.06]	0.03	0.04	.966
Weekday xsaturday $\times$ Physical activity <sup>2</sup>	-0.02 [-0.04, 0.01]	0.01	-1.44	.149	-0.01 [-0.05, 0.03]	0.02	-0.29	.779
Weekday xsunday $\times$ Physical activity <sup>2</sup>	-0.03 [-0.06, -0.01]	0.01	-2.49	.019	0.00 [-0.03, 0.04]	0.02	0.18	.854
Weekday xthursday $\times$ Physical activity <sup>2</sup>	-0.01 [-0.03, 0.02]	0.01	-0.49	.630	-0.02 [-0.09, 0.05]	0.04	-0.50	.649
Weekday xtuesday $\times$ Physical activity <sup>2</sup>	0.01 [-0.01, 0.03]	0.01	0.69	.490	0.00 [-0.07, 0.08]	0.04	0.03	.977

Table 9 continued

TITLE

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Term	Physical Activity Volume			Physical Activity Intensity				
	$\beta$ [95% CI]	SE	t	p	$\beta$ [95% CI]	SE	t	p
Weekday x wednesday $\times$ Physical activity <sup>2</sup>	0.01 [-0.01, 0.03]	0.01	0.91	.366	-0.02 [-0.09, 0.05]	0.03	-0.60	.587

*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*

Term	Physical Activity Volume			Physical Activity Intensity				
	$\beta$ [95% CI]	SE	t	p	$\beta$ [95% CI]	SE	t	p
<b>Sleep duration</b>								
(Intercept)	1.56 [1.04, 2.07]	0.26	5.93	.001	1.13 [0.56, 1.70]	0.29	3.91	.039
Sleep duration	0.01 [-0.07, 0.10]	0.04	0.33	.762	0.03 [0.00, 0.06]	0.02	2.05	.042
Weekday xmonday	-0.21 [-0.29, -0.14]	0.04	-5.41	< .001	-0.07 [-0.13, -0.02]	0.03	-2.59	.012
Weekday xsaturday	-0.14 [-0.20, -0.08]	0.03	-4.54	< .001	-0.07 [-0.12, -0.03]	0.03	-2.95	.004
Weekday xsunday	-0.21 [-0.28, -0.15]	0.03	-6.68	< .001	-0.14 [-0.19, -0.10]	0.02	-5.93	< .001
Weekday xthursday	-0.08 [-0.16, 0.01]	0.04	-1.74	.126	0.01 [-0.04, 0.07]	0.03	0.44	.663
Weekday xtuesday	-0.10 [-0.18, -0.02]	0.04	-2.55	.026	-0.01 [-0.08, 0.05]	0.03	-0.34	.738
Weekday xwednesday	-0.12 [-0.22, -0.02]	0.05	-2.35	.068	-0.03 [-0.09, 0.03]	0.03	-0.94	.362
Sleep duration <sup>2</sup>	-0.01 [-0.03, 0.02]	0.01	-0.52	.608	-0.02 [-0.09, 0.06]	0.04	-0.45	.695
Age	-0.02 [-0.02, -0.01]	0.00	-8.37	< .001	-0.02 [-0.02, -0.02]	0.00	-12.35	< .001
Sleep duration × weekday xmonday	-0.04 [-0.11, 0.03]	0.04	-1.09	.313	-0.06 [-0.12, -0.01]	0.03	-2.14	.071
Sleep duration × weekday xsaturday	-0.06 [-0.11, 0.00]	0.03	-1.89	.079	-0.06 [-0.13, 0.02]	0.04	-1.41	.243
Sleep duration × weekday xsunday	-0.08 [-0.13, -0.04]	0.02	-3.50	< .001	-0.05 [-0.12, 0.02]	0.04	-1.37	.249
Sleep duration × weekday xtuesday	-0.01 [-0.07, 0.06]	0.03	-0.20	.848	0.01 [-0.04, 0.05]	0.02	0.26	.796
Sleep duration × weekday xtuesday	-0.03 [-0.12, 0.07]	0.05	-0.57	.600	-0.02 [-0.07, 0.04]	0.03	-0.56	.587
Sleep duration × weekday xwednesday	0.01 [-0.16, 0.19]	0.09	0.14	.902	0.00 [-0.09, 0.08]	0.04	-0.06	.953
Weekday xmonday × Sleep duration <sup>2</sup>	0.04 [0.00, 0.07]	0.02	1.80	.096	-0.01 [-0.06, 0.05]	0.03	-0.20	.854
Weekday xsaturday × Sleep duration <sup>2</sup>	0.03 [0.00, 0.06]	0.01	2.19	.029	0.00 [-0.04, 0.04]	0.02	-0.10	.928
Weekday xsunday × Sleep duration <sup>2</sup>	0.03 [0.00, 0.05]	0.01	1.92	.054	0.00 [-0.03, 0.03]	0.01	0.04	.971
Weekday xtuesday × Sleep duration <sup>2</sup>	0.01 [-0.02, 0.05]	0.02	0.73	.476	0.00 [-0.03, 0.03]	0.01	0.04	.972
Weekday xtuesday × Sleep duration <sup>2</sup>	0.01 [-0.02, 0.04]	0.02	0.57	.573	0.01 [-0.02, 0.04]	0.01	0.67	.510

Table 10 continued

TITLE

Term	Physical Activity Volume				Physical Activity Intensity			
	$\beta$ [95% CI]	SE	t	p	$\beta$ [95% CI]	SE	t	p
Weekday xwednesday $\times$ Sleep duration <sup>2</sup>	0.04 [0.00, 0.09]	0.02	1.89	.110	0.02 [-0.02, 0.06]	0.02	0.86	.438
Sleep efficiency (Intercept)	1.54 [1.03, 2.06]	0.26	5.84	.002	1.12 [0.50, 1.73]	0.31	3.56	.051
Sleep efficiency	0.00 [-0.05, 0.05]	0.03	0.01	.994	-0.03 [-0.14, 0.08]	0.06	-0.49	.664
Weekday xmunday	-0.19 [-0.25, -0.14]	0.03	-6.93	< .001	-0.08 [-0.13, -0.03]	0.02	-3.43	.001
Weekday xsaturday	-0.11 [-0.17, -0.06]	0.03	-3.87	.001	-0.08 [-0.13, -0.04]	0.02	-3.65	< .001
Weekday xsunday	-0.22 [-0.28, -0.16]	0.03	-7.36	< .001	-0.15 [-0.20, -0.10]	0.03	-5.60	< .001
Weekday xthursday	-0.07 [-0.12, -0.02]	0.03	-2.82	.005	0.01 [-0.04, 0.05]	0.02	0.39	.696
Weekday xtuesday	-0.10 [-0.17, -0.03]	0.03	-2.88	.014	0.00 [-0.09, 0.08]	0.04	-0.10	.929
Weekday xwednesday	-0.08 [-0.13, -0.03]	0.03	-2.92	.004	-0.01 [-0.05, 0.04]	0.02	-0.34	.737
Sleep efficiency <sup>2</sup>	-0.02 [-0.03, 0.00]	0.01	-1.95	.052	0.00 [-0.02, 0.01]	0.01	-0.37	.711
Age	-0.02 [-0.02, -0.01]	0.00	-8.25	< .001	-0.02 [-0.02, -0.02]	0.00	-12.24	< .001
Sleep efficiency $\times$ weekday xmonday	0.02 [-0.05, 0.09]	0.04	0.53	.597	0.06 [-0.02, 0.13]	0.04	1.46	.178
Sleep efficiency $\times$ weekday xsaturday	0.02 [-0.06, 0.09]	0.04	0.44	.658	0.04 [-0.03, 0.12]	0.04	1.12	.289
Sleep efficiency $\times$ weekday xsunday	0.06 [-0.01, 0.12]	0.04	1.59	.113	0.06 [0.00, 0.12]	0.03	2.03	.045
Sleep efficiency $\times$ weekday xthursday	0.00 [-0.09, 0.09]	0.05	0.06	.950	0.02 [-0.10, 0.13]	0.06	0.32	.765
Sleep efficiency $\times$ weekday xtuesday	0.03 [-0.07, 0.12]	0.05	0.56	.590	0.00 [-0.07, 0.07]	0.03	0.00	.999
Sleep efficiency $\times$ weekday xwednesday	-0.02 [-0.10, 0.06]	0.04	-0.42	.677	0.01 [-0.07, 0.08]	0.04	0.18	.862
Weekday xmunday $\times$ Sleep efficiency <sup>2</sup>	0.02 [0.00, 0.05]	0.01	1.79	.102	0.01 [-0.03, 0.04]	0.02	0.30	.782
Weekday xsaturday $\times$ Sleep efficiency <sup>2</sup>	0.03 [0.01, 0.06]	0.01	2.50	.021	0.01 [-0.03, 0.04]	0.02	0.43	.689
Weekday xsunday $\times$ Sleep efficiency <sup>2</sup>	0.05 [0.03, 0.08]	0.01	4.57	< .001	0.01 [-0.08, 0.10]	0.05	0.19	.867
Weekday xthursday $\times$ Sleep efficiency <sup>2</sup>	0.02 [-0.01, 0.04]	0.01	1.25	.228	0.00 [-0.02, 0.02]	0.01	0.10	.920
Weekday xtuesday $\times$ Sleep efficiency <sup>2</sup>	0.01 [-0.01, 0.04]	0.01	1.07	.310	0.00 [-0.02, 0.03]	0.01	0.32	.761

Table 10 continued

TITLE

Term	Physical Activity Volume				Physical Activity Intensity			
	$\beta$ [95% CI]	SE	t	p	$\beta$ [95% CI]	SE	t	p
Weekday xwednesday $\times$ Sleep efficiency <sup>2</sup>	0.01 [-0.01, 0.04]	0.01	0.96	.342	0.00 [-0.04, 0.04]	0.02	0.04	.968
Sleep onset								
(Intercept)	1.53 [0.99, 2.08]	0.28	5.51	.003	1.09 [0.49, 1.70]	0.31	3.54	.050
Sleep onset	-0.03 [-0.07, 0.01]	0.02	-1.44	.153	-0.05 [-0.09, 0.00]	0.02	-2.14	.062
Weekday xmunday	-0.16 [-0.23, -0.10]	0.03	-4.72	<.001	-0.06 [-0.13, 0.02]	0.04	-1.52	.162
Weekday xsaturday	-0.10 [-0.16, -0.03]	0.03	-2.85	.006	-0.06 [-0.11, 0.00]	0.03	-2.02	.050
Weekday xsunday	-0.16 [-0.23, -0.10]	0.03	-4.98	<.001	-0.11 [-0.18, -0.04]	0.03	-3.22	.008
Weekday xthursday	-0.08 [-0.15, -0.01]	0.04	-2.28	.026	0.01 [-0.04, 0.07]	0.03	0.53	.597
Weekday xtuesday	-0.09 [-0.17, -0.01]	0.04	-2.08	.056	0.01 [-0.09, 0.11]	0.05	0.12	.908
Weekday xwednesday	-0.09 [-0.20, 0.02]	0.06	-1.59	.180	0.01 [-0.06, 0.08]	0.04	0.39	.701
Sleep onset <sup>2</sup>	-0.01 [-0.07, 0.05]	0.03	-0.38	.725	0.00 [-0.02, 0.03]	0.01	0.30	.772
Age	-0.02 [-0.02, -0.01]	0.00	-8.28	<.001	-0.02 [-0.02, -0.02]	0.00	-12.13	<.001
Sleep onset $\times$ weekday xmonday	0.00 [-0.08, 0.08]	0.04	0.01	.989	0.09 [0.03, 0.16]	0.03	2.95	.027
Sleep onset $\times$ weekday xsaturday	-0.01 [-0.08, 0.07]	0.04	-0.17	.874	0.06 [-0.02, 0.13]	0.04	1.49	.214
Sleep onset $\times$ weekday xsunday	0.01 [-0.06, 0.09]	0.04	0.37	.723	0.09 [0.03, 0.16]	0.03	2.72	.045
Sleep onset $\times$ weekday xthursday	-0.01 [-0.08, 0.06]	0.04	-0.33	.747	0.03 [-0.02, 0.08]	0.02	1.22	.233
Sleep onset $\times$ weekday xtuesday	0.02 [-0.03, 0.08]	0.03	0.89	.375	0.02 [-0.03, 0.07]	0.03	0.87	.397
Sleep onset $\times$ weekday xwednesday	0.00 [-0.06, 0.07]	0.03	0.13	.898	0.04 [-0.04, 0.12]	0.04	1.00	.375
Weekday xmunday $\times$ Sleep onset <sup>2</sup>	-0.01 [-0.05, 0.04]	0.02	-0.25	.807	-0.01 [-0.05, 0.03]	0.02	-0.56	.585
Weekday xsaturday $\times$ Sleep onset <sup>2</sup>	0.01 [-0.05, 0.07]	0.03	0.45	.672	0.00 [-0.04, 0.03]	0.02	-0.09	.929
Weekday xsunday $\times$ Sleep onset <sup>2</sup>	0.00 [-0.06, 0.05]	0.03	-0.06	.952	-0.02 [-0.05, 0.01]	0.02	-1.23	.219
Weekday xthursday $\times$ Sleep onset <sup>2</sup>	0.01 [-0.03, 0.06]	0.02	0.56	.577	0.00 [-0.03, 0.04]	0.02	0.24	.815
Weekday xtuesday $\times$ Sleep onset <sup>2</sup>	0.00 [-0.04, 0.04]	0.02	0.11	.914	0.00 [-0.04, 0.04]	0.02	-0.02	.986

Table 10 continued

TITLE

Term	Physical Activity Volume				Physical Activity Intensity			
	$\beta$ [95% CI]	SE	t	p	$\beta$ [95% CI]	SE	t	p
Weekday xwednesday $\times$ Sleep onset <sup>2</sup>	0.02 [-0.06, 0.10]	0.04	0.51	.639	-0.01 [-0.06, 0.04]	0.02	-0.38	.716
Sleep regularity								
(Intercept)	1.42 [0.93, 1.91]	0.25	5.70	.001	1.08 [0.55, 1.62]	0.27	3.96	.035
Sleep regularity	0.09 [-0.02, 0.20]	0.06	1.62	.224	0.03 [-0.06, 0.11]	0.04	0.68	.556
Weekday xmunday	-0.15 [-0.23, -0.08]	0.04	-4.10	< .001	-0.09 [-0.16, -0.02]	0.04	-2.66	.023
Weekday xsaturday	-0.06 [-0.15, 0.04]	0.05	-1.17	.290	-0.06 [-0.15, 0.02]	0.04	-1.47	.204
Weekday xsunday	-0.13 [-0.22, -0.05]	0.04	-3.04	.015	-0.13 [-0.20, -0.06]	0.04	-3.63	.006
Weekday xthursday	-0.04 [-0.10, 0.03]	0.03	-1.10	.271	0.00 [-0.06, 0.06]	0.03	0.05	.960
Weekday xtuesday	-0.08 [-0.17, 0.01]	0.05	-1.76	.122	-0.01 [-0.11, 0.08]	0.05	-0.25	.818
Weekday xwednesday	-0.08 [-0.17, 0.01]	0.05	-1.69	.130	-0.02 [-0.10, 0.06]	0.04	-0.46	.664
Sleep regularity <sup>2</sup>	0.03 [-0.02, 0.08]	0.02	1.32	.265	0.00 [-0.04, 0.04]	0.02	-0.14	.897
Age	-0.02 [-0.02, -0.01]	0.00	-8.03	< .001	-0.02 [-0.02, -0.01]	0.00	-11.94	< .001
Sleep regularity $\times$ weekday xmonday	-0.02 [-0.08, 0.05]	0.03	-0.52	.613	0.02 [-0.07, 0.10]	0.04	0.42	.703
Sleep regularity $\times$ weekday xsaturday	-0.01 [-0.14, 0.11]	0.06	-0.20	.858	0.01 [-0.07, 0.09]	0.04	0.26	.809
Sleep regularity $\times$ weekday xsunday	0.01 [-0.13, 0.14]	0.07	0.07	.947	0.01 [-0.10, 0.11]	0.05	0.13	.908
Sleep regularity $\times$ weekday xthursday	-0.01 [-0.07, 0.05]	0.03	-0.30	.772	0.01 [-0.03, 0.05]	0.02	0.53	.599
Sleep regularity $\times$ weekday xtuesday	-0.01 [-0.14, 0.12]	0.07	-0.11	.919	0.00 [-0.08, 0.08]	0.04	-0.02	.984
Sleep regularity $\times$ weekday xwednesday	-0.02 [-0.14, 0.10]	0.06	-0.33	.763	-0.02 [-0.07, 0.03]	0.02	-0.70	.496
Weekday xmunday $\times$ Sleep regularity <sup>2</sup>	0.00 [-0.05, 0.04]	0.02	-0.16	.878	0.02 [-0.02, 0.06]	0.02	1.02	.344
Weekday xsaturday $\times$ Sleep regularity <sup>2</sup>	-0.02 [-0.09, 0.04]	0.03	-0.66	.547	0.00 [-0.04, 0.03]	0.02	-0.21	.839
Weekday xsunday $\times$ Sleep regularity <sup>2</sup>	-0.02 [-0.08, 0.04]	0.03	-0.70	.522	-0.01 [-0.04, 0.03]	0.02	-0.39	.705
Weekday xthursday $\times$ Sleep regularity <sup>2</sup>	-0.02 [-0.06, 0.01]	0.02	-1.20	.235	0.01 [-0.03, 0.05]	0.02	0.35	.740
Weekday xtuesday $\times$ Sleep regularity <sup>2</sup>	0.00 [-0.08, 0.08]	0.04	-0.06	.957	0.01 [-0.04, 0.06]	0.02	0.39	.711

Term	Physical Activity Volume			Physical Activity Intensity				
	$\beta$ [95% CI]	SE	t	p	$\beta$ [95% CI]	SE	t	p
Weekday x wednesday $\times$ Sleep regularity <sup>2</sup>	0.00 [-0.06, 0.06]	0.03	-0.06	.958	0.01 [-0.04, 0.06]	0.03	0.35	.740

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

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

Term	Physical Activity Volume				Physical Activity Intensity			
	$\beta$ [95% CI]	SE	t	p	$\beta$ [95% CI]	SE	t	p
Sleep duration								
(Intercept)	0.41 [0.13, 0.70]	0.15	2.84	.020	0.51 [-0.04, 1.06]	0.28	1.81	.183
Physical activity	0.19 [0.13, 0.25]	0.03	6.19	< .001	0.06 [-0.22, 0.35]	0.15	0.43	.711
Seasonspring	-0.02 [-0.09, 0.04]	0.03	-0.69	.493	-0.03 [-0.11, 0.05]	0.04	-0.70	.484
Seasonsummer	-0.11 [-0.21, -0.02]	0.05	-2.28	.047	-0.15 [-0.23, -0.07]	0.04	-3.64	< .001
Seasonwinter	0.06 [0.00, 0.13]	0.03	1.85	.065	0.03 [-0.06, 0.12]	0.05	0.64	.533
Physical activity <sup>2</sup>	-0.02 [-0.03, -0.01]	0.01	-3.86	< .001	0.01 [-0.02, 0.03]	0.01	0.66	.508
Age	0.00 [-0.01, 0.00]	0.00	-1.09	.278	0.00 [-0.01, 0.00]	0.00	-1.13	.327
Physical activity × seasonspring	-0.04 [-0.11, 0.03]	0.04	-1.14	.269	0.00 [-0.05, 0.05]	0.02	0.08	.938
Physical activity × seasonsummer	-0.01 [-0.10, 0.07]	0.04	-0.27	.793	0.02 [-0.10, 0.14]	0.06	0.35	.753
Physical activity × seasonwinter	-0.05 [-0.12, 0.01]	0.03	-1.69	.098	-0.01 [-0.06, 0.05]	0.03	-0.26	.796
Seasonspring × Physical activity <sup>2</sup>	0.01 [-0.01, 0.03]	0.01	1.11	.278	0.01 [-0.04, 0.06]	0.03	0.45	.671
Seasonsummer × Physical activity <sup>2</sup>	0.02 [-0.02, 0.06]	0.02	1.01	.352	0.05 [-0.02, 0.11]	0.03	1.43	.218
Seasonwinter × Physical activity <sup>2</sup>	0.01 [-0.01, 0.03]	0.01	0.68	.500	0.02 [-0.02, 0.06]	0.02	1.13	.278
Sleep efficiency								
(Intercept)	0.05 [-0.20, 0.29]	0.12	0.39	.702	0.19 [-0.25, 0.63]	0.23	0.85	.452
Physical activity	0.13 [-0.12, 0.37]	0.12	1.02	.410	0.00 [-0.21, 0.20]	0.10	-0.02	.989
Seasonspring	0.05 [-0.03, 0.13]	0.04	1.14	.274	0.04 [-0.04, 0.13]	0.04	1.02	.320
Seasonsummer	0.00 [-0.08, 0.08]	0.04	-0.11	.912	-0.04 [-0.13, 0.04]	0.05	-0.98	.337
Seasonwinter	0.07 [-0.02, 0.16]	0.05	1.52	.174	0.06 [-0.02, 0.15]	0.04	1.40	.180
Physical activity <sup>2</sup>	-0.02 [-0.05, 0.01]	0.02	-1.29	.301	-0.02 [-0.10, 0.06]	0.04	-0.43	.701
Age	0.00 [0.00, 0.01]	0.00	1.51	.176	0.00 [0.00, 0.01]	0.00	0.65	.532

Table 11 continued

Term	Physical Activity Volume				Physical Activity Intensity			
	$\beta$ [95% CI]	SE	t	p	$\beta$ [95% CI]	SE	t	p
Physical activity $\times$ seasonspring	-0.07 [-0.14, 0.00]	0.03	-2.10	.052	-0.06 [-0.14, 0.03]	0.04	-1.28	.283
Physical activity $\times$ seasonsummer	0.01 [-0.07, 0.08]	0.04	0.19	.854	-0.05 [-0.16, 0.07]	0.06	-0.81	.483
Physical activity $\times$ seasonwinter	-0.05 [-0.17, 0.07]	0.06	-0.75	.509	-0.06 [-0.14, 0.03]	0.04	-1.35	.259
Seasonspring $\times$ Physical activity <sup>2</sup>	0.01 [-0.01, 0.03]	0.01	1.30	.201	0.01 [-0.04, 0.06]	0.03	0.43	.689
Seasonsummer $\times$ Physical activity <sup>2</sup>	-0.01 [-0.04, 0.01]	0.01	-1.08	.283	0.03 [-0.03, 0.09]	0.03	1.04	.346
Seasonwinter $\times$ Physical activity <sup>2</sup>	0.00 [-0.03, 0.03]	0.02	0.28	.791	0.01 [-0.04, 0.06]	0.02	0.44	.674
Sleep onset								
(Intercept)	-0.18 [-0.47, 0.11]	0.15	-1.20	.239	-0.14 [-0.60, 0.32]	0.23	-0.60	.577
Physical activity	0.14 [-0.27, 0.56]	0.21	0.68	.569	0.08 [-0.07, 0.22]	0.07	1.05	.397
Seasonspring	0.05 [-0.03, 0.13]	0.04	1.24	.256	0.04 [-0.03, 0.12]	0.04	1.12	.280
Seasonsummer	0.07 [0.01, 0.14]	0.03	2.16	.036	0.07 [0.00, 0.14]	0.04	1.96	.053
Seasonwinter	0.03 [-0.05, 0.12]	0.04	0.82	.448	0.03 [-0.05, 0.11]	0.04	0.64	.535
Physical activity <sup>2</sup>	-0.01 [-0.06, 0.03]	0.02	-0.62	.591	0.04 [-0.05, 0.13]	0.05	0.82	.491
Age	0.00 [0.00, 0.01]	0.00	0.75	.501	0.00 [0.00, 0.00]	0.00	0.59	.557
Physical activity $\times$ seasonspring	-0.01 [-0.06, 0.04]	0.02	-0.52	.602	-0.02 [-0.08, 0.04]	0.03	-0.54	.610
Physical activity $\times$ seasonsummer	0.01 [-0.05, 0.07]	0.03	0.21	.837	-0.01 [-0.06, 0.03]	0.02	-0.62	.540
Physical activity $\times$ seasonwinter	0.04 [-0.04, 0.12]	0.04	0.95	.395	-0.01 [-0.08, 0.05]	0.03	-0.35	.740
Seasonspring $\times$ Physical activity <sup>2</sup>	-0.01 [-0.02, 0.01]	0.01	-0.62	.540	0.00 [-0.05, 0.06]	0.03	0.07	.947
Seasonsummer $\times$ Physical activity <sup>2</sup>	-0.02 [-0.05, 0.01]	0.02	-1.23	.255	-0.01 [-0.05, 0.03]	0.02	-0.55	.593
Seasonwinter $\times$ Physical activity <sup>2</sup>	-0.01 [-0.04, 0.01]	0.01	-1.08	.340	-0.01 [-0.05, 0.04]	0.02	-0.27	.800
Sleep regularity								
(Intercept)	0.29 [-0.19, 0.78]	0.25	1.18	.318	0.34 [-0.18, 0.87]	0.27	1.29	.285
Physical activity	0.03 [-0.13, 0.19]	0.08	0.37	.742	0.03 [-0.02, 0.09]	0.03	1.30	.246

Table 11 continued

Term	Physical Activity Volume				Physical Activity Intensity			
	$\beta$ [95% CI]	SE	t	p	$\beta$ [95% CI]	SE	t	p
Seasonspring	-0.11 [-0.18, -0.04]	0.04	-2.97	.006	-0.13 [-0.23, -0.03]	0.05	-2.44	.048
Seasonsummer	-0.03 [-0.10, 0.05]	0.04	-0.72	.474	-0.08 [-0.16, 0.00]	0.04	-2.03	.044
Seasonwinter	-0.05 [-0.13, 0.04]	0.04	-1.12	.291	-0.06 [-0.19, 0.07]	0.07	-0.89	.430
Physical activity <sup>2</sup>	-0.01 [-0.04, 0.01]	0.01	-1.05	.366	-0.04 [-0.13, 0.05]	0.05	-0.95	.433
Age	0.00 [-0.01, 0.00]	0.00	-0.17	.872	0.00 [0.00, 0.00]	0.00	-0.10	.921
Physical activity × seasonspring	0.07 [0.00, 0.14]	0.04	1.85	.101	0.01 [-0.05, 0.07]	0.03	0.27	.791
Physical activity × seasonsummer	0.14 [0.06, 0.23]	0.04	3.25	.010	0.03 [-0.02, 0.08]	0.03	0.99	.324
Physical activity × seasonwinter	0.05 [-0.01, 0.11]	0.03	1.69	.097	0.01 [-0.03, 0.06]	0.02	0.52	.608
Seasonspring × Physical activity <sup>2</sup>	-0.01 [-0.03, 0.01]	0.01	-1.24	.222	0.02 [-0.02, 0.06]	0.02	1.09	.305
Seasonsummer × Physical activity <sup>2</sup>	-0.04 [-0.07, -0.01]	0.01	-2.71	.016	0.03 [-0.01, 0.08]	0.02	1.41	.194
Seasonwinter × Physical activity <sup>2</sup>	-0.01 [-0.02, 0.01]	0.01	-0.82	.410	0.02 [-0.04, 0.08]	0.03	0.62	.570

*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			
	$\beta$ [95% CI]	SE	t	p	$\beta$ [95% CI]	SE	t	p		
Sleep duration										
(Intercept)	1.44 [0.94, 1.94]	0.26	5.62	.002	1.12 [0.57, 1.67]	0.28	3.97	.037		
Sleep duration	0.00 [-0.06, 0.05]	0.03	-0.17	.875	0.00 [-0.03, 0.03]	0.01	0.25	.811		
Seasonspring	-0.01 [-0.07, 0.06]	0.03	-0.19	.850	-0.06 [-0.12, 0.00]	0.03	-1.92	.065		
Seasonsummer	-0.01 [-0.09, 0.08]	0.04	-0.18	.861	-0.05 [-0.12, 0.03]	0.04	-1.28	.217		
Seasonwinter	-0.03 [-0.10, 0.03]	0.03	-0.92	.357	-0.05 [-0.11, 0.02]	0.03	-1.30	.214		
Sleep duration <sup>2</sup>	0.02 [-0.01, 0.04]	0.01	1.22	.273	-0.01 [-0.09, 0.07]	0.04	-0.34	.767		
Age	-0.02 [-0.02, -0.01]	0.00	-8.48	< .001	-0.02 [-0.02, -0.01]	0.00	-12.24	< .001		
Sleep duration × seasonspring	-0.02 [-0.07, 0.03]	0.03	-0.68	.515	0.00 [-0.03, 0.03]	0.02	-0.08	.939		
Sleep duration × seasonsummer	-0.03 [-0.13, 0.06]	0.05	-0.68	.546	-0.01 [-0.06, 0.05]	0.03	-0.27	.801		
Sleep duration × seasonwinter	-0.01 [-0.08, 0.06]	0.03	-0.32	.765	0.00 [-0.05, 0.05]	0.03	-0.10	.923		
Seasonspring × Sleep duration <sup>2</sup>	0.00 [-0.02, 0.03]	0.01	0.26	.796	0.00 [-0.02, 0.02]	0.01	-0.05	.963		
Seasonsummer × Sleep duration <sup>2</sup>	-0.02 [-0.07, 0.03]	0.03	-0.65	.555	0.00 [-0.03, 0.02]	0.01	-0.39	.701		
Seasonwinter × Sleep duration <sup>2</sup>	0.01 [-0.01, 0.04]	0.01	1.17	.257	0.00 [-0.02, 0.02]	0.01	-0.31	.763		
Sleep efficiency										
(Intercept)	1.44 [0.92, 1.96]	0.26	5.44	.003	1.11 [0.52, 1.70]	0.30	3.67	.046		
Sleep efficiency	0.02 [-0.02, 0.07]	0.02	1.03	.306	0.00 [-0.09, 0.09]	0.05	0.00	.997		
Seasonspring	0.00 [-0.06, 0.06]	0.03	-0.03	.977	-0.07 [-0.14, 0.00]	0.04	-1.86	.096		
Seasonsummer	-0.01 [-0.10, 0.07]	0.04	-0.32	.753	-0.05 [-0.13, 0.03]	0.04	-1.21	.263		
Seasonwinter	-0.02 [-0.08, 0.04]	0.03	-0.64	.525	-0.06 [-0.13, 0.02]	0.04	-1.40	.212		
Sleep efficiency <sup>2</sup>	0.00 [-0.01, 0.01]	0.01	0.26	.792	0.00 [-0.02, 0.02]	0.01	0.05	.964		
Age	-0.02 [-0.02, -0.01]	0.00	-8.22	< .001	-0.02 [-0.02, -0.01]	0.00	-12.12	< .001		

Table 12 continued

Term	Physical Activity Volume				Physical Activity Intensity			
	$\beta$ [95% CI]	SE	t	p	$\beta$ [95% CI]	SE	t	p
Sleep efficiency $\times$ season <sup>spring</sup>	-0.04 [-0.10, 0.02]	0.03	-1.36	.175	0.00 [-0.09, 0.08]	0.04	-0.03	.978
Sleep efficiency $\times$ season <sup>summer</sup>	0.02 [-0.05, 0.09]	0.04	0.66	.517	0.01 [-0.04, 0.06]	0.03	0.48	.630
Sleep efficiency $\times$ season <sup>winter</sup>	-0.01 [-0.07, 0.05]	0.03	-0.29	.770	0.00 [-0.06, 0.05]	0.03	-0.10	.925
Seasonspring $\times$ Sleep efficiency <sup>2</sup>	0.00 [-0.01, 0.02]	0.01	0.44	.664	0.00 [-0.01, 0.02]	0.01	0.17	.867
Seasonsummer $\times$ Sleep efficiency <sup>2</sup>	-0.01 [-0.03, 0.02]	0.01	-0.48	.636	0.00 [-0.02, 0.01]	0.01	-0.21	.836
Seasonwinter $\times$ Sleep efficiency <sup>2</sup>	0.01 [-0.01, 0.03]	0.01	1.14	.267	0.00 [-0.02, 0.03]	0.01	0.27	.798
Sleep onset (Intercept)	1.45 [0.93, 1.98]	0.27	5.41	.003	1.10 [0.49, 1.71]	0.31	3.54	.051
Sleep onset	-0.02 [-0.07, 0.03]	0.03	-0.74	.487	0.00 [-0.04, 0.03]	0.02	-0.23	.823
Seasonspring	-0.03 [-0.10, 0.04]	0.04	-0.78	.434	-0.05 [-0.10, 0.01]	0.03	-1.62	.104
Seasonsummer	-0.03 [-0.14, 0.07]	0.06	-0.61	.559	-0.06 [-0.12, 0.01]	0.03	-1.67	.101
Seasonwinter	-0.03 [-0.10, 0.04]	0.04	-0.91	.361	-0.05 [-0.11, 0.01]	0.03	-1.68	.095
Sleep onset <sup>2</sup>	-0.02 [-0.05, 0.02]	0.02	-1.08	.335	0.00 [-0.02, 0.02]	0.01	0.23	.815
Age	-0.02 [-0.02, -0.01]	0.00	-8.28	< .001	-0.02 [-0.02, -0.01]	0.00	-12.15	< .001
Sleep onset $\times$ season <sup>spring</sup>	-0.03 [-0.07, 0.01]	0.02	-1.44	.150	0.01 [-0.05, 0.06]	0.03	0.27	.800
Sleep onset $\times$ season <sup>summer</sup>	0.01 [-0.05, 0.08]	0.03	0.39	.709	0.01 [-0.04, 0.06]	0.03	0.29	.779
Sleep onset $\times$ season <sup>winter</sup>	-0.04 [-0.08, 0.00]	0.02	-1.84	.066	-0.01 [-0.08, 0.07]	0.04	-0.14	.895
Seasonspring $\times$ Sleep onset <sup>2</sup>	0.02 [-0.01, 0.06]	0.02	1.40	.176	-0.02 [-0.07, 0.04]	0.03	-0.56	.615
Seasonsummer $\times$ Sleep onset <sup>2</sup>	0.02 [-0.03, 0.06]	0.02	0.67	.525	0.01 [-0.02, 0.04]	0.02	0.52	.605
Seasonwinter $\times$ Sleep onset <sup>2</sup>	0.01 [-0.02, 0.04]	0.02	0.77	.443	0.00 [-0.06, 0.05]	0.03	-0.05	.963
Sleep regularity (Intercept)	1.34 [0.83, 1.85]	0.26	5.13	.003	1.06 [0.52, 1.60]	0.27	3.87	.037
Sleep regularity	0.08 [0.03, 0.13]	0.02	3.23	.026	0.03 [-0.02, 0.09]	0.03	1.34	.269

Table 12 continued

Term	Physical Activity Volume				Physical Activity Intensity			
	$\beta$ [95% CI]	SE	t	p	$\beta$ [95% CI]	SE	t	p
Seasonspring	0.02 [-0.05, 0.08]	0.03	0.50	.619	-0.06 [-0.16, 0.03]	0.05	-1.27	.265
Seasonsummer	-0.01 [-0.11, 0.09]	0.05	-0.22	.830	-0.03 [-0.12, 0.05]	0.04	-0.81	.441
Seasonwinter	0.00 [-0.06, 0.07]	0.03	0.10	.924	-0.04 [-0.13, 0.05]	0.05	-0.91	.406
Sleep regularity <sup>2</sup>	0.03 [0.00, 0.05]	0.01	2.24	.041	0.01 [-0.02, 0.04]	0.02	0.46	.674
Age	-0.02 [-0.02, -0.01]	0.00	-8.22	< .001	-0.02 [-0.02, -0.01]	0.00	-12.17	< .001
Sleep regularity × seasonspring	0.01 [-0.04, 0.05]	0.02	0.37	.716	0.01 [-0.03, 0.04]	0.02	0.51	.610
Sleep regularity × seasonsummer	0.00 [-0.05, 0.06]	0.03	0.14	.890	-0.01 [-0.07, 0.04]	0.03	-0.50	.635
Sleep regularity × seasonwinter	0.02 [-0.01, 0.06]	0.02	1.19	.233	0.01 [-0.04, 0.07]	0.03	0.51	.633
Seasonspring × Sleep regularity <sup>2</sup>	-0.01 [-0.03, 0.02]	0.01	-0.62	.534	0.00 [-0.03, 0.03]	0.01	-0.06	.954
Seasonsummer × Sleep regularity <sup>2</sup>	0.00 [-0.04, 0.03]	0.02	-0.31	.754	-0.01 [-0.04, 0.01]	0.01	-0.94	.354
Seasonwinter × Sleep regularity <sup>2</sup>	-0.01 [-0.03, 0.02]	0.01	-0.58	.560	-0.01 [-0.03, 0.02]	0.01	-0.46	.650

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			
	$\beta$ [95% CI]	SE	t	p	$\beta$ [95% CI]	SE	t	p
Sleep duration								
(Intercept)	0.58 [0.35, 0.82]	0.12	4.89	< .001	0.59 [0.30, 0.88]	0.15	3.96	.003
Physical activity	0.11 [0.00, 0.22]	0.06	1.88	.124	0.07 [-0.36, 0.50]	0.22	0.33	.772
Regioneurope	-0.15 [-0.32, 0.03]	0.09	-1.65	.100	-0.13 [-0.30, 0.05]	0.09	-1.42	.155
Regionafrica	-0.10 [-0.39, 0.19]	0.15	-0.66	.532	-0.16 [-0.46, 0.14]	0.15	-1.04	.335
Regionasia	-0.31 [-0.55, -0.07]	0.12	-2.55	.016	-0.54 [-0.77, -0.32]	0.12	-4.71	< .001
Regionnorth america	-0.04 [-0.27, 0.20]	0.12	-0.30	.764	-0.07 [-0.27, 0.14]	0.10	-0.64	.520
Regionsouth america	-0.35 [-0.54, -0.16]	0.10	-3.60	.001	-0.42 [-0.60, -0.24]	0.09	-4.47	< .001
Physical activity <sup>2</sup>	-0.01 [-0.03, 0.01]	0.01	-1.28	.228	0.01 [-0.09, 0.11]	0.05	0.18	.865
Age	0.00 [-0.01, 0.00]	0.00	-1.79	.074	0.00 [-0.01, 0.00]	0.00	-1.30	.259
Physical activity × regioneurope	0.00 [-0.11, 0.11]	0.06	-0.05	.963	0.00 [-0.26, 0.25]	0.13	-0.01	.990
Physical activity × regionafrica	0.15 [-0.06, 0.37]	0.11	1.38	.237	0.03 [-0.31, 0.36]	0.17	0.16	.885
Physical activity × regionasia	0.27 [0.07, 0.48]	0.11	2.58	.047	-0.02 [-0.37, 0.33]	0.18	-0.10	.928
Physical activity × regionnorth america	0.08 [-0.06, 0.21]	0.07	1.12	.261	-0.08 [-0.27, 0.12]	0.10	-0.75	.460
Physical activity × regionsouth america	0.13 [0.02, 0.25]	0.06	2.23	.038	-0.08 [-0.28, 0.12]	0.10	-0.79	.470
Regioneurope × Physical activity <sup>2</sup>	0.01 [-0.01, 0.03]	0.01	0.77	.461	0.01 [-0.12, 0.13]	0.06	0.10	.926
Regionafrica × Physical activity <sup>2</sup>	-0.04 [-0.12, 0.04]	0.04	-0.92	.397	0.01 [-0.16, 0.18]	0.09	0.11	.917
Regionasia × Physical activity <sup>2</sup>	-0.07 [-0.17, 0.04]	0.05	-1.29	.262	0.15 [-0.22, 0.52]	0.19	0.79	.496
Regionnorth america × Physical activity <sup>2</sup>	-0.02 [-0.06, 0.03]	0.02	-0.76	.445	0.06 [-0.07, 0.18]	0.06	0.93	.369
Regionsouth america × Physical activity <sup>2</sup>	0.00 [-0.04, 0.04]	0.02	0.09	.929	0.09 [-0.08, 0.27]	0.09	1.03	.385
Sleep efficiency								
(Intercept)	0.24 [-0.07, 0.55]	0.16	1.50	.185	0.31 [-0.04, 0.66]	0.18	1.75	.143

Table 13 continued

TITLE

Term	Physical Activity Volume				Physical Activity Intensity			
	$\beta$ [95% CI]	SE	t	p	$\beta$ [95% CI]	SE	t	p
Physical activity	-0.04 [-0.24, 0.16]	0.10	-0.38	.737	-0.08 [-0.30, 0.15]	0.11	-0.66	.561
Regioneurope	-0.17 [-0.35, 0.00]	0.09	-1.97	.052	-0.17 [-0.36, 0.01]	0.09	-1.89	.063
Regionafrica	-0.08 [-0.27, 0.12]	0.10	-0.77	.445	-0.13 [-0.35, 0.09]	0.11	-1.17	.247
Regionasia	-0.22 [-0.43, -0.01]	0.11	-2.09	.038	-0.48 [-0.69, -0.27]	0.11	-4.53	< .001
Regionnorth america	-0.08 [-0.28, 0.11]	0.10	-0.83	.407	-0.15 [-0.35, 0.05]	0.10	-1.43	.154
Regionsouth america	-0.32 [-0.51, -0.12]	0.10	-3.19	.003	-0.47 [-0.68, -0.26]	0.11	-4.35	< .001
Physical activity <sup>2</sup>	0.00 [-0.03, 0.03]	0.02	0.22	.841	0.00 [-0.04, 0.05]	0.03	0.19	.853
Age	0.00 [0.00, 0.01]	0.00	0.99	.341	0.00 [0.00, 0.00]	0.00	0.44	.660
Physical activity × regioneurope	0.08 [0.01, 0.15]	0.03	2.23	.026	0.04 [-0.12, 0.19]	0.08	0.44	.678
Physical activity × regionafrica	0.18 [-0.09, 0.44]	0.13	1.31	.283	0.05 [-0.36, 0.47]	0.21	0.25	.822
Physical activity × regionasia	0.40 [0.15, 0.65]	0.13	3.10	.047	0.10 [-0.42, 0.62]	0.27	0.38	.732
Physical activity × regionnorth america	0.15 [-0.22, 0.53]	0.19	0.80	.492	0.02 [-0.28, 0.31]	0.15	0.11	.916
Physical activity × regionsouth america	0.33 [0.18, 0.48]	0.08	4.37	.008	-0.01 [-0.37, 0.35]	0.18	-0.05	.963
Regioneurope × Physical activity <sup>2</sup>	-0.01 [-0.03, 0.01]	0.01	-1.17	.245	-0.02 [-0.09, 0.05]	0.04	-0.49	.645
Regionafrica × Physical activity <sup>2</sup>	-0.03 [-0.10, 0.05]	0.04	-0.73	.496	-0.02 [-0.20, 0.16]	0.09	-0.18	.865
Regionasia × Physical activity <sup>2</sup>	-0.08 [-0.15, -0.02]	0.03	-2.41	.028	0.03 [-0.16, 0.21]	0.09	0.31	.770
Regionnorth america × Physical activity <sup>2</sup>	-0.02 [-0.06, 0.02]	0.02	-1.02	.312	0.02 [-0.14, 0.18]	0.08	0.22	.836
Regionsouth america × Physical activity <sup>2</sup>	-0.05 [-0.10, -0.01]	0.02	-2.21	.069	0.03 [-0.14, 0.19]	0.08	0.33	.766
Sleep onset								
(Intercept)	0.05 [-0.55, 0.64]	0.30	0.15	.889	0.08 [-0.65, 0.81]	0.37	0.21	.845
Physical activity	0.07 [-0.25, 0.40]	0.16	0.45	.692	0.15 [-0.15, 0.45]	0.15	0.97	.424
Regioneurope	0.10 [-0.06, 0.25]	0.08	1.24	.218	0.08 [-0.08, 0.24]	0.08	0.99	.322
Regionafrica	-0.01 [-0.22, 0.20]	0.11	-0.11	.911	-0.16 [-0.60, 0.27]	0.22	-0.74	.514

Table 13 continued

TITLE

Term	Physical Activity Volume				Physical Activity Intensity			
	$\beta$ [95% CI]	SE	t	p	$\beta$ [95% CI]	SE	t	p
Regionasia	0.22 [0.02, 0.41]	0.10	2.21	.031	-0.04 [-0.45, 0.38]	0.21	-0.18	.869
Regionnorth america	0.04 [-0.14, 0.22]	0.09	0.45	.656	-0.21 [-0.61, 0.20]	0.21	-0.99	.394
Regionsouth america	-0.06 [-0.34, 0.21]	0.14	-0.45	.678	-0.21 [-0.73, 0.31]	0.27	-0.79	.501
Physical activity <sup>2</sup>	-0.02 [-0.06, 0.03]	0.02	-0.69	.553	-0.06 [-0.17, 0.06]	0.06	-0.99	.406
Age	0.00 [0.00, 0.01]	0.00	0.57	.591	0.00 [0.00, 0.00]	0.00	0.69	.491
Physical activity × regioneurope	-0.04 [-0.13, 0.05]	0.05	-0.95	.377	-0.12 [-0.38, 0.13]	0.13	-0.95	.425
Physical activity × regionafrica	0.30 [-0.14, 0.74]	0.22	1.35	.299	0.04 [-0.30, 0.37]	0.17	0.21	.845
Physical activity × regionasia	0.25 [-0.15, 0.65]	0.21	1.23	.329	0.05 [-0.32, 0.42]	0.19	0.27	.806
Physical activity × regionnorth america	0.35 [-0.17, 0.87]	0.26	1.32	.310	0.01 [-0.20, 0.23]	0.11	0.13	.901
Physical activity × regionsouth america	0.20 [-0.05, 0.44]	0.13	1.57	.233	-0.08 [-0.28, 0.12]	0.10	-0.77	.489
Regioneurope × Physical activity <sup>2</sup>	0.01 [-0.01, 0.04]	0.01	1.00	.370	0.08 [-0.06, 0.23]	0.08	1.10	.372
Regionafrica × Physical activity <sup>2</sup>	0.01 [-0.05, 0.07]	0.03	0.33	.747	0.13 [-0.13, 0.39]	0.13	0.98	.413
Regionasia × Physical activity <sup>2</sup>	-0.02 [-0.08, 0.04]	0.03	-0.66	.513	0.21 [-0.29, 0.72]	0.26	0.82	.491
Regionnorth america × Physical activity <sup>2</sup>	-0.02 [-0.08, 0.03]	0.03	-0.81	.457	0.17 [-0.10, 0.44]	0.14	1.21	.327
Regionsouth america × Physical activity <sup>2</sup>	0.03 [-0.05, 0.10]	0.04	0.69	.548	0.16 [-0.19, 0.52]	0.18	0.90	.457
Sleep regularity								
(Intercept)	-0.24 [-0.69, 0.21]	0.23	-1.04	.362	-0.15 [-0.66, 0.36]	0.26	-0.58	.601
Physical activity	0.08 [-0.01, 0.17]	0.05	1.77	.121	0.09 [-0.01, 0.20]	0.05	1.70	.131
Regioneurope	0.21 [0.03, 0.39]	0.09	2.35	.021	0.16 [-0.03, 0.35]	0.10	1.64	.107
Regionafrica	0.35 [0.15, 0.54]	0.10	3.50	.001	0.38 [0.17, 0.60]	0.11	3.49	.001
Regionasia	0.29 [0.09, 0.50]	0.10	2.84	.005	0.27 [-0.03, 0.57]	0.15	1.79	.119
Regionnorth america	0.01 [-0.25, 0.28]	0.13	0.10	.926	0.01 [-0.33, 0.35]	0.17	0.06	.957
Regionsouth america	0.06 [-0.17, 0.28]	0.11	0.49	.635	-0.05 [-0.42, 0.32]	0.19	-0.26	.808

Table 13 continued

Term	Physical Activity Volume				Physical Activity Intensity			
	$\beta$ [95% CI]	SE	t	p	$\beta$ [95% CI]	SE	t	p
Physical activity <sup>2</sup>	-0.01 [-0.02, 0.01]	0.01	-1.04	.307	-0.05 [-0.13, 0.04]	0.04	-1.08	.355
Age	0.00 [-0.01, 0.00]	0.00	-0.81	.424	0.00 [-0.01, 0.00]	0.00	-1.19	.236
Physical activity × regioneurope	0.06 [-0.02, 0.15]	0.05	1.42	.183	-0.05 [-0.16, 0.06]	0.05	-0.88	.402
Physical activity × regionafrica	-0.16 [-0.46, 0.13]	0.15	-1.09	.363	-0.03 [-0.17, 0.12]	0.07	-0.37	.711
Physical activity × regionasia	-0.09 [-0.39, 0.21]	0.15	-0.59	.598	0.01 [-0.23, 0.25]	0.12	0.07	.947
Physical activity × regionnorth america	-0.06 [-0.19, 0.06]	0.06	-0.99	.327	-0.02 [-0.18, 0.14]	0.08	-0.23	.820
Physical activity × regionsouth america	0.05 [-0.12, 0.21]	0.08	0.58	.597	0.06 [-0.10, 0.22]	0.08	0.74	.489
Regioneurope × Physical activity <sup>2</sup>	-0.03 [-0.05, -0.01]	0.01	-3.64	< .001	0.03 [-0.02, 0.08]	0.02	1.24	.232
Regionafrica × Physical activity <sup>2</sup>	-0.03 [-0.09, 0.03]	0.03	-1.08	.307	-0.08 [-0.22, 0.06]	0.07	-1.17	.308
Regionasia × Physical activity <sup>2</sup>	-0.04 [-0.13, 0.05]	0.05	-0.95	.389	-0.06 [-0.45, 0.33]	0.20	-0.31	.786
Regionnorth america × Physical activity <sup>2</sup>	-0.02 [-0.06, 0.03]	0.02	-0.77	.446	-0.04 [-0.15, 0.07]	0.06	-0.72	.485
Regionsouth america × Physical activity <sup>2</sup>	-0.06 [-0.09, -0.02]	0.02	-3.04	.009	-0.04 [-0.23, 0.15]	0.10	-0.41	.716

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				
	$\beta$ [95% CI]	SE	t	p	$\beta$ [95% CI]	SE	t	p
Sleep duration								
(Intercept)	1.41 [1.10, 1.72]	0.16	8.99	< .001	0.94 [0.14, 1.73]	0.40	2.31	.132
Sleep duration	0.03 [-0.02, 0.08]	0.03	1.23	.230	0.03 [-0.06, 0.12]	0.04	0.65	.564
Regioneurope	-0.23 [-0.42, -0.03]	0.10	-2.27	.028	-0.10 [-0.27, 0.07]	0.09	-1.14	.268
Regionafrica	-0.23 [-0.54, 0.07]	0.16	-1.48	.191	-0.03 [-0.35, 0.29]	0.16	-0.19	.862
Regionasia	-0.50 [-0.77, -0.24]	0.14	-3.68	.004	-0.32 [-0.60, -0.04]	0.14	-2.23	.081
Regionnorth america	-0.47 [-0.77, -0.17]	0.15	-3.10	.018	-0.16 [-0.62, 0.30]	0.23	-0.68	.553
Regionsouth america	-0.64 [-0.91, -0.37]	0.14	-4.67	.003	-0.27 [-0.86, 0.33]	0.31	-0.87	.467
Sleep duration <sup>2</sup>	0.00 [-0.06, 0.06]	0.03	-0.08	.939	-0.03 [-0.13, 0.08]	0.05	-0.51	.658
Age	-0.02 [-0.02, -0.01]	0.00	-10.45	< .001	-0.02 [-0.02, -0.02]	0.00	-12.81	< .001
Sleep duration × regioneurope	-0.06 [-0.12, 0.00]	0.03	-1.81	.108	-0.02 [-0.10, 0.05]	0.04	-0.64	.564
Sleep duration × regionafrica	-0.11 [-0.42, 0.20]	0.16	-0.71	.544	-0.07 [-0.28, 0.15]	0.11	-0.60	.601
Sleep duration × regionasia	-0.11 [-0.48, 0.26]	0.19	-0.58	.615	-0.07 [-0.23, 0.09]	0.08	-0.84	.465
Sleep duration × regionnorth america	0.08 [-0.22, 0.38]	0.15	0.52	.649	-0.05 [-0.27, 0.18]	0.12	-0.40	.721
Sleep duration × regionsouth america	-0.04 [-0.25, 0.16]	0.11	-0.40	.720	-0.05 [-0.20, 0.10]	0.08	-0.65	.571
Regioneurope × Sleep duration <sup>2</sup>	0.01 [-0.05, 0.07]	0.03	0.27	.808	0.01 [-0.04, 0.06]	0.02	0.40	.716
Regionafrica × Sleep duration <sup>2</sup>	0.06 [-0.10, 0.22]	0.08	0.76	.517	-0.01 [-0.18, 0.15]	0.08	-0.18	.873
Regionasia × Sleep duration <sup>2</sup>	0.06 [-0.12, 0.25]	0.09	0.65	.572	-0.01 [-0.14, 0.13]	0.07	-0.09	.932
Regionnorth america × Sleep duration <sup>2</sup>	0.04 [-0.05, 0.12]	0.04	0.89	.438	0.01 [-0.03, 0.05]	0.02	0.44	.664
Regionsouth america × Sleep duration <sup>2</sup>	0.04 [-0.03, 0.11]	0.04	1.12	.349	0.02 [0.00, 0.05]	0.01	1.66	.106
Sleep efficiency								
(Intercept)	1.43 [1.12, 1.74]	0.16	9.05	< .001	0.90 [-0.05, 1.85]	0.49	1.86	.194

Table 14 continued

TITLE

Term	Physical Activity Volume				Physical Activity Intensity			
	$\beta$ [95% CI]	SE	t	p	$\beta$ [95% CI]	SE	t	p
Sleep efficiency	-0.09 [-0.19, 0.01]	0.05	-1.73	.131	-0.05 [-0.26, 0.16]	0.11	-0.44	.697
Regioneurope	-0.24 [-0.42, -0.06]	0.09	-2.61	.010	-0.10 [-0.31, 0.11]	0.11	-0.90	.403
Regionafrica	-0.13 [-0.32, 0.06]	0.10	-1.32	.188	-0.05 [-0.22, 0.12]	0.09	-0.61	.546
Regionasia	-0.40 [-0.59, -0.20]	0.10	-3.97	< .001	-0.30 [-0.49, -0.12]	0.10	-3.21	.004
Regionnorth america	-0.43 [-0.62, -0.23]	0.10	-4.30	< .001	-0.18 [-0.60, 0.25]	0.22	-0.81	.484
Regionsouth america	-0.64 [-0.84, -0.44]	0.10	-6.28	< .001	-0.25 [-0.94, 0.44]	0.35	-0.71	.545
Sleep efficiency <sup>2</sup>	-0.02 [-0.04, 0.00]	0.01	-1.61	.135	-0.01 [-0.07, 0.05]	0.03	-0.29	.794
Age	-0.02 [-0.02, -0.01]	0.00	-10.20	< .001	-0.02 [-0.02, -0.02]	0.00	-12.81	< .001
Sleep efficiency × regioneurope	0.11 [-0.01, 0.23]	0.06	1.85	.122	0.06 [-0.13, 0.24]	0.09	0.61	.594
Sleep efficiency × regionafrica	0.29 [0.12, 0.45]	0.08	3.41	.011	-0.03 [-0.29, 0.22]	0.13	-0.26	.816
Sleep efficiency × regionasia	0.30 [0.14, 0.46]	0.08	3.62	.005	0.09 [-0.06, 0.24]	0.08	1.14	.294
Sleep efficiency × regionnorth america	0.00 [-0.22, 0.22]	0.11	-0.03	.975	0.05 [-0.38, 0.48]	0.22	0.23	.840
Sleep efficiency × regionsouth america	0.03 [-0.09, 0.14]	0.06	0.42	.681	0.05 [-0.22, 0.32]	0.14	0.38	.737
Regioneurope × Sleep efficiency <sup>2</sup>	0.03 [0.00, 0.06]	0.02	2.28	.055	0.01 [-0.02, 0.04]	0.02	0.65	.545
Regionafrica × Sleep efficiency <sup>2</sup>	0.04 [0.01, 0.07]	0.02	2.87	.005	-0.01 [-0.04, 0.02]	0.01	-0.61	.551
Regionasia × Sleep efficiency <sup>2</sup>	0.06 [0.02, 0.11]	0.02	2.73	.011	0.01 [-0.02, 0.04]	0.02	0.55	.585
Regionnorth america × Sleep efficiency <sup>2</sup>	0.01 [-0.04, 0.07]	0.03	0.55	.611	0.02 [-0.05, 0.09]	0.03	0.59	.600
Regionsouth america × Sleep efficiency <sup>2</sup>	0.01 [-0.02, 0.04]	0.01	0.77	.455	0.01 [-0.05, 0.07]	0.03	0.38	.733
Sleep onset								
(Intercept)	1.33 [1.01, 1.65]	0.16	8.11	< .001	0.88 [0.03, 1.73]	0.43	2.04	.164
Sleep onset	-0.09 [-0.21, 0.03]	0.06	-1.44	.230	-0.03 [-0.17, 0.11]	0.07	-0.42	.704
Regioneurope	-0.11 [-0.30, 0.08]	0.10	-1.15	.252	-0.08 [-0.24, 0.08]	0.08	-0.94	.351
Regionafrica	0.12 [-0.34, 0.58]	0.24	0.50	.642	-0.10 [-0.47, 0.27]	0.19	-0.53	.623

Table 14 continued

TITLE

Term	Physical Activity Volume				Physical Activity Intensity			
	$\beta$ [95% CI]	SE	t	p	$\beta$ [95% CI]	SE	t	p
Regionasia	-0.34 [-0.59, -0.09]	0.13	-2.62	.009	-0.27 [-0.49, -0.06]	0.11	-2.47	.015
Regionnorth america	-0.43 [-0.80, -0.06]	0.19	-2.29	.061	-0.09 [-0.72, 0.55]	0.32	-0.26	.812
Regionsouth america	-0.53 [-0.77, -0.29]	0.12	-4.30	< .001	-0.22 [-0.85, 0.42]	0.32	-0.67	.564
Sleep onset <sup>2</sup>	0.03 [-0.02, 0.08]	0.03	1.11	.305	-0.01 [-0.11, 0.09]	0.05	-0.20	.855
Age	-0.02 [-0.02, -0.01]	0.00	-10.28	< .001	-0.02 [-0.02, -0.02]	0.00	-12.78	< .001
Sleep onset × regioneurope	0.06 [-0.04, 0.16]	0.05	1.15	.296	0.03 [-0.09, 0.15]	0.06	0.46	.672
Sleep onset × regionafrica	0.08 [-0.35, 0.50]	0.22	0.36	.731	0.03 [-0.29, 0.34]	0.16	0.16	.877
Sleep onset × regionasia	-0.31 [-1.22, 0.60]	0.46	-0.67	.551	-0.02 [-0.93, 0.90]	0.47	-0.03	.976
Sleep onset × regionnorth america	0.01 [-0.19, 0.22]	0.10	0.14	.893	0.07 [-0.13, 0.28]	0.10	0.67	.523
Sleep onset × regionsouth america	0.03 [-0.12, 0.18]	0.08	0.40	.705	0.02 [-0.08, 0.13]	0.05	0.41	.692
Regioneurope × Sleep onset <sup>2</sup>	-0.04 [-0.09, 0.01]	0.02	-1.66	.121	0.01 [-0.08, 0.10]	0.05	0.24	.830
Regionafrica × Sleep onset <sup>2</sup>	-0.18 [-0.59, 0.24]	0.21	-0.83	.468	0.06 [-0.50, 0.61]	0.28	0.20	.857
Regionasia × Sleep onset <sup>2</sup>	-0.38 [-1.15, 0.40]	0.40	-0.95	.424	-0.07 [-0.92, 0.79]	0.44	-0.15	.893
Regionnorth america × Sleep onset <sup>2</sup>	0.05 [-0.22, 0.31]	0.13	0.34	.758	0.00 [-0.15, 0.15]	0.08	-0.03	.980
Regionsouth america × Sleep onset <sup>2</sup>	-0.04 [-0.11, 0.04]	0.04	-1.01	.345	0.00 [-0.06, 0.06]	0.03	-0.07	.948
Sleep regularity								
(Intercept)	1.41 [1.11, 1.71]	0.15	9.17	< .001	0.90 [-0.02, 1.82]	0.47	1.91	.185
Sleep regularity	0.06 [0.00, 0.13]	0.03	1.88	.109	0.04 [0.00, 0.08]	0.02	1.78	.089
Regioneurope	-0.25 [-0.46, -0.04]	0.11	-2.35	.031	-0.11 [-0.28, 0.07]	0.09	-1.19	.253
Regionafrica	-0.22 [-0.53, 0.10]	0.16	-1.35	.237	-0.10 [-0.33, 0.13]	0.12	-0.82	.438
Regionasia	-0.49 [-0.72, -0.25]	0.12	-4.10	< .001	-0.34 [-0.58, -0.11]	0.12	-2.88	.022
Regionnorth america	-0.44 [-0.71, -0.18]	0.14	-3.27	.009	-0.14 [-0.53, 0.25]	0.20	-0.70	.537
Regionsouth america	-0.64 [-0.84, -0.44]	0.10	-6.19	< .001	-0.25 [-0.89, 0.40]	0.33	-0.74	.528

Table 14 continued

TITLE

Term	Physical Activity Volume				Physical Activity Intensity			
	$\beta$ [95% CI]	SE	t	p	$\beta$ [95% CI]	SE	t	p
Sleep regularity <sup>2</sup>	0.00 [-0.04, 0.04]	0.02	-0.09	.930	0.00 [-0.05, 0.04]	0.02	-0.03	.979
Age	-0.02 [-0.02, -0.01]	0.00	-9.94	< .001	-0.02 [-0.02, -0.02]	0.00	-12.93	< .001
Sleep regularity × regioneurope	0.02 [-0.05, 0.08]	0.03	0.50	.630	-0.01 [-0.07, 0.05]	0.03	-0.23	.824
Sleep regularity × regionafrica	0.02 [-0.32, 0.36]	0.17	0.13	.905	0.01 [-0.19, 0.20]	0.10	0.06	.960
Sleep regularity × regionasia	0.01 [-0.30, 0.33]	0.16	0.09	.933	0.02 [-0.14, 0.18]	0.08	0.25	.815
Sleep regularity × regionnorth america	0.22 [-0.07, 0.51]	0.15	1.50	.255	-0.01 [-0.38, 0.37]	0.19	-0.03	.979
Sleep regularity × regionsouth america	0.03 [-0.14, 0.20]	0.09	0.37	.743	0.03 [-0.09, 0.15]	0.06	0.48	.663
Regioneurope × Sleep regularity <sup>2</sup>	0.02 [-0.03, 0.07]	0.03	0.78	.479	0.00 [-0.04, 0.05]	0.02	0.15	.884
Regionafrica × Sleep regularity <sup>2</sup>	0.04 [-0.12, 0.19]	0.08	0.45	.688	0.01 [-0.09, 0.11]	0.05	0.14	.895
Regionasia × Sleep regularity <sup>2</sup>	0.03 [-0.09, 0.15]	0.06	0.45	.683	0.01 [-0.03, 0.06]	0.02	0.49	.624
Regionnorth america × Sleep regularity <sup>2</sup>	0.07 [-0.05, 0.20]	0.06	1.19	.326	-0.02 [-0.09, 0.05]	0.04	-0.56	.602
Regionsouth america × Sleep regularity <sup>2</sup>	0.04 [-0.05, 0.14]	0.05	0.83	.474	0.01 [-0.02, 0.05]	0.02	0.90	.371

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			
	$\beta$ [95% CI]	SE	t	p	$\beta$ [95% CI]	SE	t	p
<b>Sleep duration</b>								
(Intercept)	0.74 [0.44, 1.03]	0.15	4.91	< .001	0.80 [0.26, 1.34]	0.10	0.56	.614
Physical activity	0.18 [0.06, 0.30]	0.06	2.95	.003	0.05 [-0.13, 0.24]	0.01	-4.33	< .001
Daylight hours	-0.03 [-0.04, -0.02]	0.01	-4.79	< .001	-0.03 [-0.04, -0.01]	0.04	0.14	.894
Physical activity <sup>2</sup>	-0.05 [-0.09, 0.00]	0.02	-1.93	.062	0.01 [-0.08, 0.09]	0.04	0.14	.894
Age	0.00 [-0.01, 0.00]	0.00	-0.96	.340	0.00 [-0.01, 0.00]	0.00	-1.10	.340
Physical activity × daylight hours	0.00 [-0.01, 0.01]	0.01	-0.29	.769	0.00 [-0.02, 0.02]	0.01	0.10	.927
Daylight hours × Physical activity <sup>2</sup>	0.00 [0.00, 0.01]	0.00	1.30	.203	0.00 [-0.01, 0.01]	0.00	0.39	.715
<b>Sleep efficiency</b>								
(Intercept)	0.09 [-0.25, 0.44]	0.18	0.53	.612	0.23 [-0.20, 0.67]	0.22	1.05	.353
Physical activity	0.11 [-0.38, 0.61]	0.25	0.45	.696	-0.04 [-0.32, 0.23]	0.14	-0.31	.785
Daylight hours	0.00 [-0.01, 0.01]	0.01	-0.16	.873	0.00 [-0.01, 0.01]	0.01	-0.25	.803
Physical activity <sup>2</sup>	-0.01 [-0.10, 0.07]	0.05	-0.32	.769	-0.01 [-0.12, 0.10]	0.06	-0.23	.830
Age	0.00 [0.00, 0.01]	0.00	1.51	.178	0.00 [0.00, 0.01]	0.00	0.65	.530
Physical activity × daylight hours	0.00 [-0.02, 0.02]	0.01	-0.14	.900	0.00 [-0.01, 0.01]	0.00	-0.02	.982
Daylight hours × Physical activity <sup>2</sup>	0.00 [-0.01, 0.00]	0.00	-0.09	.935	0.00 [-0.01, 0.01]	0.00	0.19	.856
<b>Sleep onset</b>								
(Intercept)	-0.25 [-0.60, 0.10]	0.18	-1.42	.178	-0.25 [-0.72, 0.22]	0.24	-1.04	.342
Physical activity	0.22 [-0.33, 0.77]	0.28	0.79	.510	0.07 [-0.21, 0.36]	0.14	0.51	.655
Daylight hours	0.01 [0.00, 0.02]	0.01	1.62	.127	0.01 [0.00, 0.02]	0.01	2.34	.019
Physical activity <sup>2</sup>	-0.03 [-0.11, 0.06]	0.04	-0.57	.613	0.04 [-0.09, 0.18]	0.07	0.62	.583
Age	0.00 [0.00, 0.01]	0.00	0.70	.529	0.00 [0.00, 0.00]	0.00	0.52	.604

Table 15 continued

Term	Physical Activity Volume				Physical Activity Intensity			
	$\beta$ [95% CI]	SE	t	p	$\beta$ [95% CI]	SE	t	p
Physical activity $\times$ daylight hours	-0.01 [-0.02, 0.01]	0.01	-0.77	.486	0.00 [-0.01, 0.01]	0.01	-0.09	.934
Daylight hours $\times$ Physical activity <sup>2</sup>	0.00 [0.00, 0.01]	0.00	0.19	.856	0.00 [-0.01, 0.00]	0.00	-0.21	.835
Sleep regularity								
(Intercept)	0.25 [-0.36, 0.87]	0.31	0.80	.482	0.34 [-0.33, 1.02]	0.35	0.99	.400
Physical activity	-0.04 [-0.33, 0.25]	0.15	-0.29	.790	0.04 [-0.06, 0.15]	0.06	0.81	.440
Daylight hours	0.00 [-0.01, 0.01]	0.01	-0.03	.979	0.00 [-0.02, 0.01]	0.01	-0.62	.546
Physical activity <sup>2</sup>	0.03 [-0.05, 0.10]	0.04	0.64	.563	-0.06 [-0.11, 0.00]	0.03	-2.10	.036
Age	0.00 [-0.01, 0.00]	0.00	-0.26	.804	0.00 [0.00, 0.00]	0.00	-0.22	.825
Physical activity $\times$ daylight hours	0.01 [0.00, 0.03]	0.01	1.45	.207	0.00 [-0.01, 0.01]	0.01	0.00	> .999
Daylight hours $\times$ Physical activity <sup>2</sup>	0.00 [-0.01, 0.00]	0.00	-1.48	.202	0.00 [-0.01, 0.01]	0.00	0.68	.533

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			
	$\beta$ [95% CI]	SE	t	p	$\beta$ [95% CI]	SE	t	p
Sleep duration								
(Intercept)	1.27 [0.79, 1.75]	0.25	5.16	.001	1.13 [0.60, 1.66]	0.27	4.17	.027
Sleep duration	0.00 [-0.18, 0.17]	0.09	-0.02	.988	0.02 [-0.06, 0.09]	0.04	0.46	.651
Daylight hours	0.01 [0.00, 0.03]	0.01	2.37	.020	0.00 [-0.02, 0.01]	0.01	-0.51	.628
Sleep duration <sup>2</sup>	0.06 [-0.01, 0.13]	0.03	1.74	.131	-0.01 [-0.10, 0.08]	0.05	-0.27	.803
Age	-0.02 [-0.02, -0.01]	0.00	-8.67	< .001	-0.02 [-0.02, -0.02]	0.00	-12.48	< .001
Sleep duration × daylight hours	0.00 [-0.02, 0.02]	0.01	-0.16	.887	0.00 [-0.01, 0.01]	0.00	-0.35	.737
Daylight hours × Sleep duration <sup>2</sup>	0.00 [-0.01, 0.00]	0.00	-1.15	.299	0.00 [0.00, 0.00]	0.00	-0.18	.860
Sleep efficiency								
(Intercept)	1.30 [0.75, 1.85]	0.28	4.63	.005	1.12 [0.56, 1.67]	0.28	3.96	.032
Sleep efficiency	-0.02 [-0.14, 0.10]	0.06	-0.36	.718	-0.05 [-0.15, 0.06]	0.05	-0.86	.396
Daylight hours	0.01 [0.00, 0.02]	0.01	2.09	.037	0.00 [-0.02, 0.01]	0.01	-0.59	.579
Sleep efficiency <sup>2</sup>	0.02 [-0.06, 0.10]	0.04	0.48	.662	0.00 [-0.05, 0.04]	0.02	-0.06	.952
Age	-0.02 [-0.02, -0.01]	0.00	-8.40	< .001	-0.02 [-0.02, -0.02]	0.00	-12.27	< .001
Sleep efficiency × daylight hours	0.00 [-0.01, 0.01]	0.00	0.61	.541	0.00 [0.00, 0.01]	0.00	0.97	.330
Daylight hours × Sleep efficiency <sup>2</sup>	0.00 [-0.01, 0.01]	0.00	-0.32	.767	0.00 [0.00, 0.00]	0.00	0.17	.866
Sleep onset								
(Intercept)	1.33 [0.81, 1.85]	0.27	5.00	.002	1.10 [0.58, 1.62]	0.27	4.12	.026
Sleep onset	-0.04 [-0.14, 0.05]	0.05	-0.87	.394	-0.04 [-0.12, 0.03]	0.04	-1.17	.248
Daylight hours	0.01 [0.00, 0.02]	0.01	1.36	.187	0.00 [-0.02, 0.01]	0.01	-0.37	.722
Sleep onset <sup>2</sup>	-0.04 [-0.14, 0.06]	0.05	-0.81	.459	0.01 [-0.05, 0.07]	0.03	0.37	.712
Age	-0.02 [-0.02, -0.01]	0.00	-8.47	< .001	-0.02 [-0.02, -0.02]	0.00	-12.23	< .001

Table 16 continued

Term	Physical Activity Volume				Physical Activity Intensity			
	$\beta$ [95% CI]	SE	t	p	$\beta$ [95% CI]	SE	t	p
Sleep onset × daylight hours	0.00 [-0.01, 0.01]	0.00	0.16	.877	0.00 [0.00, 0.01]	0.00	1.17	.245
Daylight hours × Sleep onset <sup>2</sup>	0.00 [0.00, 0.01]	0.00	0.76	.474	0.00 [-0.01, 0.00]	0.00	-0.42	.682
Sleep regularity								
(Intercept)	1.21 [0.70, 1.73]	0.26	4.60	.004	1.09 [0.58, 1.60]	0.26	4.18	.024
Sleep regularity	0.09 [-0.04, 0.22]	0.07	1.40	.230	0.07 [-0.06, 0.19]	0.07	0.99	.387
Daylight hours	0.01 [0.00, 0.02]	0.01	1.90	.058	0.00 [-0.02, 0.01]	0.01	-0.70	.506
Sleep regularity <sup>2</sup>	0.02 [-0.03, 0.08]	0.03	0.83	.411	-0.01 [-0.06, 0.05]	0.03	-0.21	.833
Age	-0.02 [-0.02, -0.01]	0.00	-8.21	< .001	-0.02 [-0.02, -0.01]	0.00	-12.13	< .001
Sleep regularity × daylight hours	0.00 [-0.01, 0.01]	0.00	-0.10	.924	0.00 [-0.01, 0.01]	0.00	-0.55	.600
Daylight hours × Sleep regularity <sup>2</sup>	0.00 [0.00, 0.00]	0.00	-0.06	.954	0.00 [0.00, 0.00]	0.00	0.39	.697

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				
	$\beta$ [95% CI]	SE	t	p	$\beta$ [95% CI]	SE	t	p
<b>Sleep duration</b>								
(Intercept)	0.92 [0.60, 1.25]	0.17	5.55	.001	0.83 [0.37, 1.28]	0.17	3.53	.037
Physical activity	0.23 [0.18, 0.29]	0.03	7.94	< .001	0.05 [-0.28, 0.38]	0.17	0.30	.795
Wrist	-0.58 [-0.82, -0.34]	0.12	-4.69	< .001	-0.45 [-0.68, -0.21]	0.12	-3.78	< .001
Physical activity <sup>2</sup>	-0.03 [-0.05, -0.01]	0.01	-2.59	.013	0.05 [0.00, 0.10]	0.03	2.13	.096
Age	0.00 [-0.01, 0.00]	0.00	-1.80	.073	0.00 [-0.01, 0.00]	0.00	-1.24	.283
Physical activity × wrist	-0.13 [-0.22, -0.04]	0.04	-2.94	.033	0.02 [-0.08, 0.12]	0.05	0.36	.734
Wrist × Physical activity <sup>2</sup>	0.02 [0.00, 0.04]	0.01	1.84	.071	-0.04 [-0.08, 0.01]	0.02	-1.69	.120
<b>Sleep efficiency</b>								
(Intercept)	-0.35 [-0.88, 0.18] <sup>†</sup>	0.27	-1.30	.311	-0.41 [-0.84, 0.03]	0.22	-1.82	.187
Physical activity	0.24 [-0.19, 0.67] <sup>†</sup>	0.22	1.11	.384	-0.02 [-0.45, 0.41]	0.22	-0.09	.935
Wrist	0.68 [0.46, 0.91] <sup>†</sup>	0.12	5.93	.002	0.78 [0.58, 0.98]	0.10	7.72	< .001
Physical activity <sup>2</sup>	-0.04 [-0.07, -0.01] <sup>†</sup>	0.02	-2.50	.063	0.01 [-0.14, 0.16]	0.08	0.11	.919
Age	0.00 [0.00, 0.00] <sup>†</sup>	0.00	0.83	.404	0.00 [0.00, 0.00]	0.00	0.46	.646
Physical activity × wrist	-0.27 [-0.60, 0.07] <sup>†</sup>	0.17	-1.55	.256	-0.02 [-0.45, 0.40]	0.22	-0.10	.926
Wrist × Physical activity <sup>2</sup>	0.04 [0.01, 0.07] <sup>†</sup>	0.01	2.83	.028	-0.03 [-0.15, 0.10]	0.06	-0.40	.726
<b>Sleep onset</b>								
(Intercept)	-0.75 [-1.50, 0.00]	0.38	-1.96	.133	-0.94 [-1.48, -0.40]	0.27	-3.41	.008
Physical activity	0.34 [-0.31, 0.99]	0.33	1.04	.412	0.16 [-0.20, 0.51]	0.18	0.86	.477
Wrist	1.02 [0.57, 1.47]	0.23	4.47	< .001	1.11 [0.62, 1.59]	0.25	4.45	< .001
Physical activity <sup>2</sup>	0.01 [-0.06, 0.07]	0.03	0.23	.839	0.09 [-0.11, 0.30]	0.10	0.87	.475
Age	0.00 [0.00, 0.00]	0.00	-0.50	.627	0.00 [0.00, 0.00]	0.00	0.07	.948

Table 17 continued

Term	Physical Activity Volume				Physical Activity Intensity			
	$\beta$ [95% CI]	SE	t	p	$\beta$ [95% CI]	SE	t	p
Physical activity $\times$ wrist	-0.41 [-0.91, 0.10]	0.26	-1.58	.255	-0.16 [-0.53, 0.22]	0.19	-0.82	.495
Wrist $\times$ Physical activity <sup>2</sup>	0.00 [-0.08, 0.08]	0.04	-0.02	.988	-0.09 [-0.26, 0.09]	0.09	-0.98	.426
Sleep regularity								
(Intercept)	-0.07 [-0.70, 0.55]	0.32	-0.22	.833	-0.11 [-0.70, 0.48]	0.30	-0.36	.735
Physical activity	0.07 [-0.17, 0.30]	0.12	0.54	.639	0.12 [0.02, 0.22]	0.05	2.32	.113
Wrist	0.33 [-0.07, 0.72]	0.20	1.61	.108	0.50 [0.10, 0.90]	0.21	2.44	.015
Physical activity <sup>2</sup>	-0.08 [-0.12, -0.04]	0.02	-4.07	.025	-0.08 [-0.31, 0.14]	0.12	-0.73	.543
Age	0.00 [0.00, 0.00]	0.00	-0.13	.896	0.00 [-0.01, 0.00]	0.00	-0.65	.527
Physical activity $\times$ wrist	0.08 [-0.12, 0.28]	0.10	0.78	.511	-0.08 [-0.25, 0.09]	0.08	-0.94	.433
Wrist $\times$ Physical activity <sup>2</sup>	0.05 [0.01, 0.10]	0.02	2.42	.097	0.07 [-0.13, 0.27]	0.10	0.69	.562

Note. Adjusted for BMI, age, and sex. Outcomes variables are listed in the column headers.. † value came from a pooled model where fewer than 75% of models converged.

Table 18

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

Term	Physical Activity Volume				Physical Activity Intensity			
	$\beta$ [95% CI]	SE	t	p	$\beta$ [95% CI]	SE	t	p
Sleep duration								
(Intercept)	0.41 [-0.16, 0.98]	0.29	1.41	.179	0.87 [0.32, 1.41]	0.28	3.12	.021
Sleep duration	-0.02 [-0.06, 0.02]	0.02	-0.97	.382	-0.01 [-0.04, 0.01]	0.01	-0.93	.364
Wrist	1.28 [0.76, 1.80]	0.27	4.83	< .001	0.28 [-0.15, 0.71]	0.22	1.26	.212
Sleep duration <sup>2</sup>	0.06 [0.03, 0.08]	0.01	4.65	.012	-0.01 [-0.13, 0.12]	0.06	-0.11	.923
Age	-0.02 [-0.02, -0.01]	0.00	-8.89	< .001	-0.02 [-0.02, -0.02]	0.00	-12.42	< .001
Sleep duration × wrist	0.02 [-0.04, 0.08]	0.03	0.57	.603	0.03 [-0.03, 0.08]	0.03	0.96	.405
Wrist × Sleep duration <sup>2</sup>	-0.08 [-0.10, -0.05]	0.01	-5.96	.001	-0.02 [-0.10, 0.07]	0.04	-0.40	.726
Sleep efficiency								
(Intercept)	0.52 [-0.03, 1.07]	0.28	1.86	.078	0.86 [0.18, 1.55]	0.35	2.48	.070
Sleep efficiency	0.05 [0.01, 0.10]	0.02	2.50	.021	0.01 [-0.10, 0.12]	0.06	0.24	.830
Wrist	1.15 [0.64, 1.67]	0.26	4.37	< .001	0.27 [-0.17, 0.71]	0.23	1.19	.238
Sleep efficiency <sup>2</sup>	0.01 [0.01, 0.02]	0.00	3.25	.002	0.00 [-0.03, 0.04]	0.02	0.26	.815
Age	-0.02 [-0.02, -0.01]	0.00	-8.80	< .001	-0.02 [-0.02, -0.02]	0.00	-12.27	< .001
Sleep efficiency × wrist	-0.06 [-0.11, -0.01]	0.03	-2.33	.028	-0.02 [-0.10, 0.06]	0.04	-0.45	.680
Wrist × Sleep efficiency <sup>2</sup>	-0.02 [-0.05, 0.00]	0.01	-2.01	.094	-0.01 [-0.02, 0.01]	0.01	-1.09	.296
Sleep onset								
(Intercept)	0.50 [-0.06, 1.05]	0.28	1.75	.099	0.84 [0.16, 1.52]	0.35	2.44	.072
Sleep onset	-0.06 [-0.20, 0.08]	0.07	-0.84	.424	-0.10 [-0.34, 0.14]	0.12	-0.82	.479
Wrist	1.17 [0.66, 1.68]	0.26	4.48	< .001	0.29 [-0.20, 0.77]	0.25	1.16	.259
Sleep onset <sup>2</sup>	-0.03 [-0.16, 0.10]	0.07	-0.45	.679	-0.07 [-0.22, 0.08]	0.08	-0.89	.448
Age	-0.02 [-0.02, -0.01]	0.00	-8.85	< .001	-0.02 [-0.02, -0.02]	0.00	-12.19	< .001

Table 18 continued

Term	Physical Activity Volume				Physical Activity Intensity			
	$\beta$ [95% CI]	SE	t	p	$\beta$ [95% CI]	SE	t	p
Sleep onset × wrist	0.02 [-0.10, 0.14]	0.06	0.33	.742	0.10 [-0.15, 0.34]	0.13	0.78	.501
Wrist × Sleep onset <sup>2</sup>	0.03 [-0.10, 0.15]	0.06	0.39	.717	0.07 [-0.07, 0.21]	0.07	0.95	.417
Sleep regularity								
(Intercept)	0.46 [-0.08, 0.99]	0.27	1.68	1.03	0.86 [0.24, 1.48]	0.32	2.72	.045
Sleep regularity	0.13 [0.06, 0.20]	0.03	3.71	.038	0.06 [-0.07, 0.18]	0.06	0.92	.449
Wrist	1.13 [0.60, 1.65]	0.27	4.22	< .001	0.23 [-0.21, 0.67]	0.23	1.01	.315
Sleep regularity <sup>2</sup>	0.04 [0.00, 0.08]	0.02	1.97	.148	0.00 [-0.07, 0.06]	0.03	-0.08	.943
Age	-0.02 [-0.02, -0.01]	0.00	-8.82	< .001	-0.02 [-0.02, -0.02]	0.00	-12.35	< .001
Sleep regularity × wrist	-0.07 [-0.12, -0.02]	0.03	-2.59	.038	-0.04 [-0.16, 0.09]	0.06	-0.56	.625
Wrist × Sleep regularity <sup>2</sup>	-0.03 [-0.07, 0.02]	0.02	-1.16	.329	0.01 [-0.05, 0.07]	0.03	0.29	.796

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

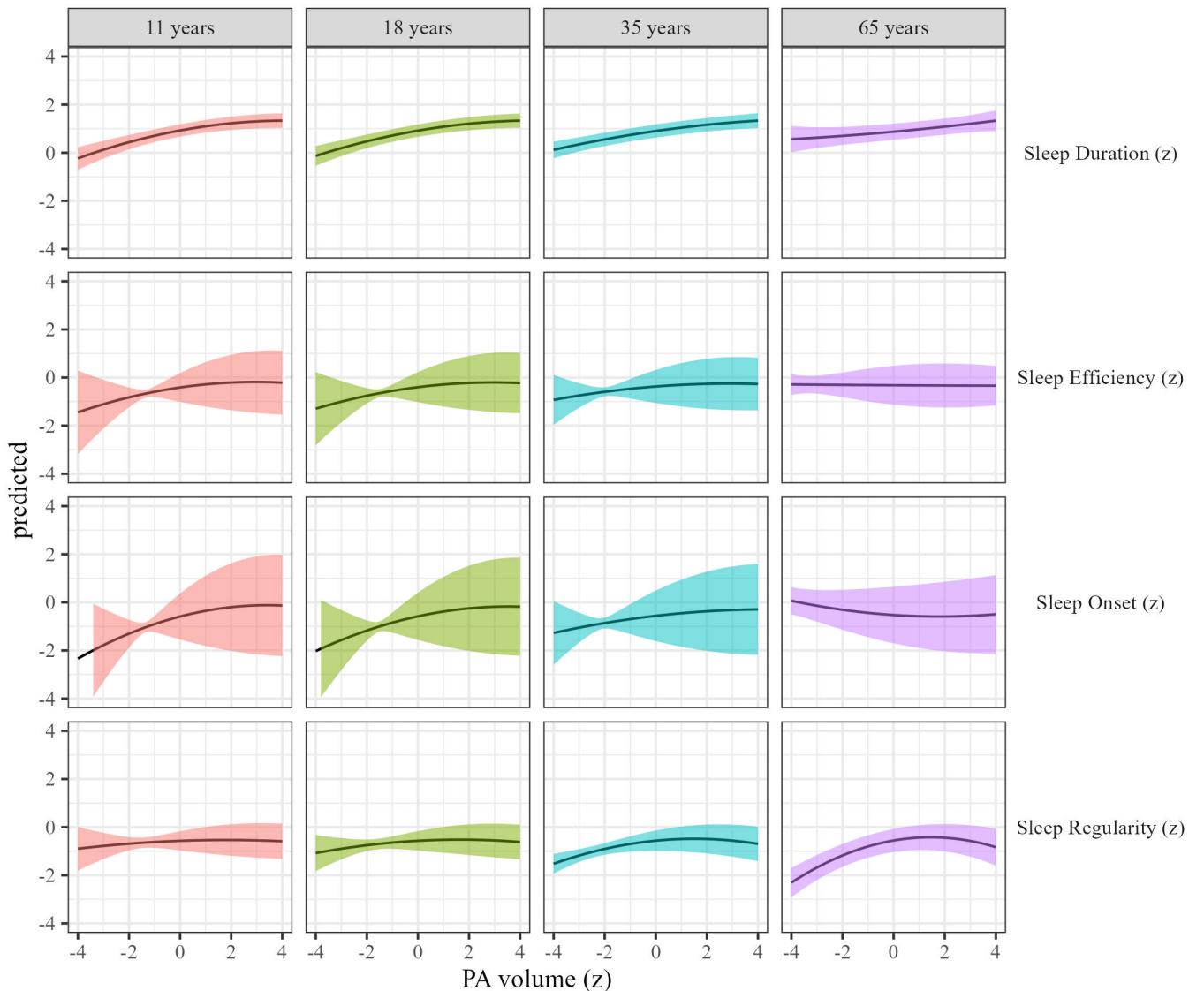


Figure 1. Sleep metrics on Physical activity volume

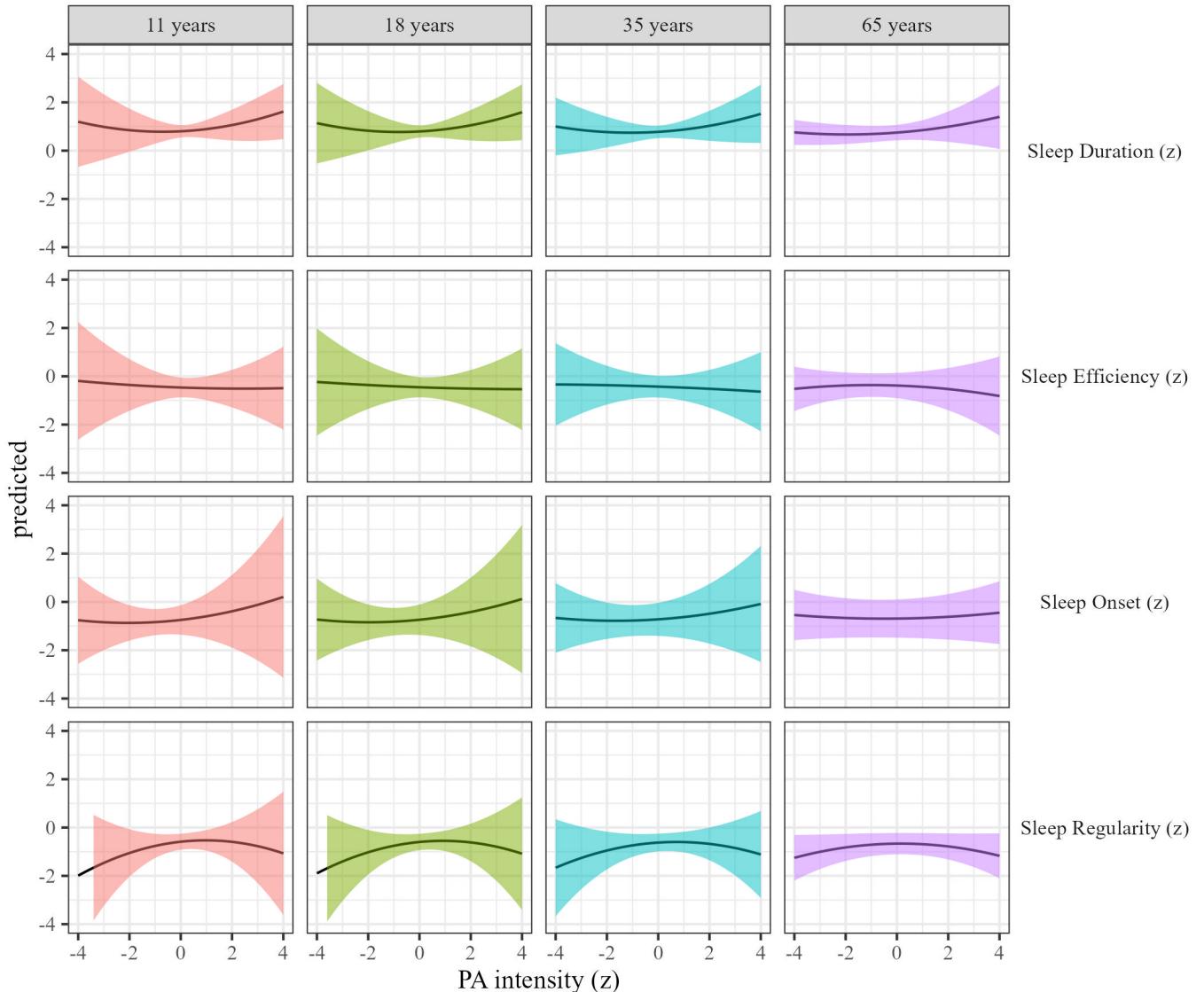
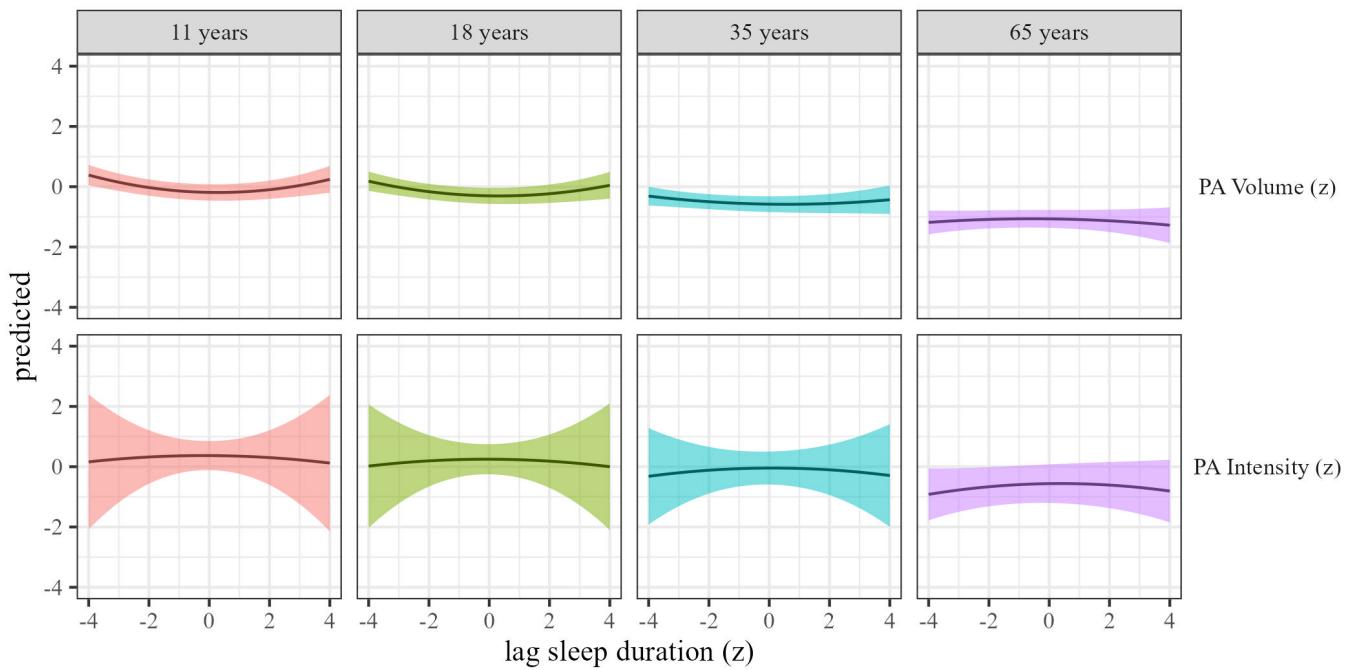
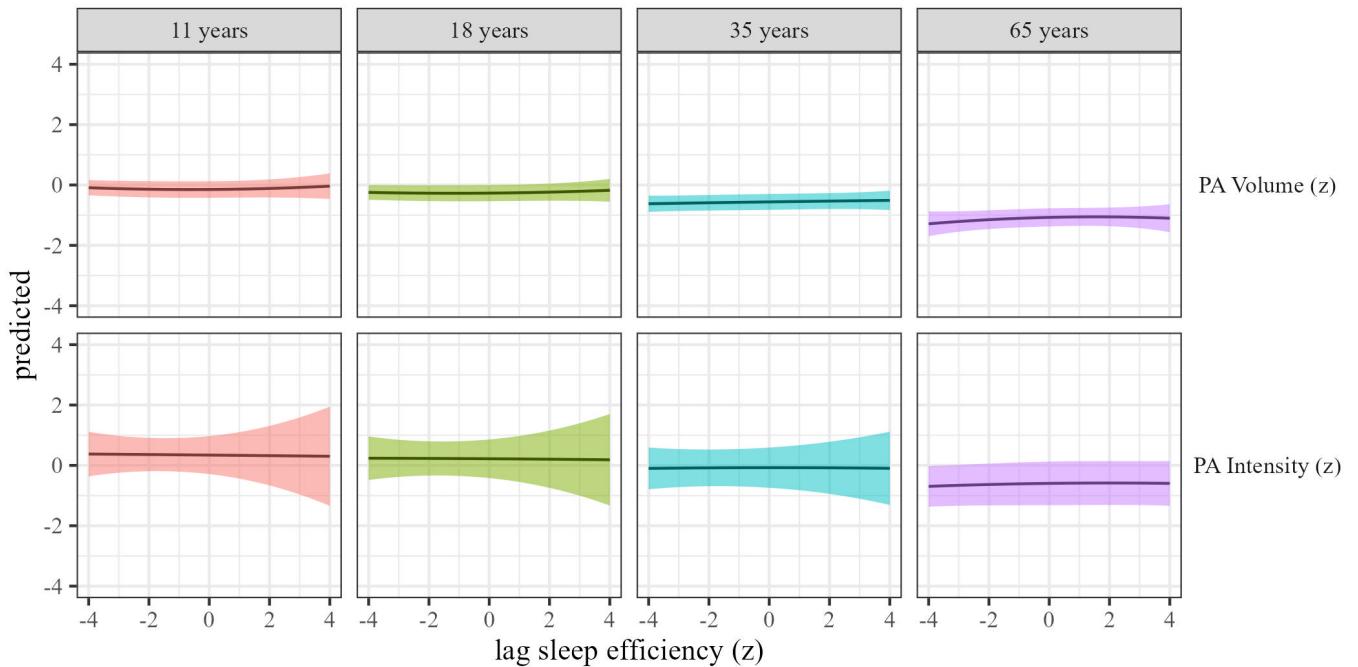


Figure 2. Sleep metrics on Physical activity intensity



*Figure 3.* Physical activity by sleep duration



*Figure 4.* Physical activity by sleep efficiency

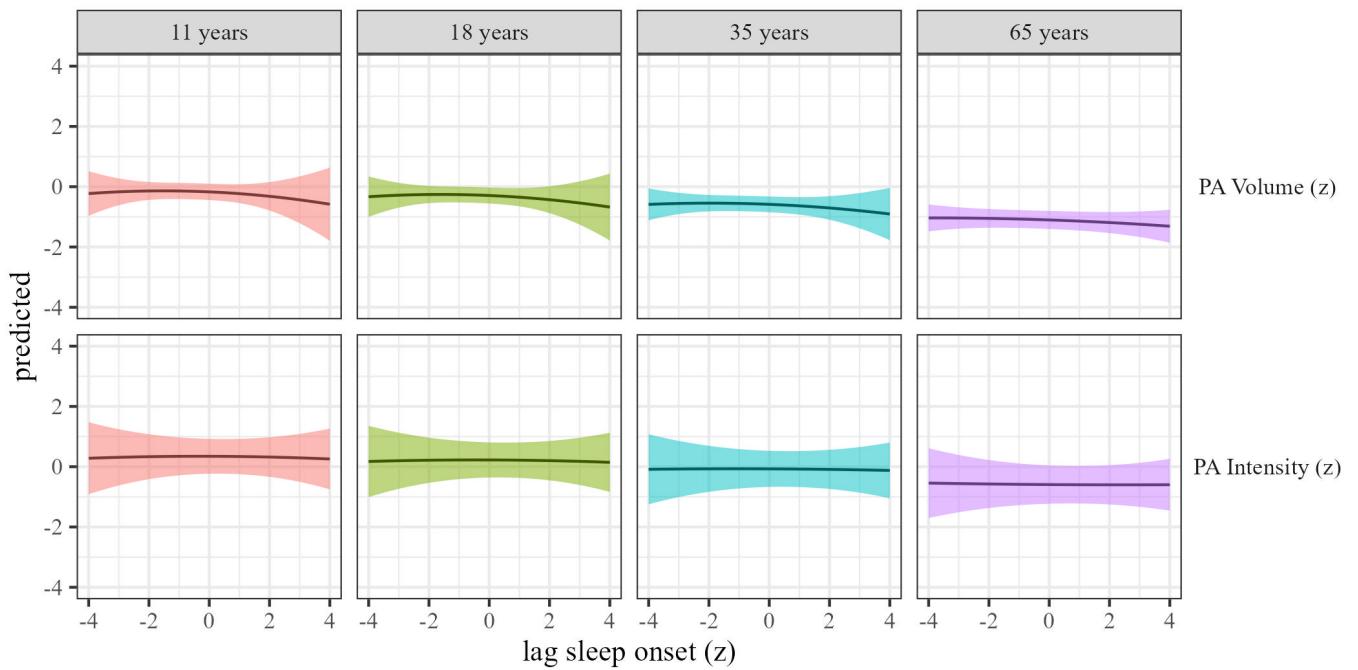


Figure 5. Physical activity by sleep onset

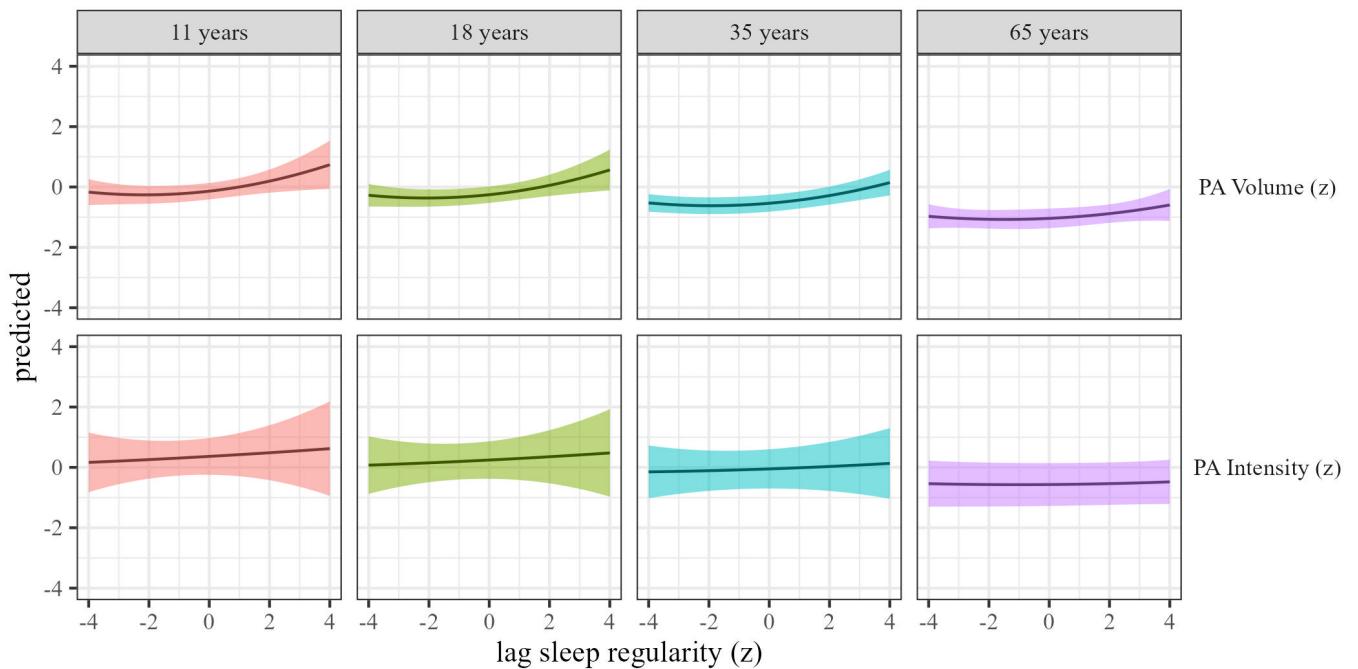


Figure 6. Physical activity by sleep regularity

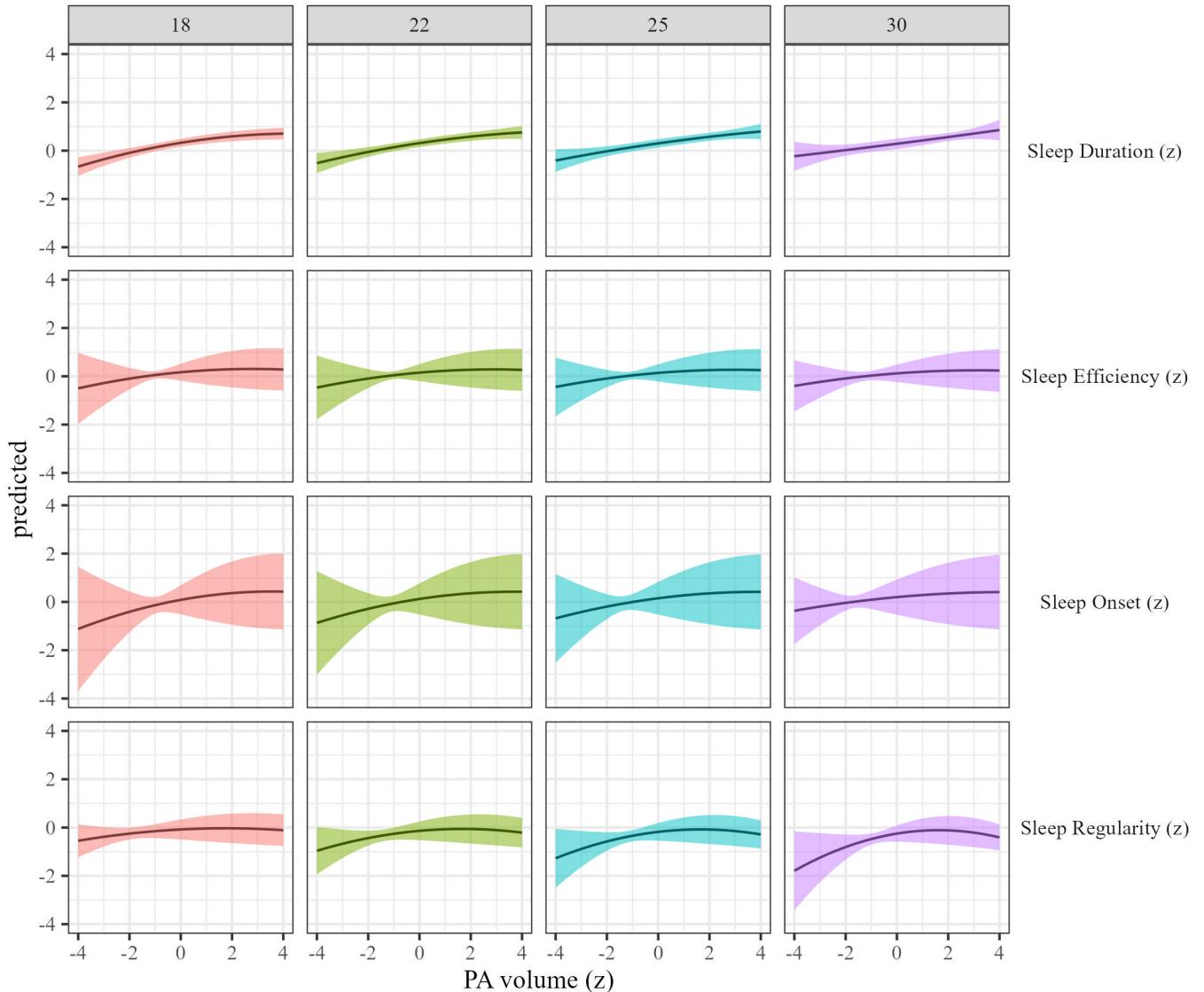


Figure 7. Sleep metrics on Physical activity volume by BMI

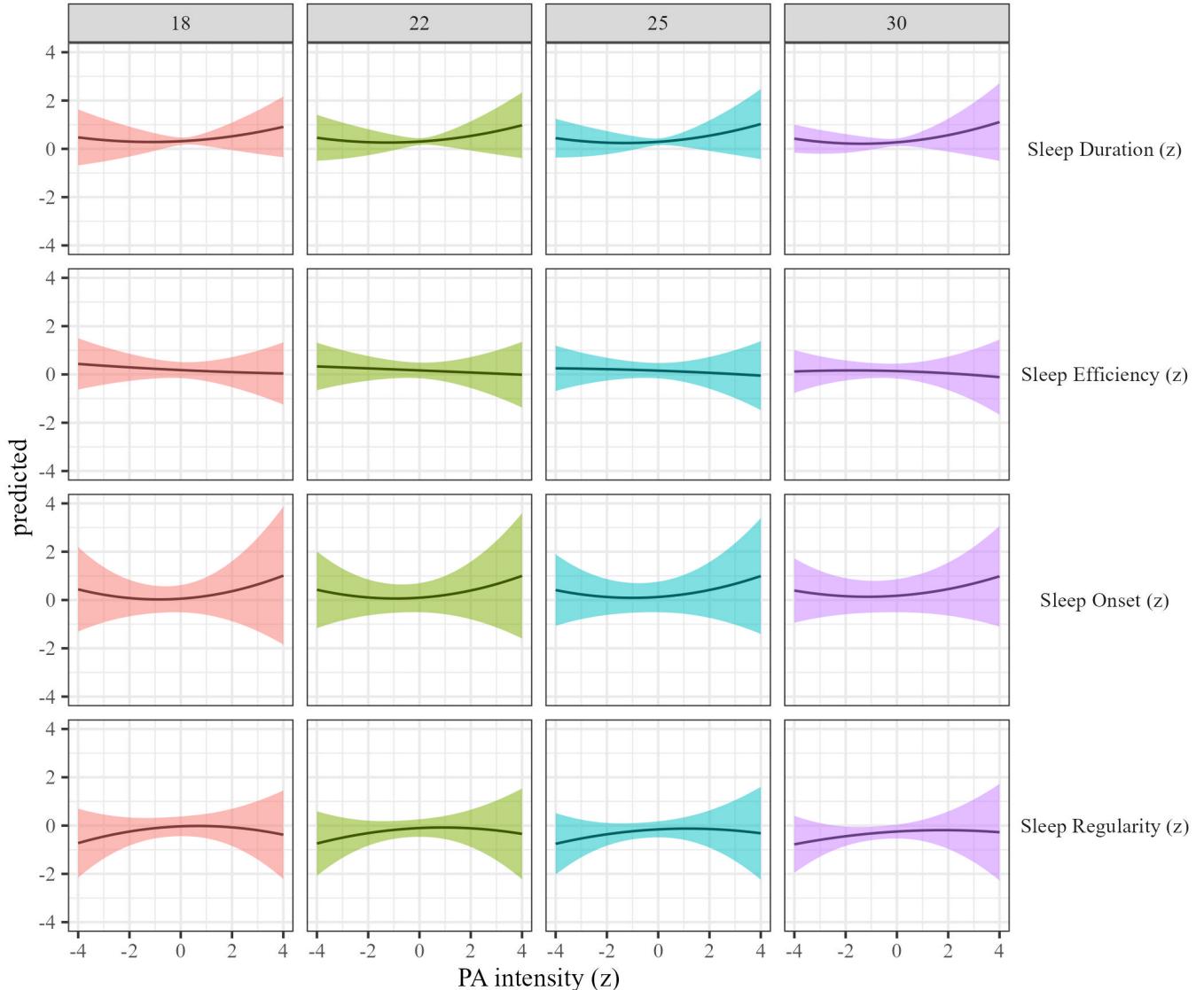


Figure 8. Sleep metrics on Physical activity intensity moderated by BMI

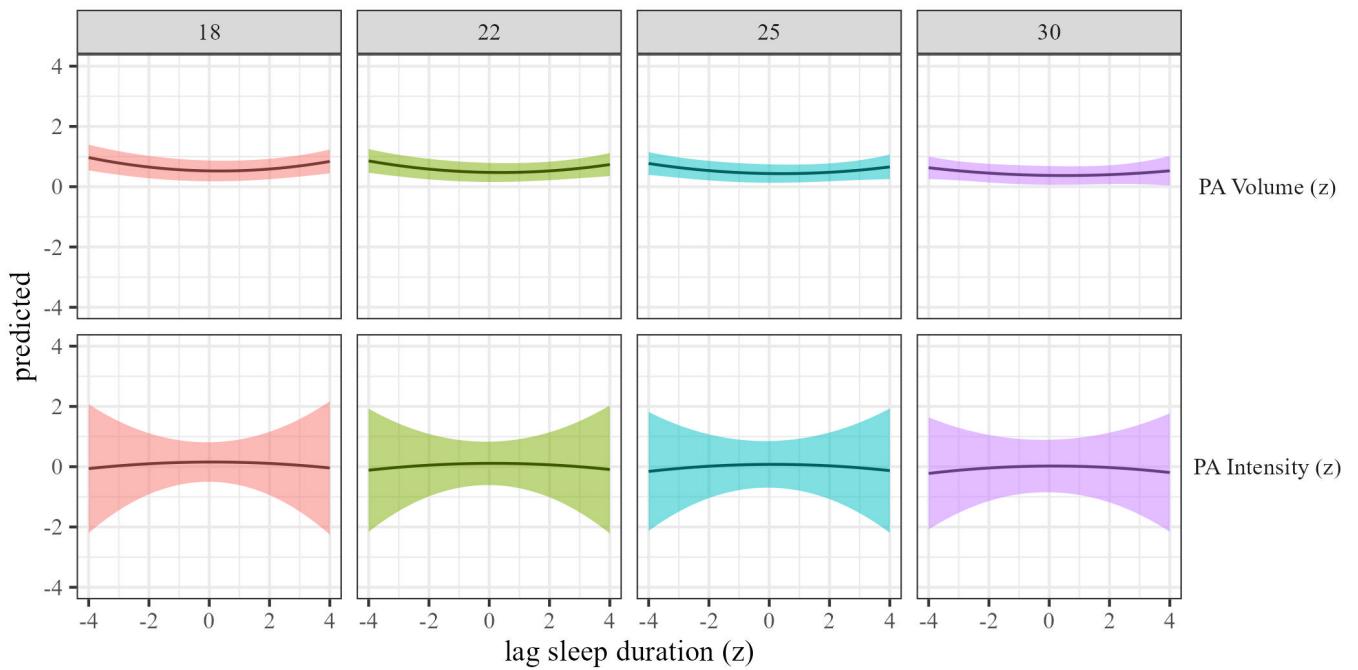


Figure 9. Physical activity by sleep duration moderated by BMI

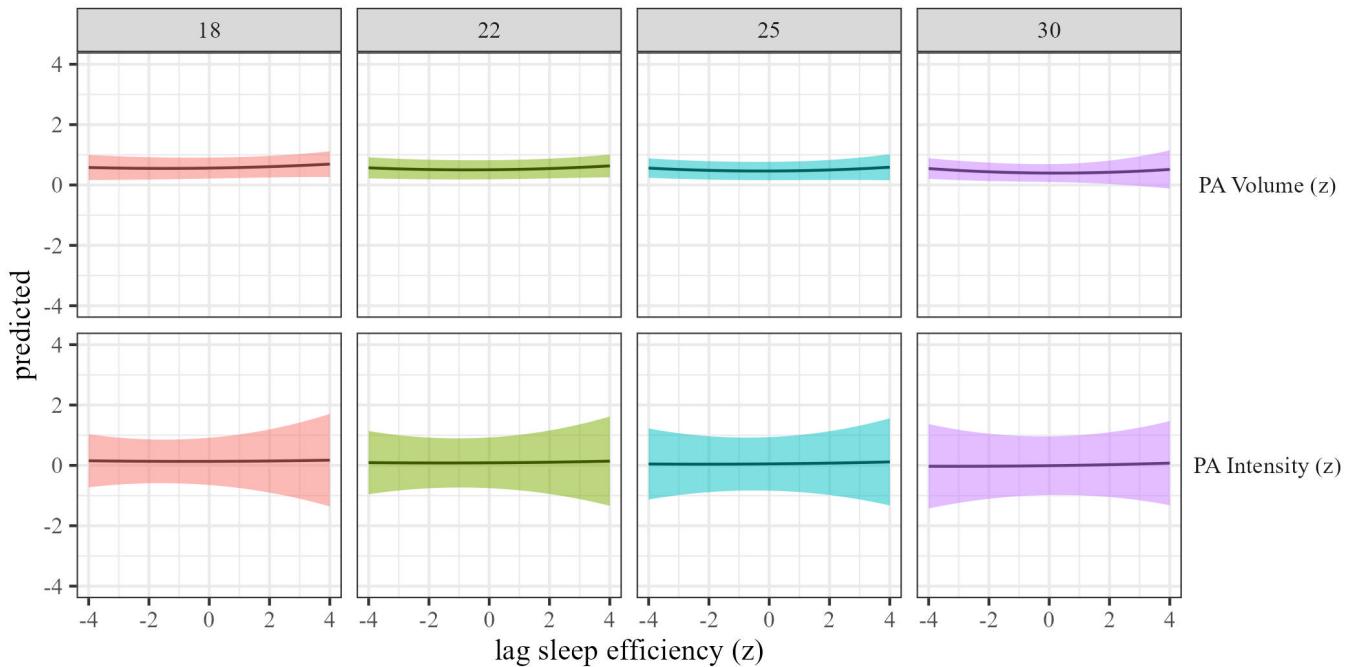
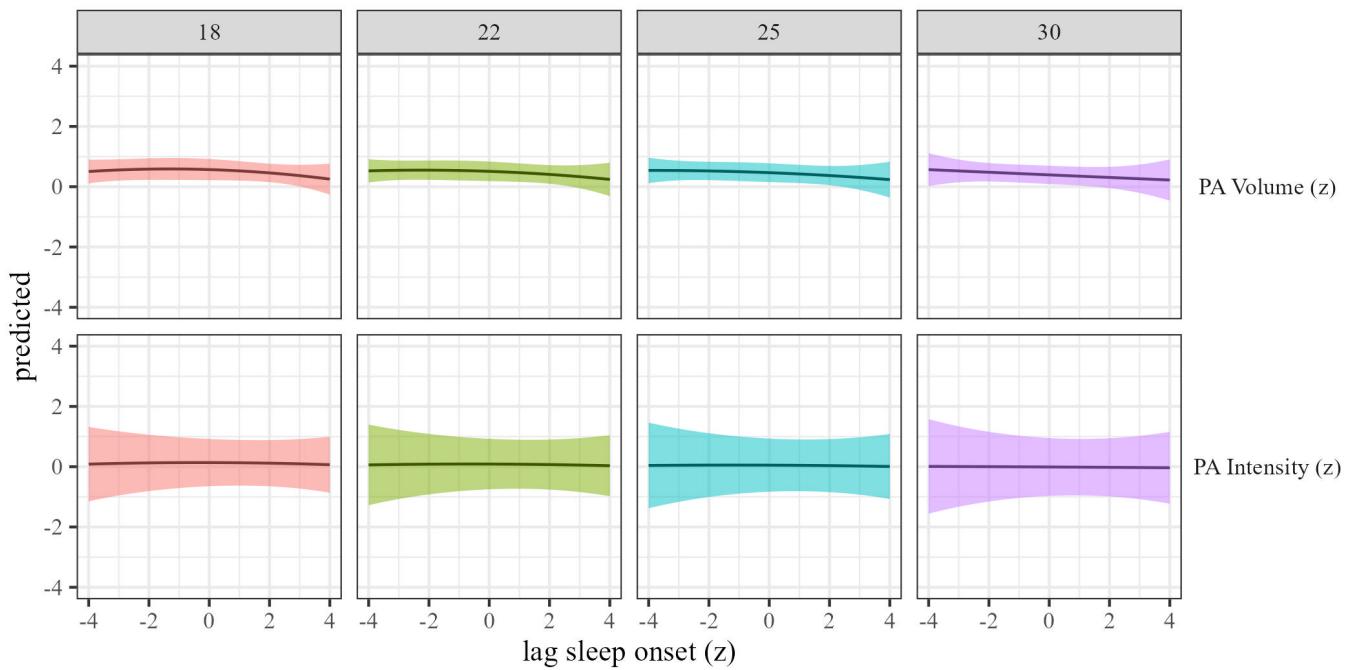
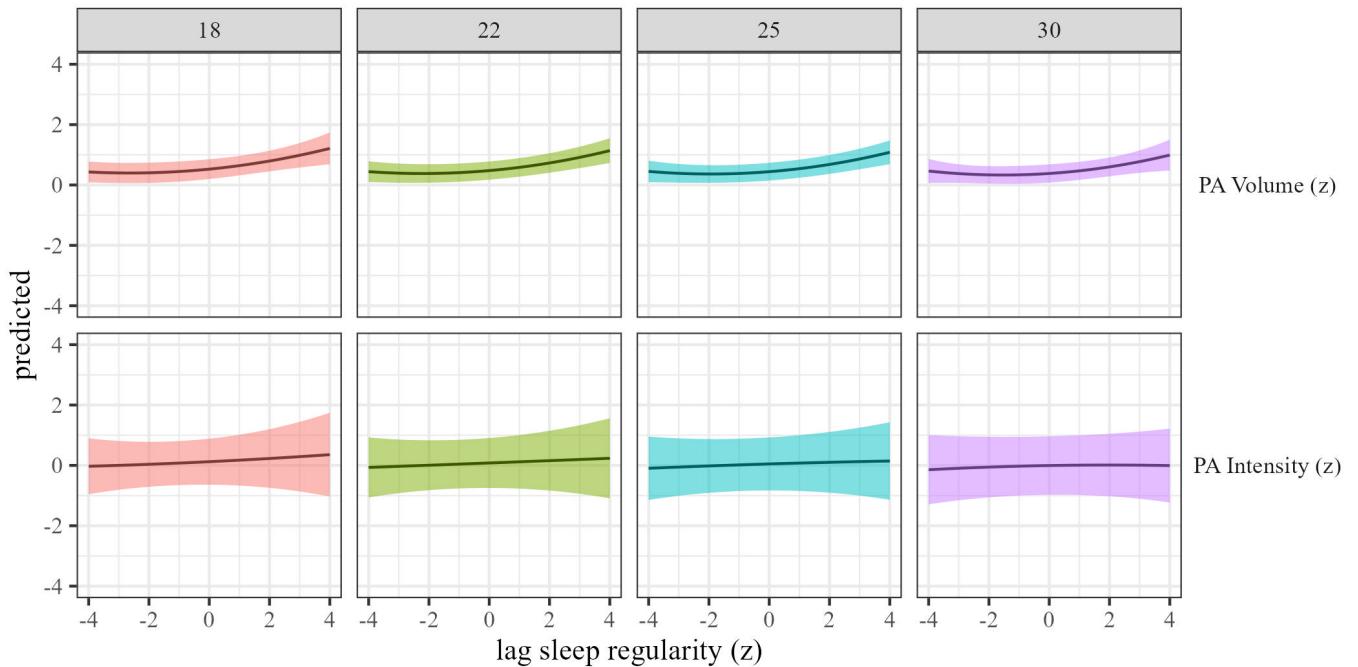


Figure 10. Physical activity by sleep efficiency moderated by BMI



*Figure 11.* Physical activity by sleep onset moderated by BMI



*Figure 12.* Physical activity by sleep regularity moderated by BMI

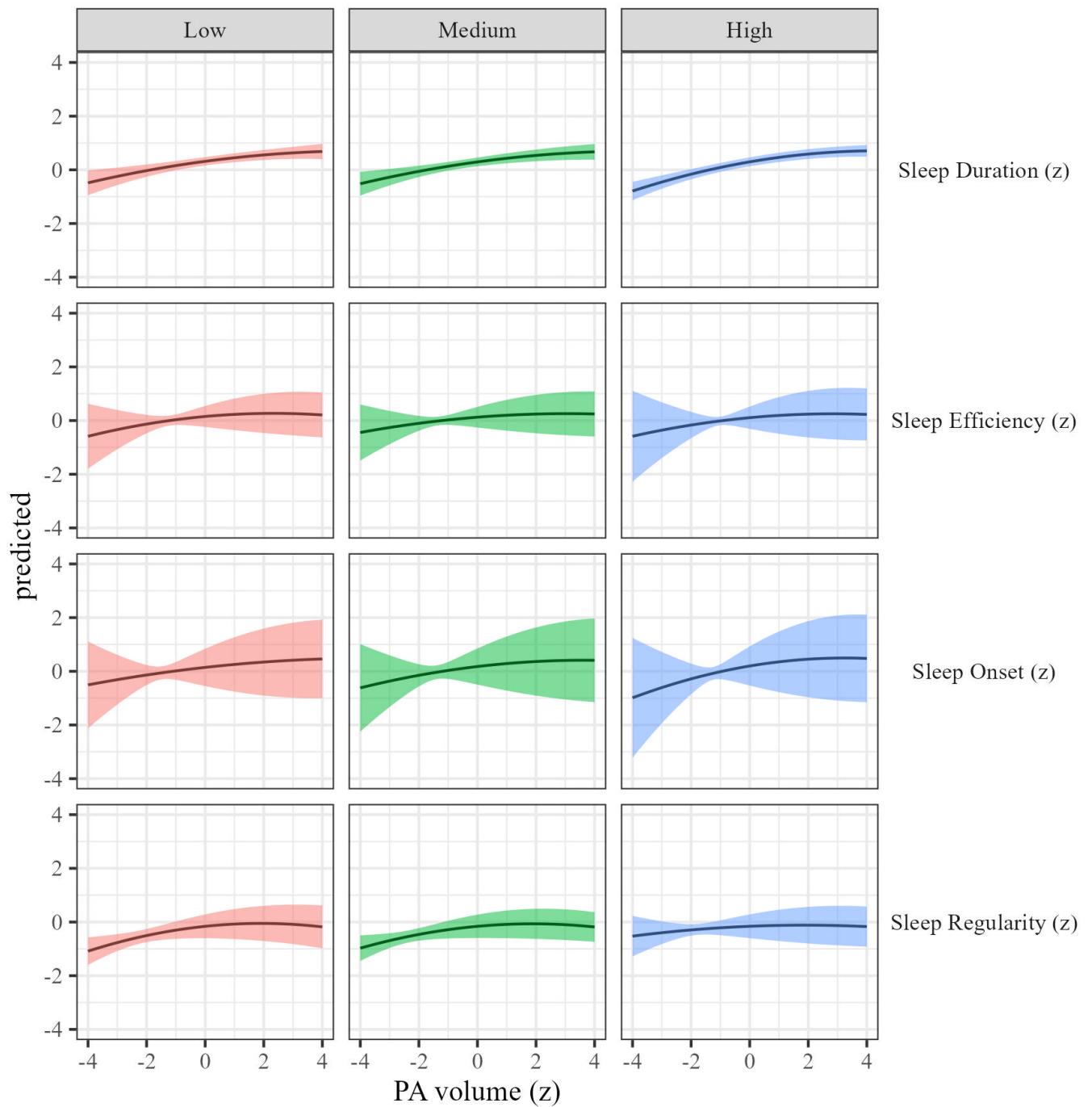


Figure 13. Sleep metrics on Physical activity volume by SES

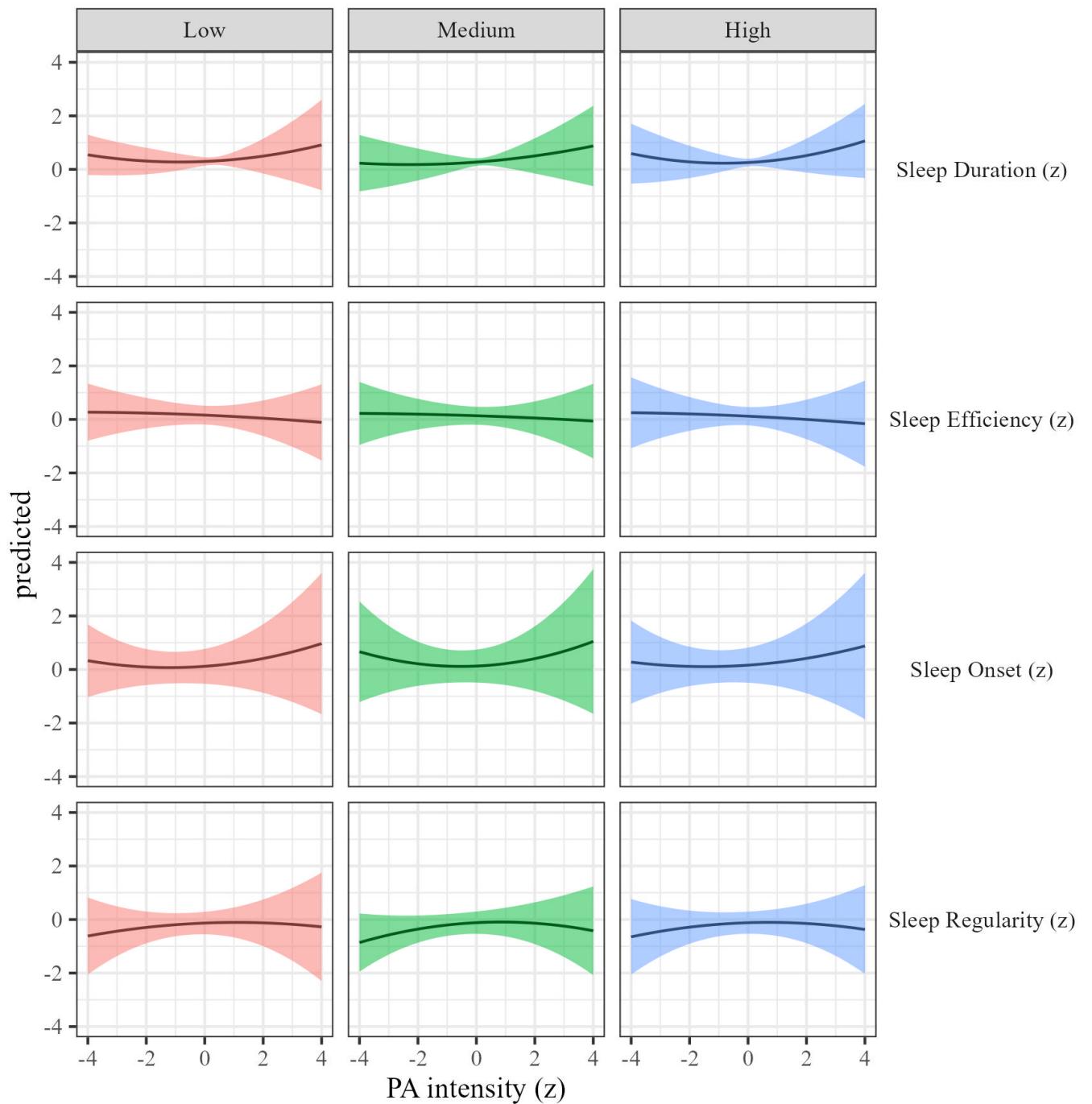


Figure 14. Sleep metrics on Physical activity intensity moderated by SES

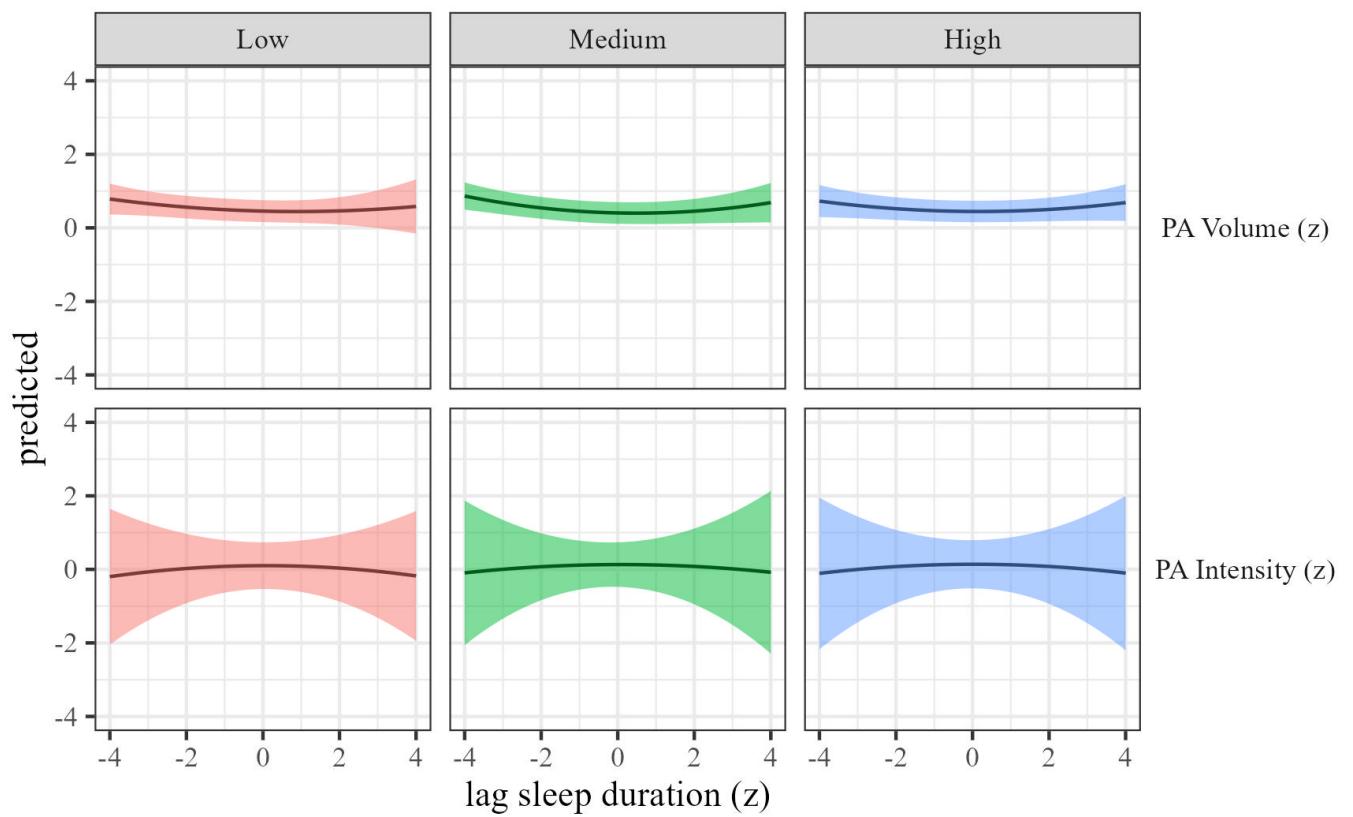


Figure 15. Physical activity by sleep duration moderated by SES

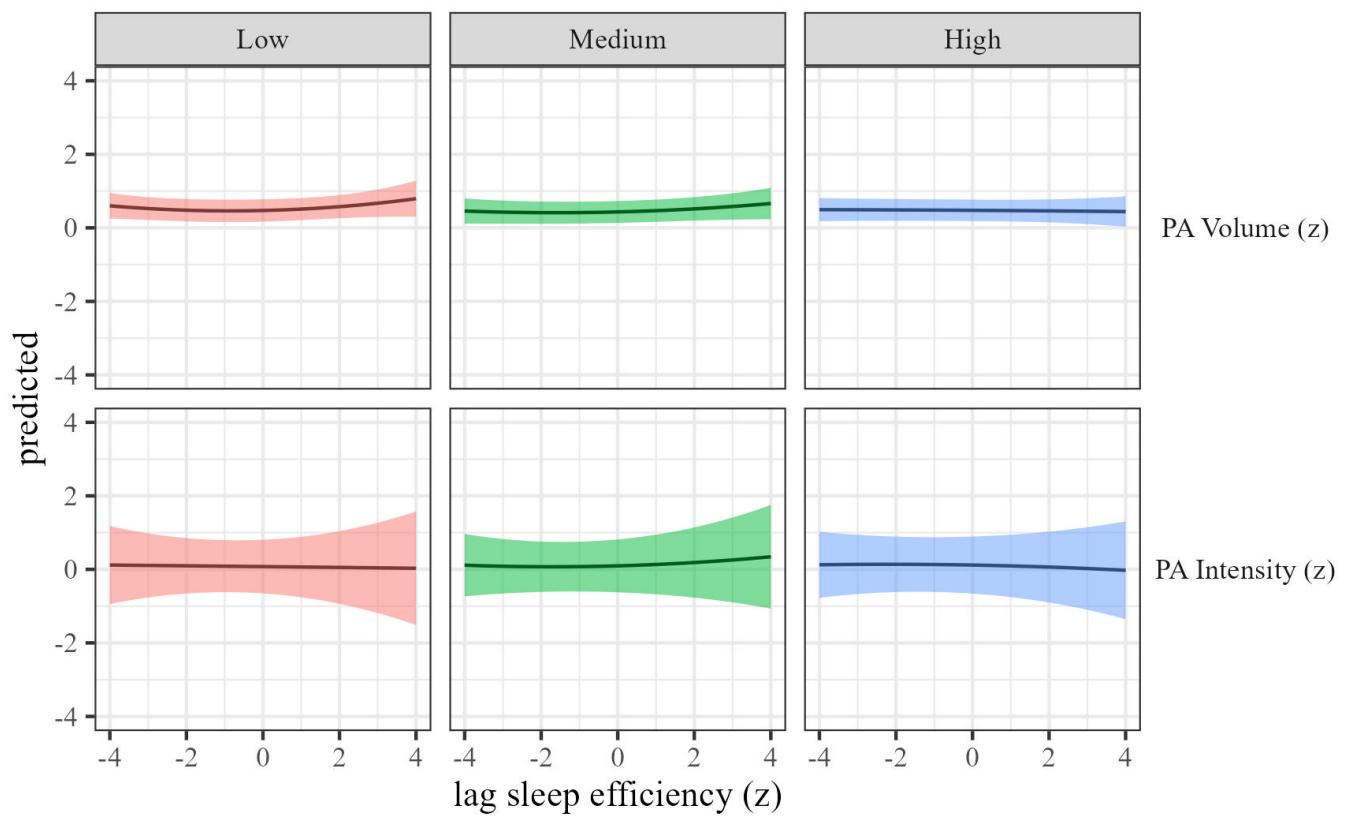


Figure 16. Physical activity by sleep efficiency moderated by SES

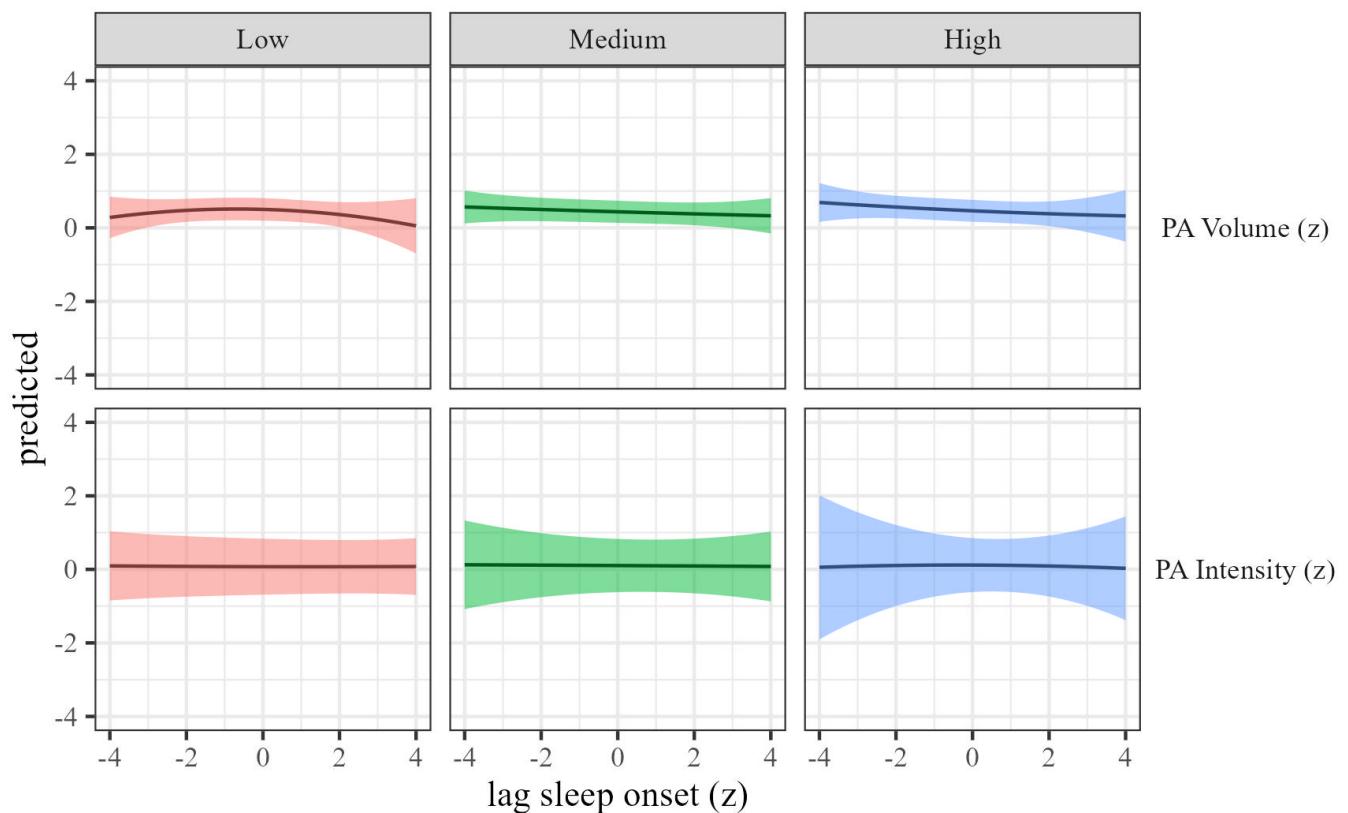


Figure 17. Physical activity by sleep onset moderated by SES

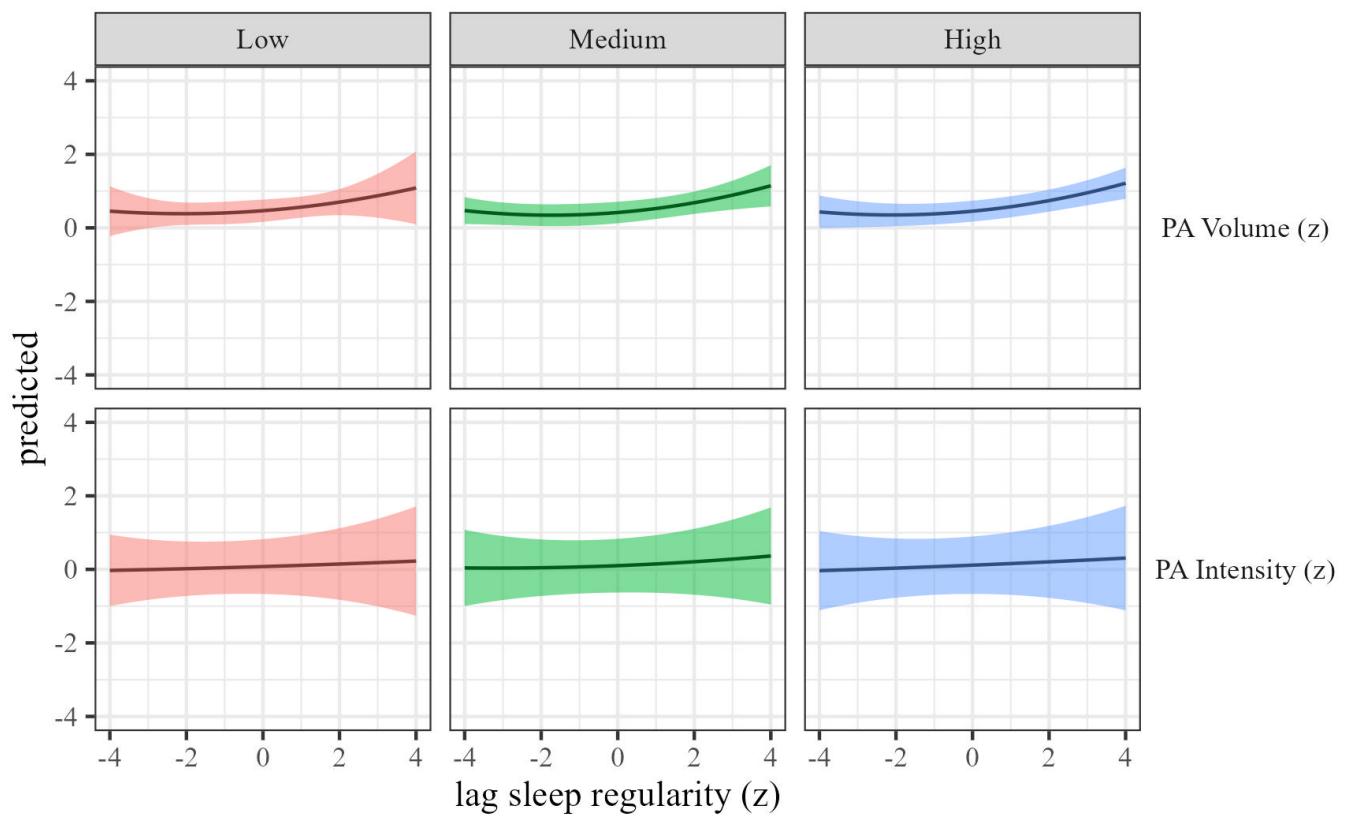


Figure 18. Physical activity by sleep regularity moderated by SES

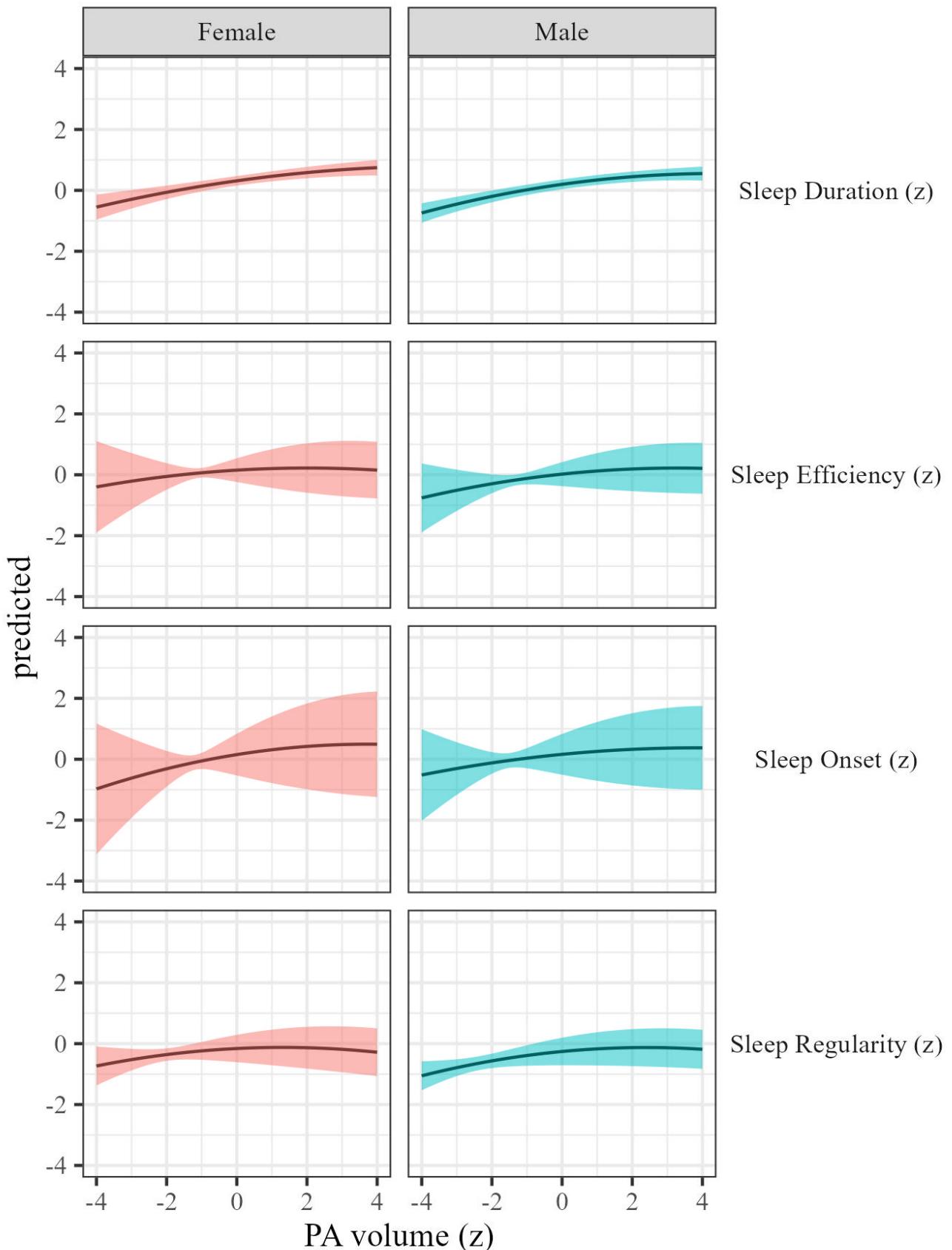


Figure 19. Sleep metrics on Physical activity volume by sex

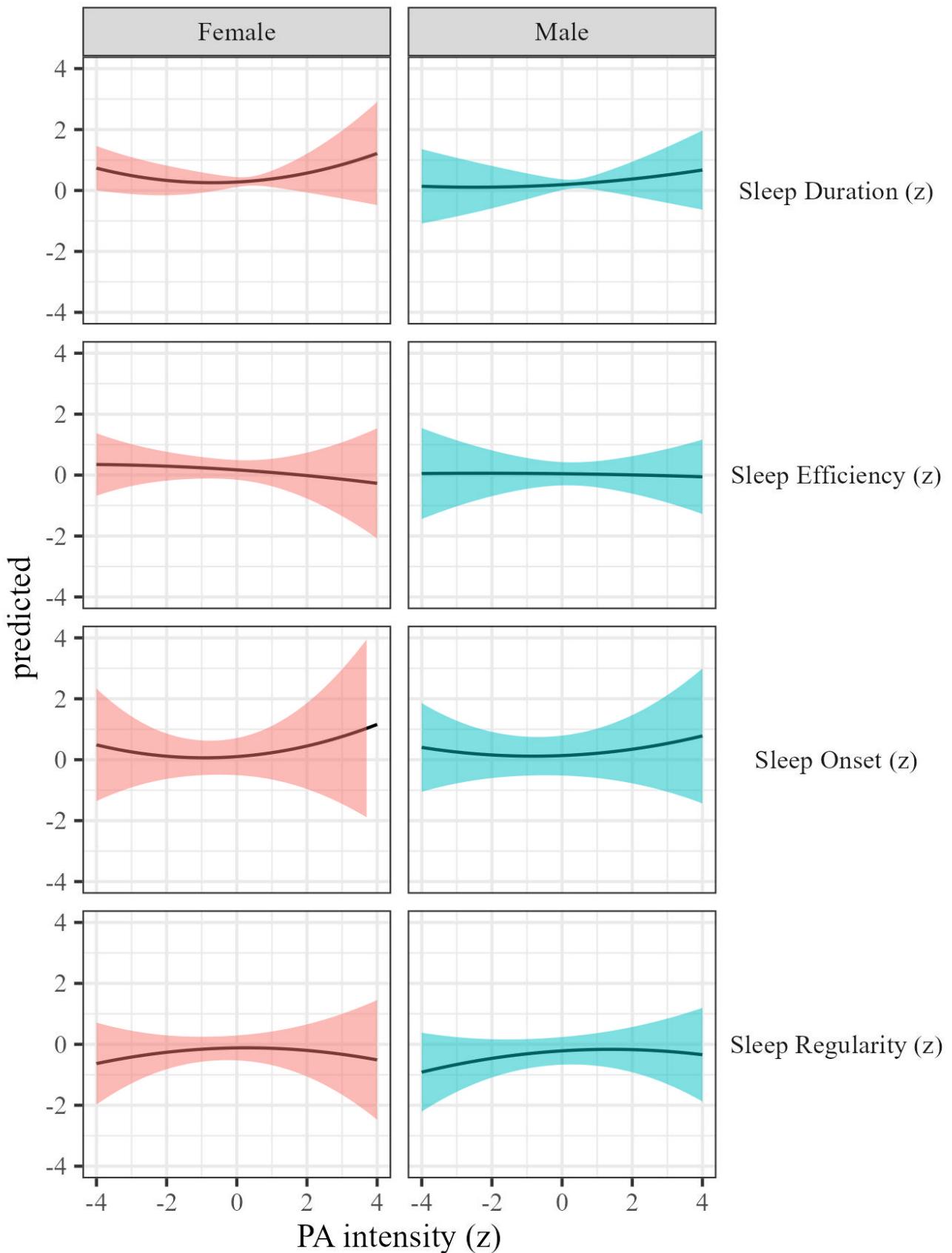


Figure 20. Sleep metrics on Physical activity intensity moderated by sex

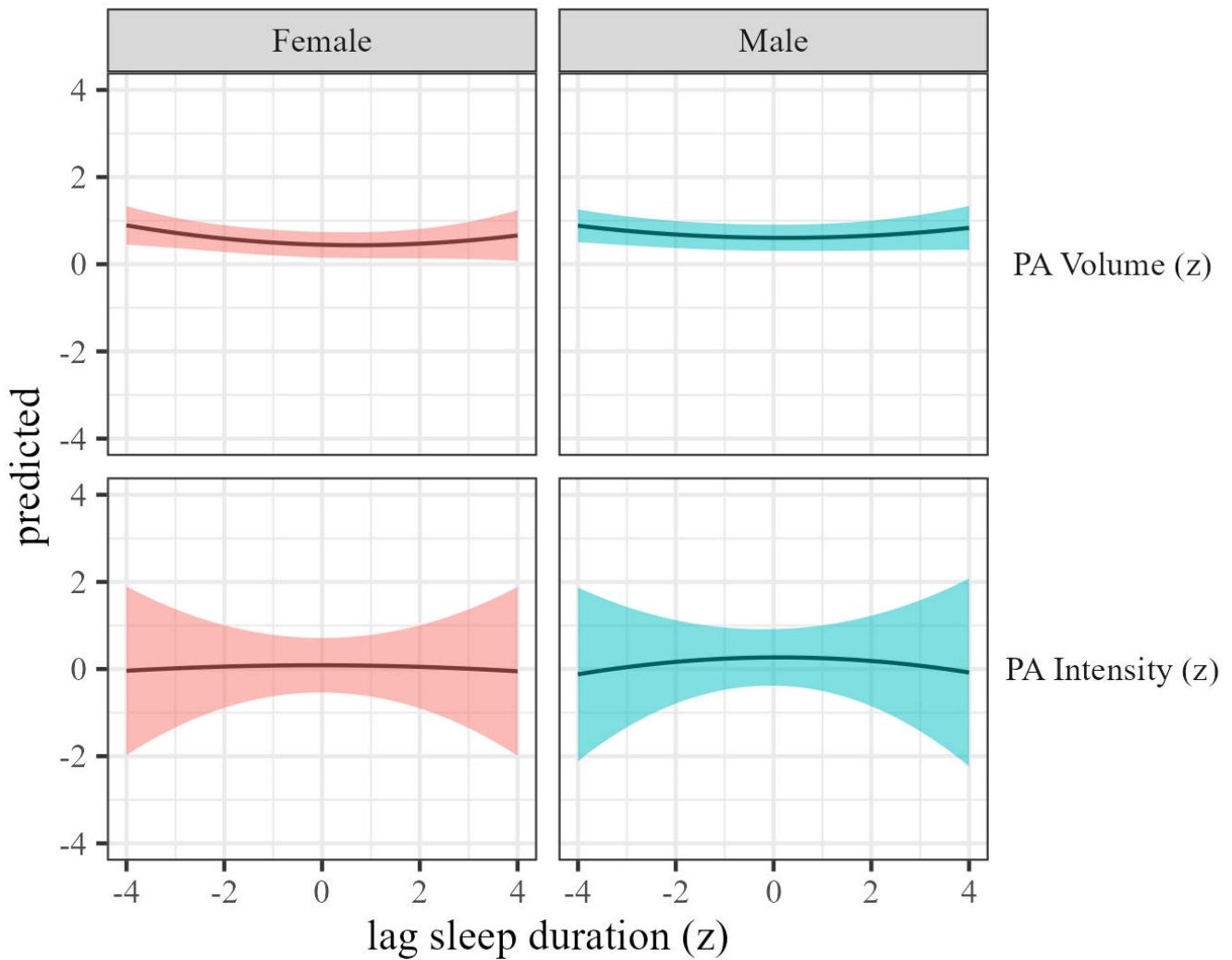


Figure 21. Physical activity by sleep duration moderated by sex

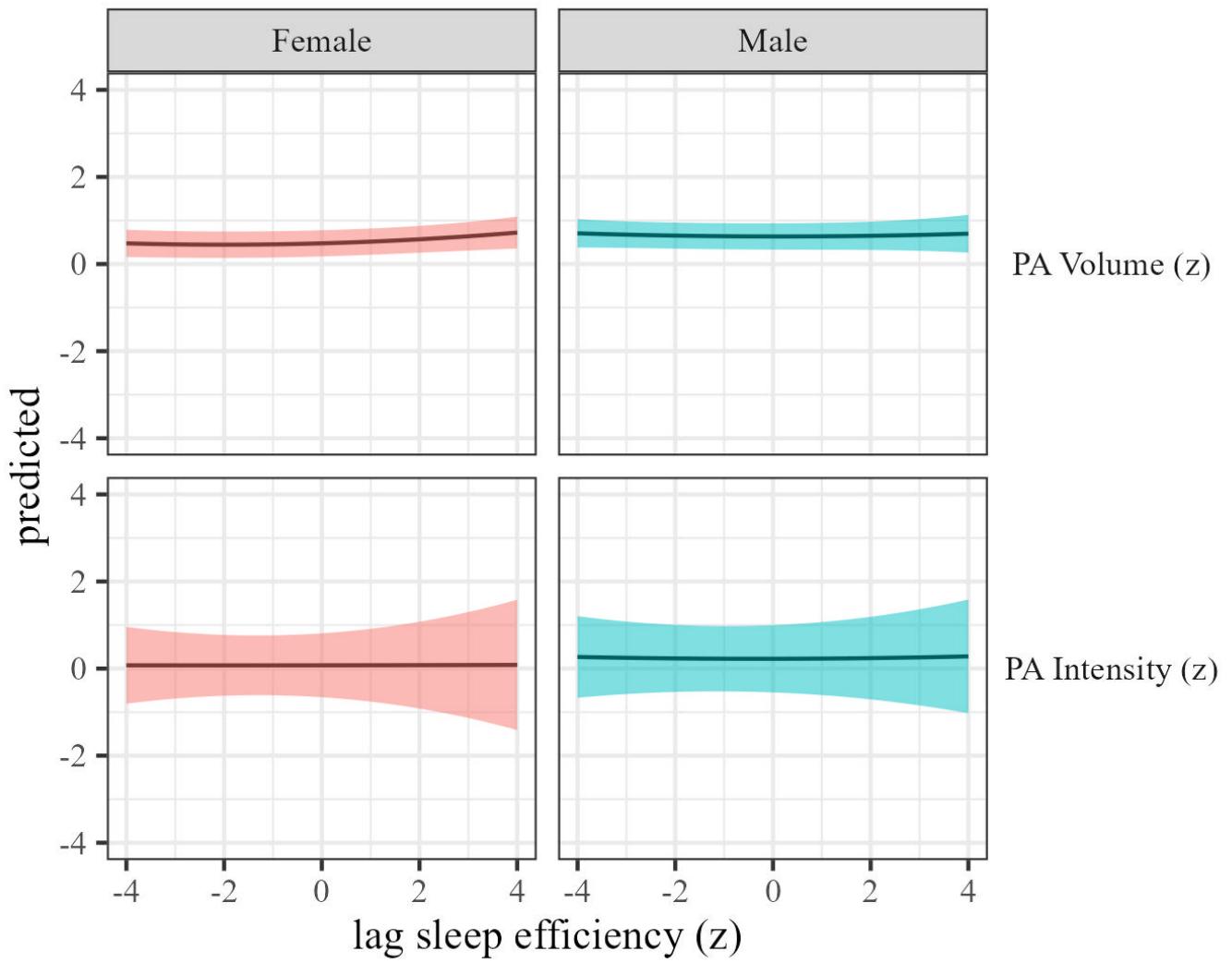


Figure 22. Physical activity by sleep efficiency moderated by sex

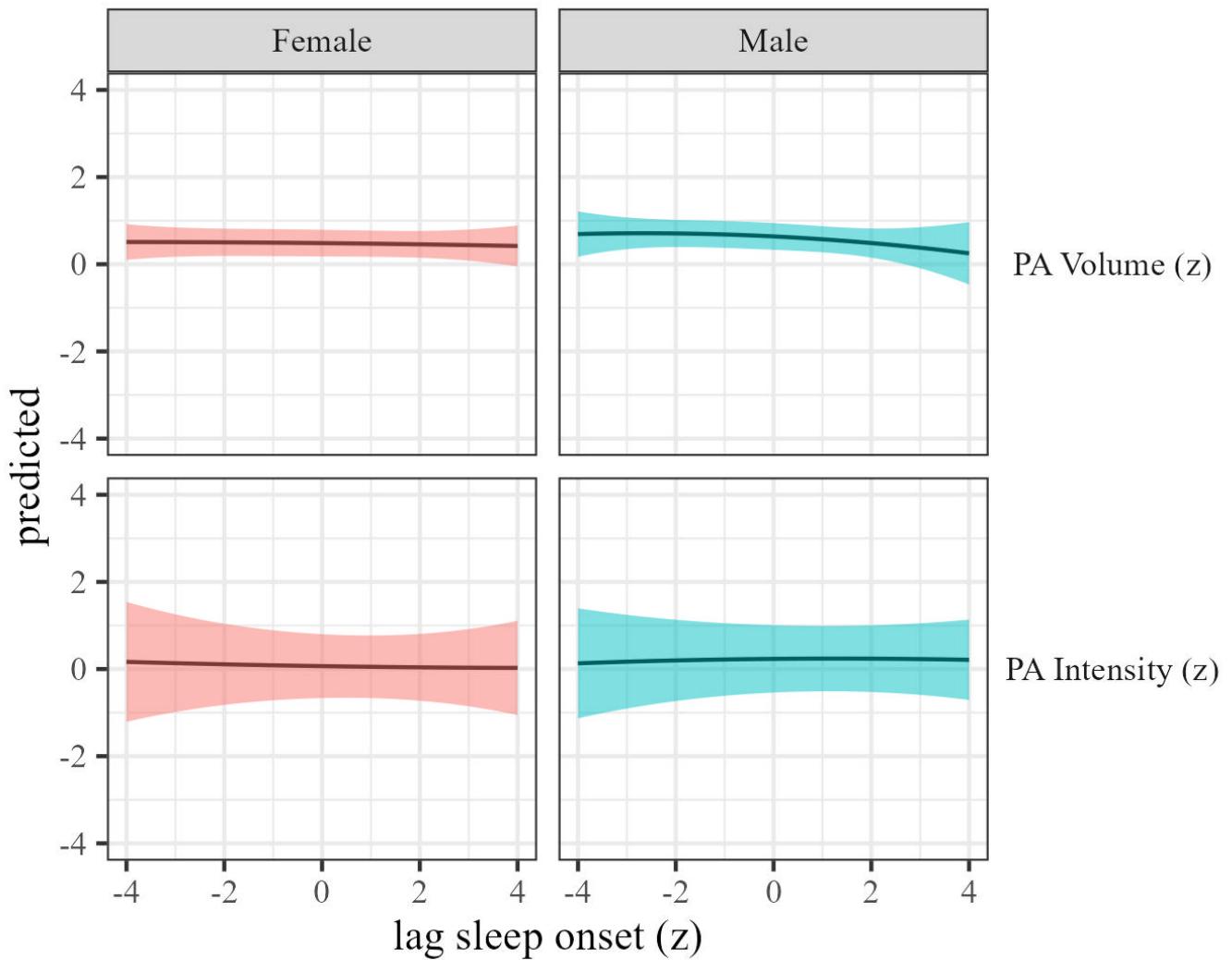


Figure 23. Physical activity by sleep onset moderated by sex

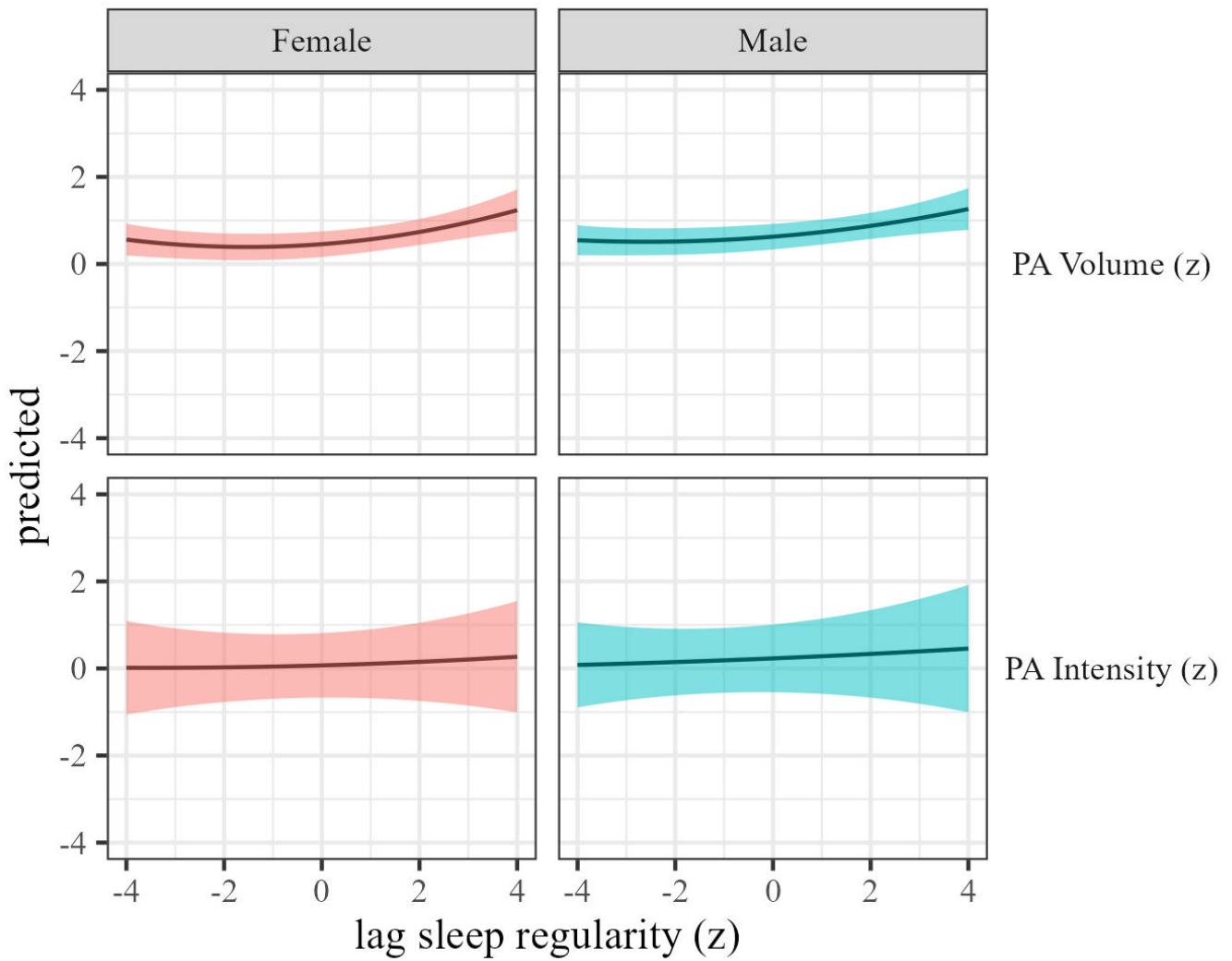


Figure 24. Physical activity by sleep regularity moderated by sex

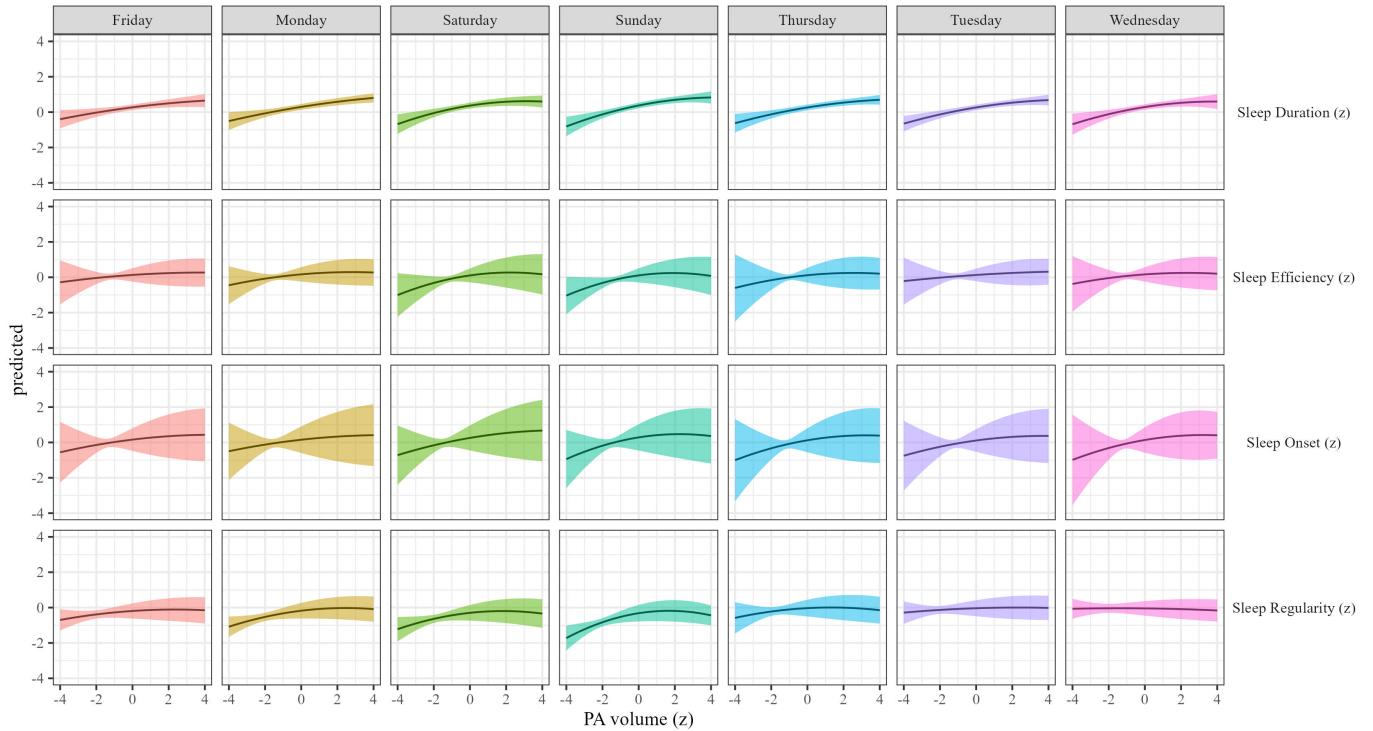


Figure 25. Sleep metrics on Physical activity volume by weekday

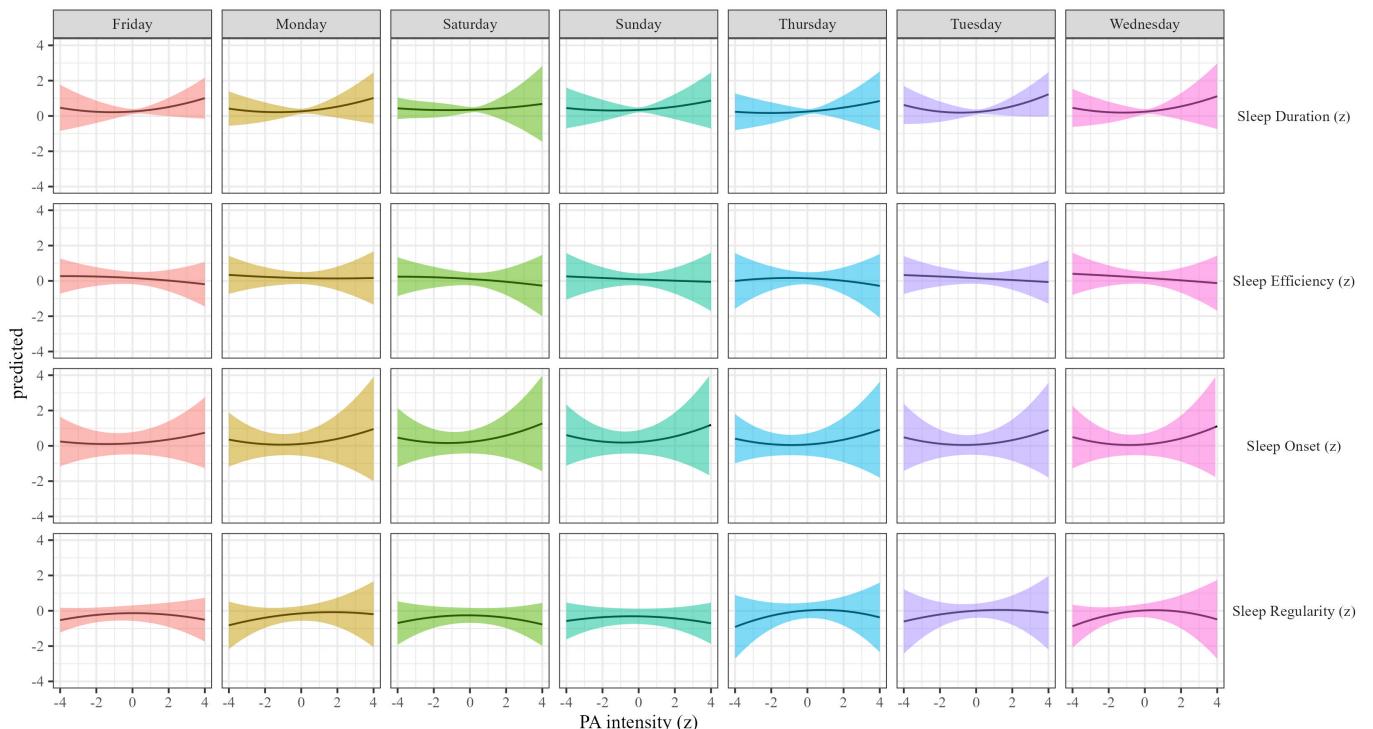


Figure 26. Sleep metrics on Physical activity intensity moderated by weekday

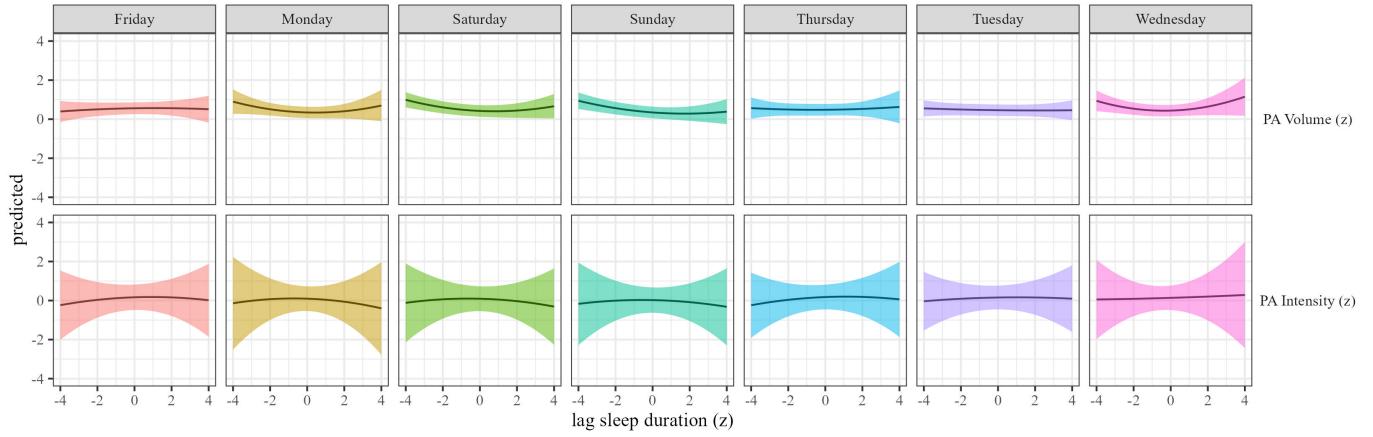


Figure 27. Physical activity by sleep duration moderated by weekday

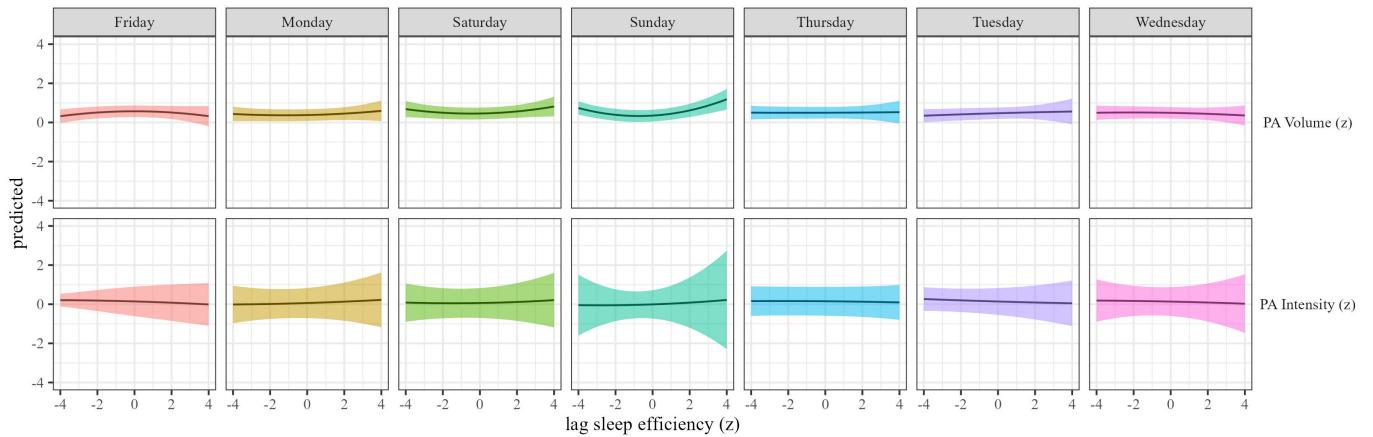


Figure 28. Physical activity by sleep efficiency moderated by weekday

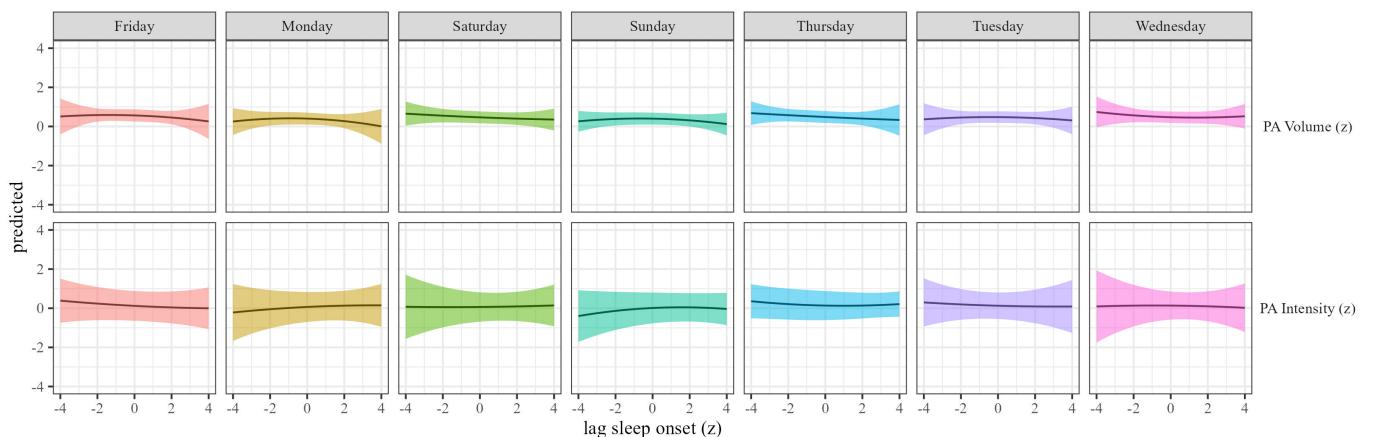


Figure 29. Physical activity by sleep onset moderated by weekday

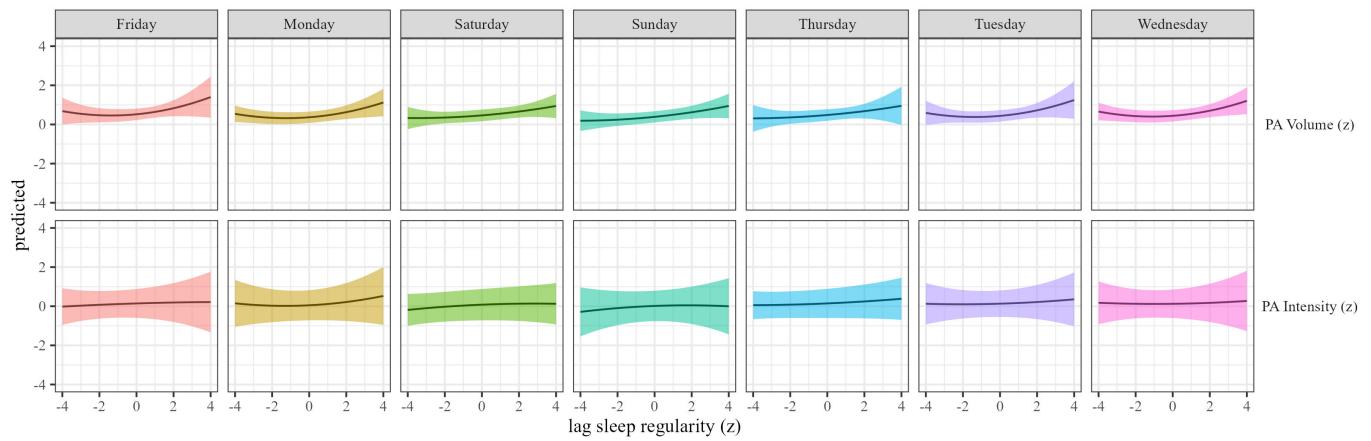


Figure 30. Physical activity by sleep regularity moderated by weekday

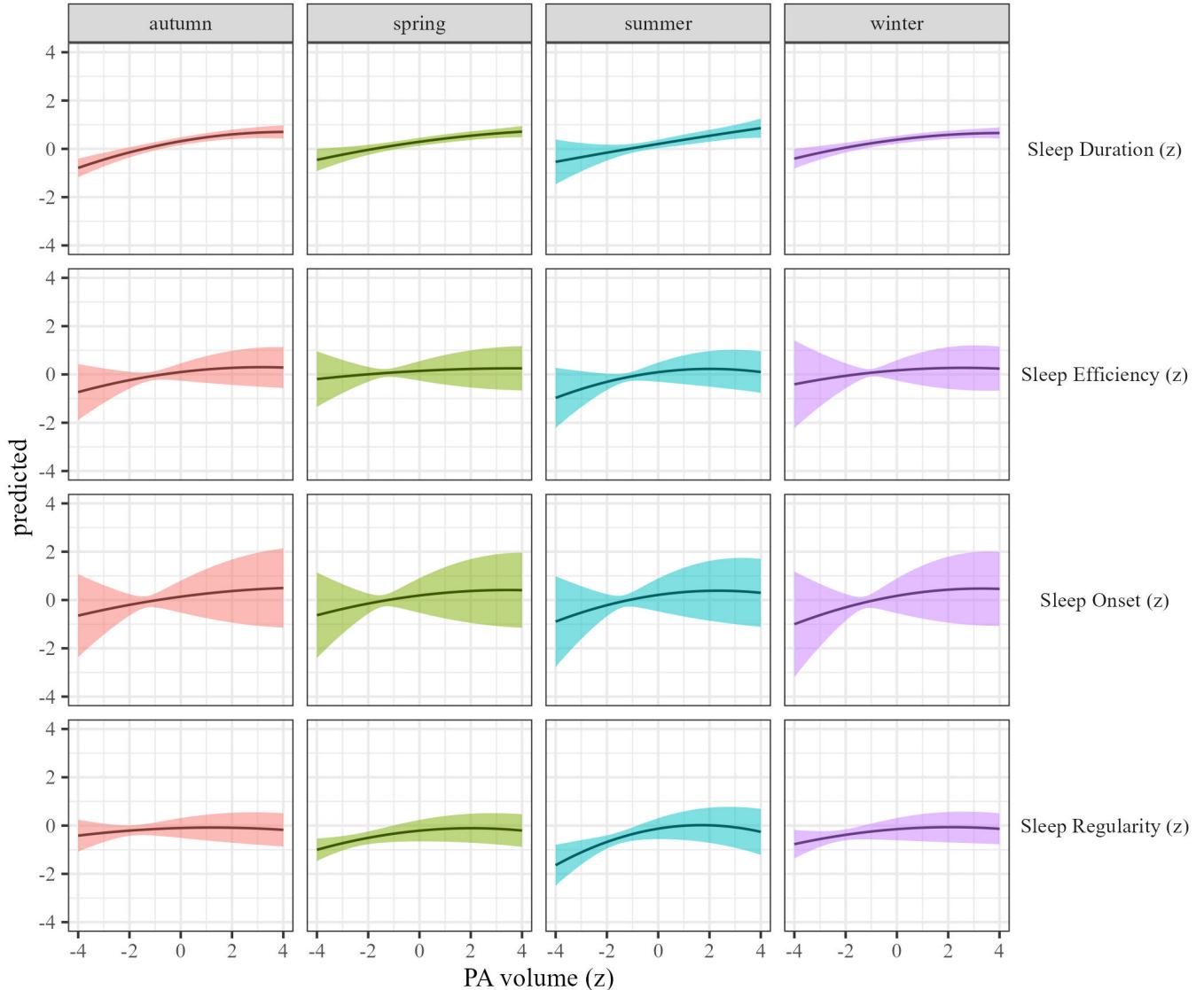


Figure 31. Sleep metrics on Physical activity volume by season

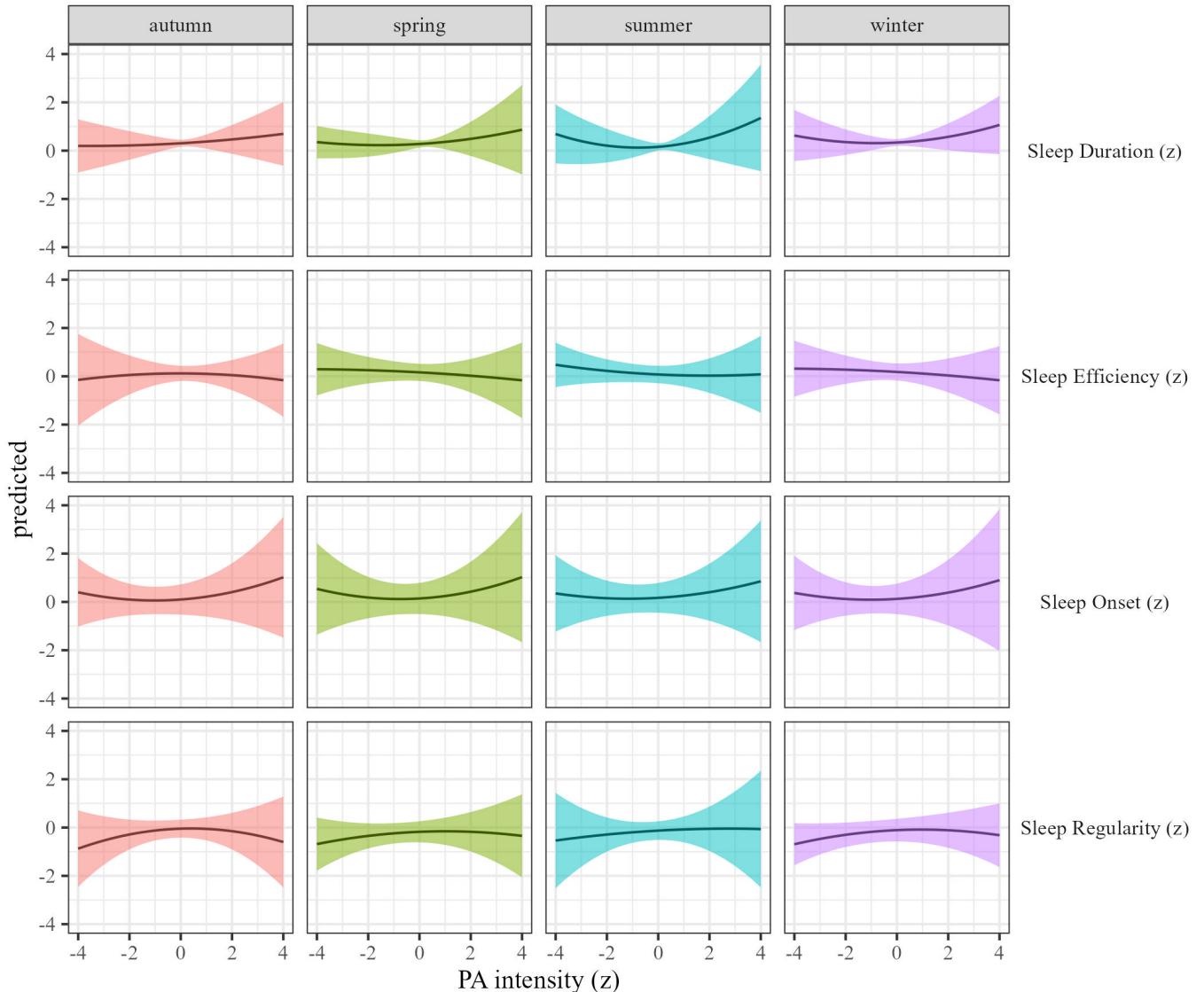
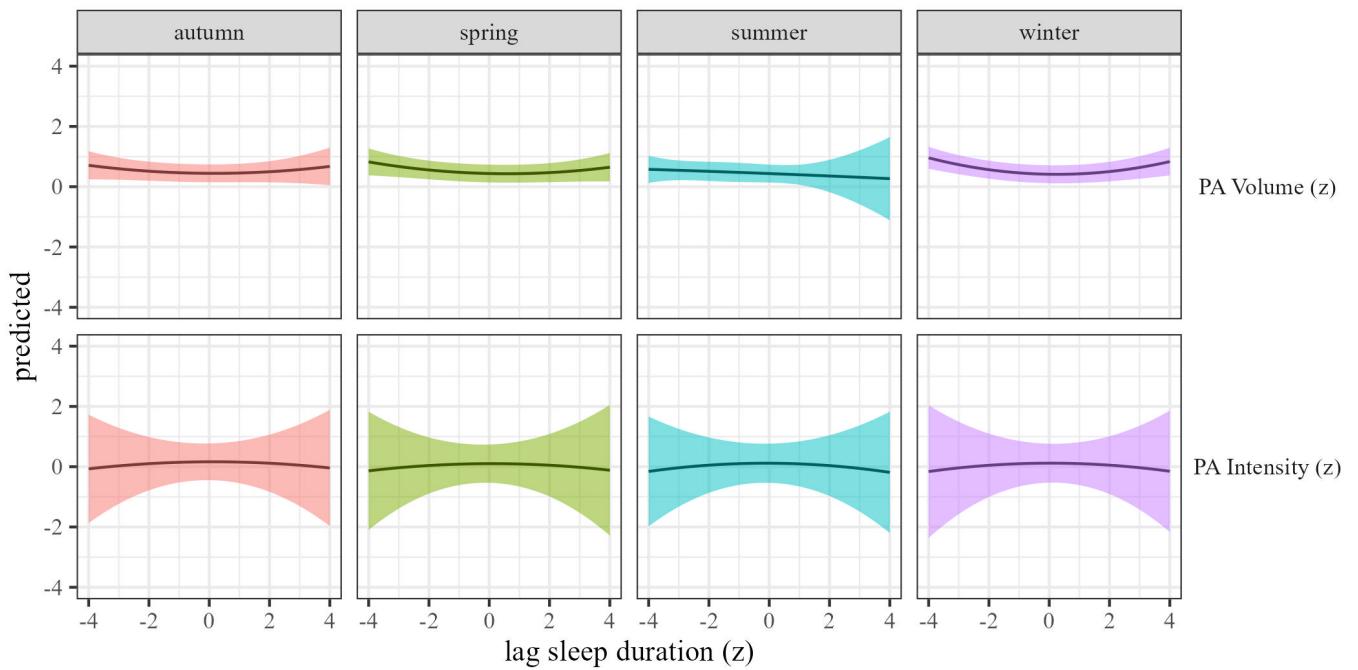
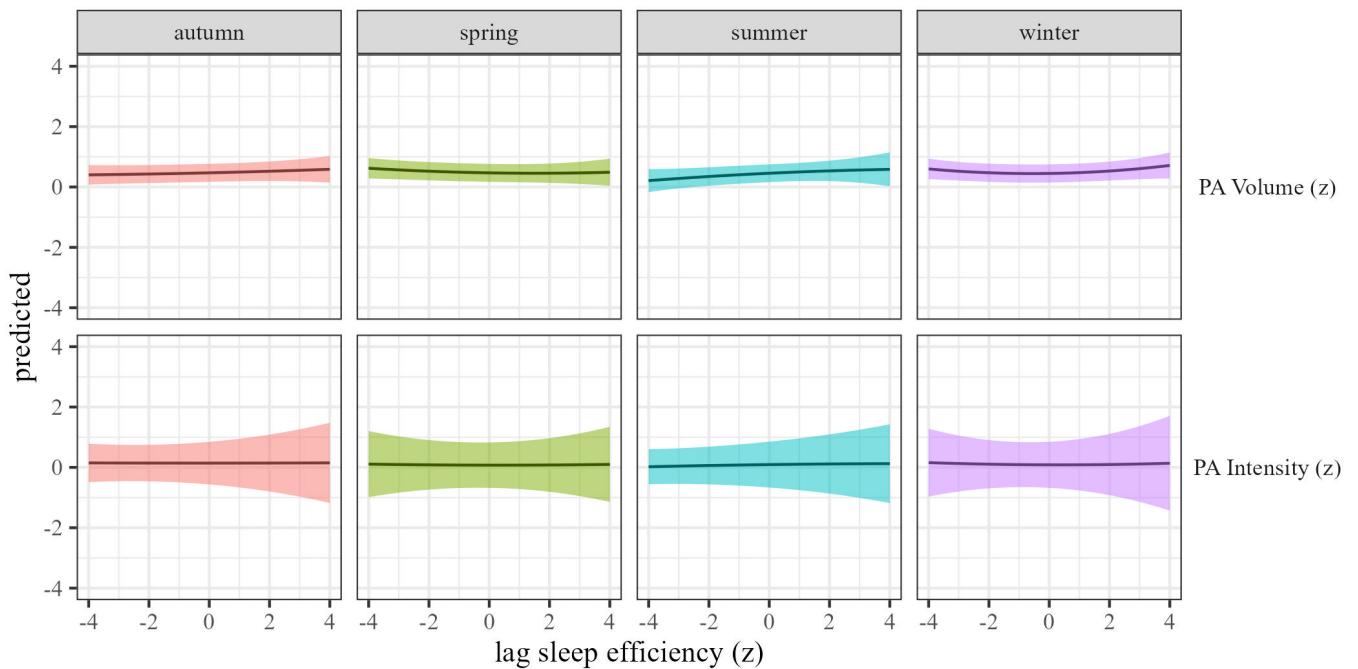


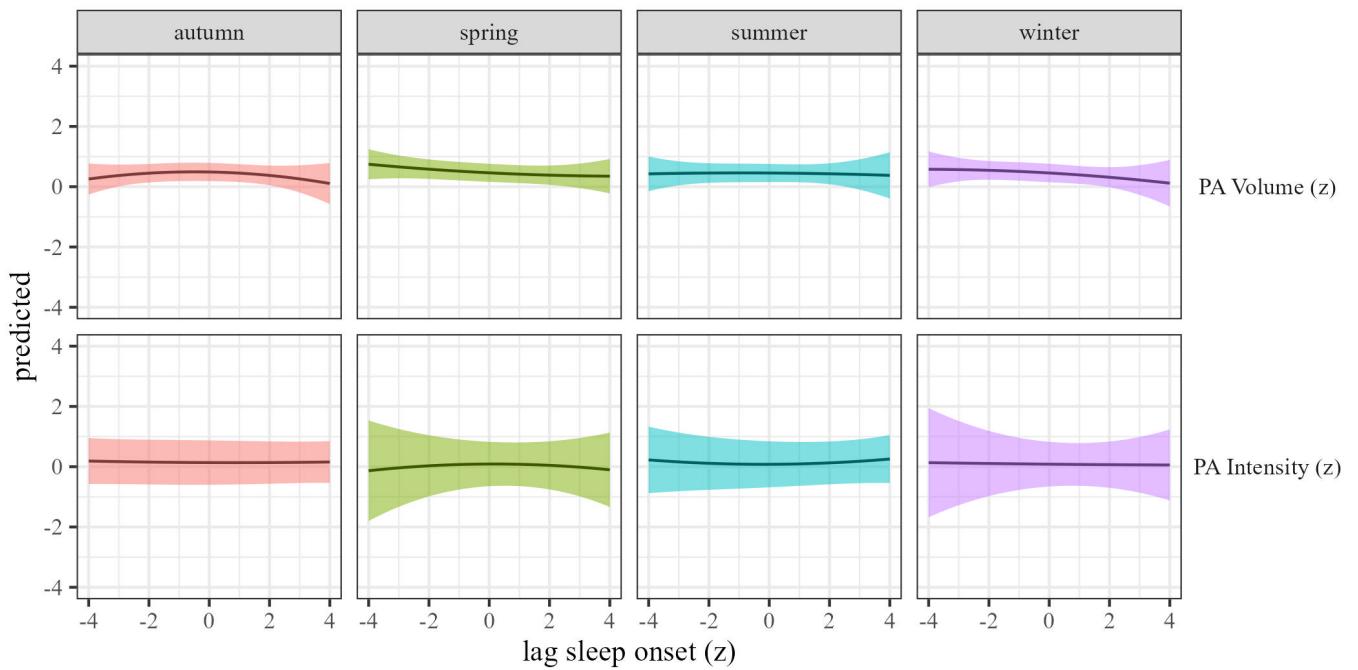
Figure 32. Sleep metrics on Physical activity intensity moderated by season



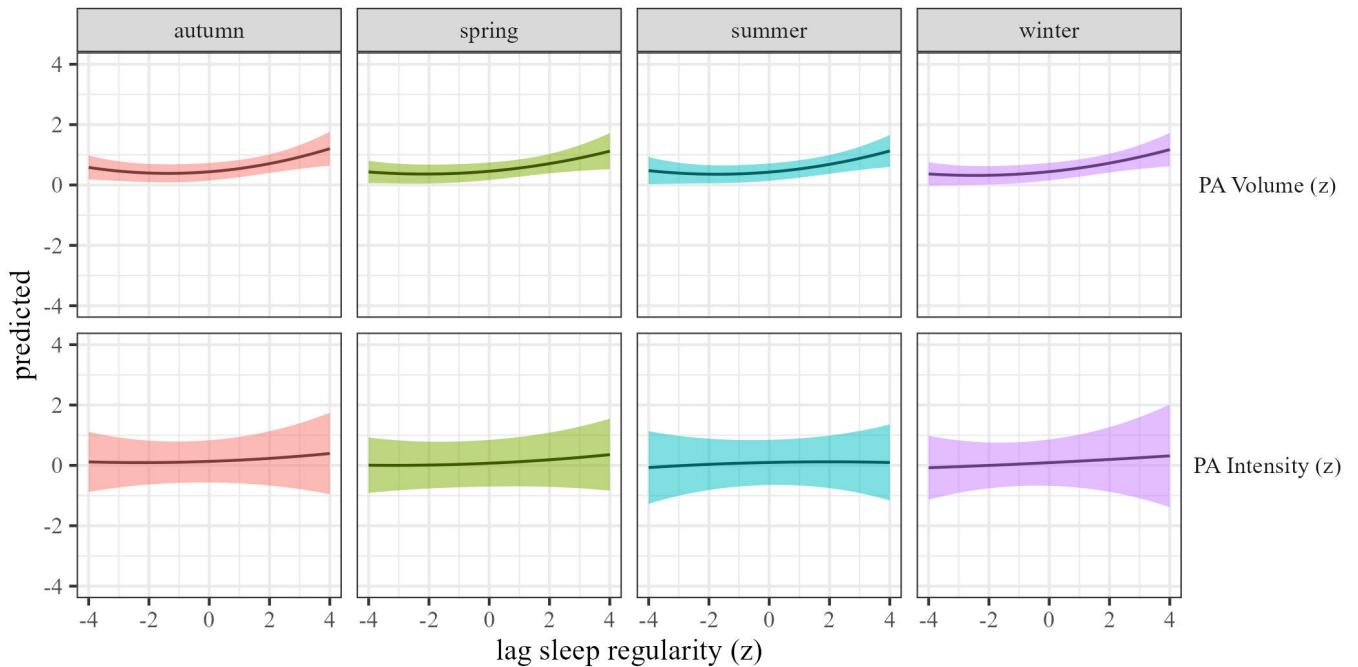
*Figure 33.* Physical activity by sleep duration moderated by season



*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

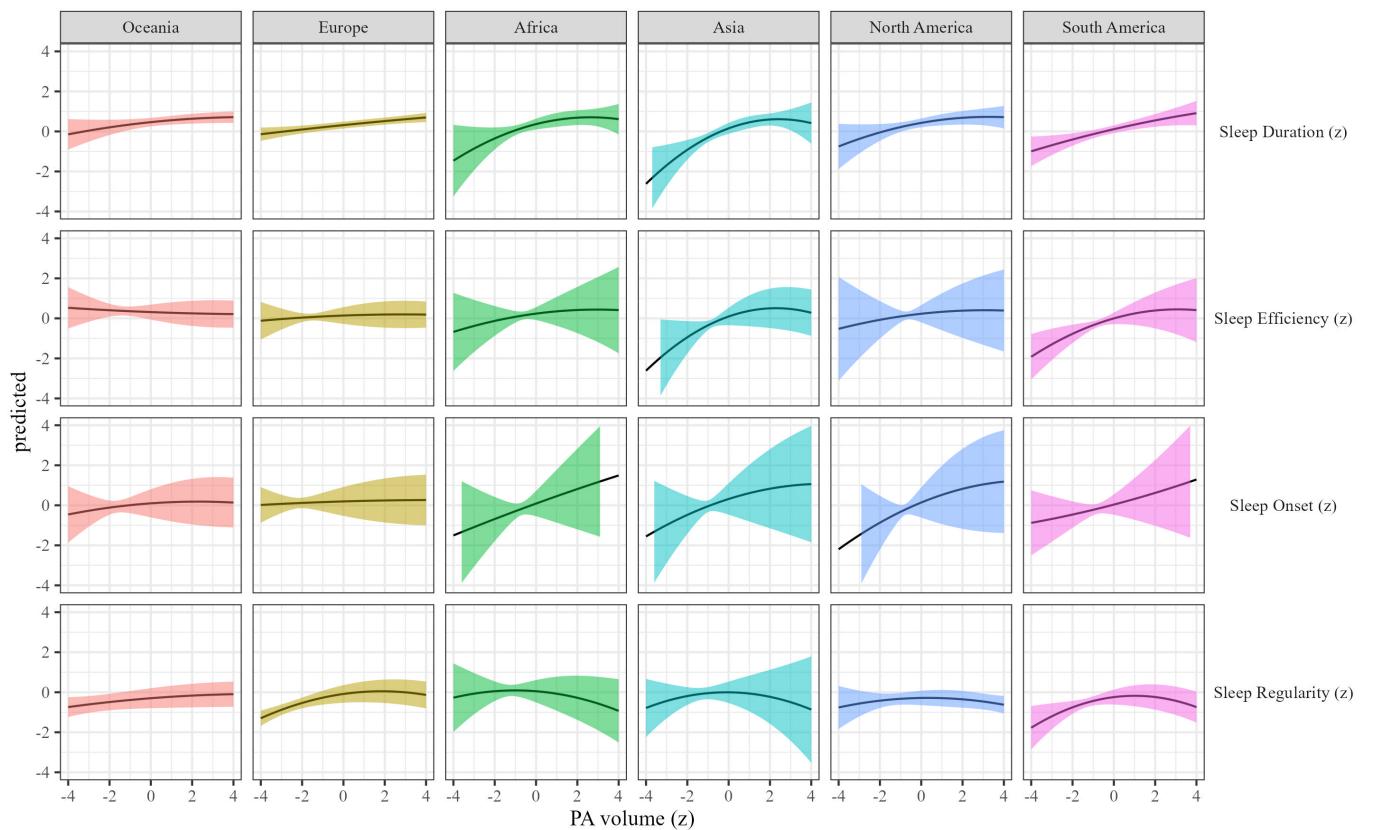


Figure 37. Sleep metrics on Physical activity volume by region

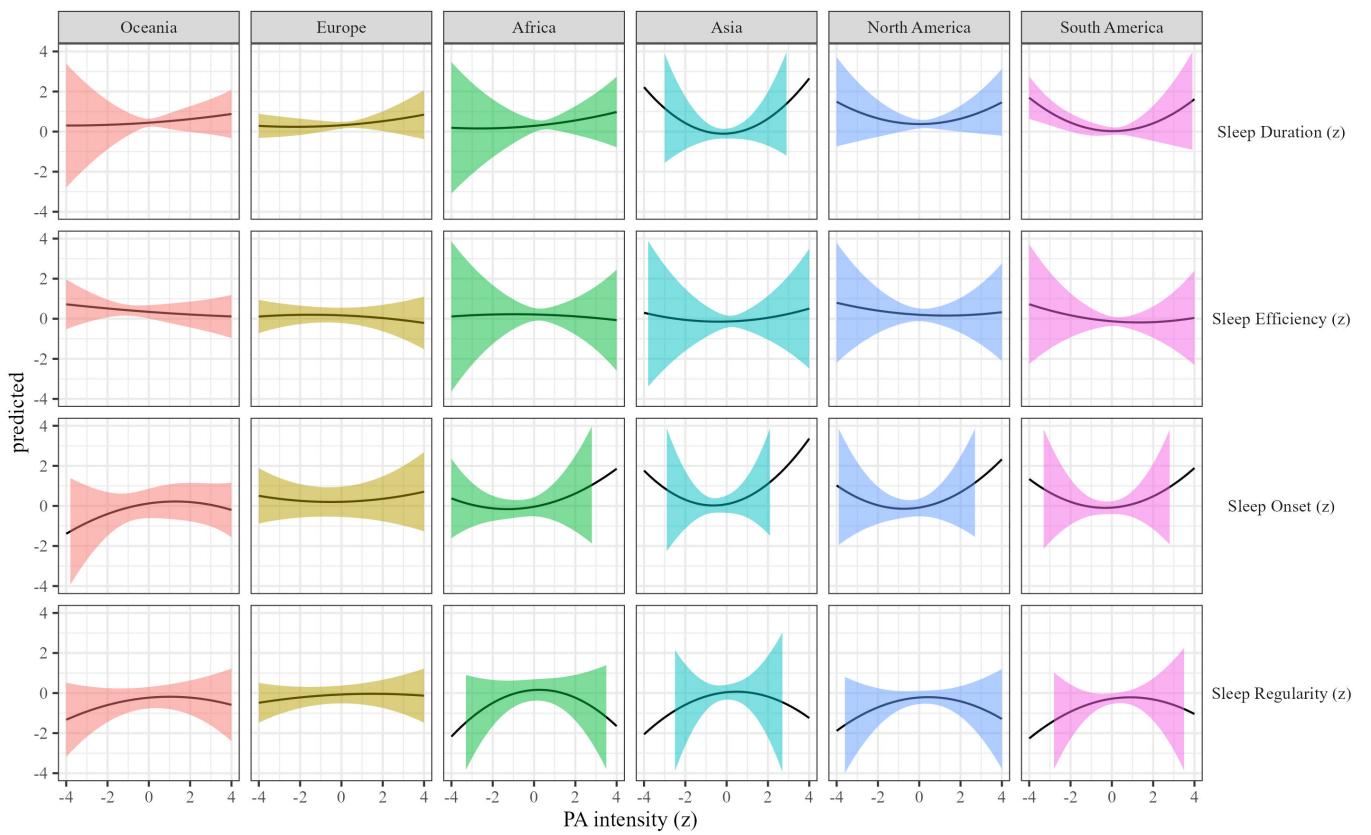


Figure 38. Sleep metrics on Physical activity intensity moderated by region

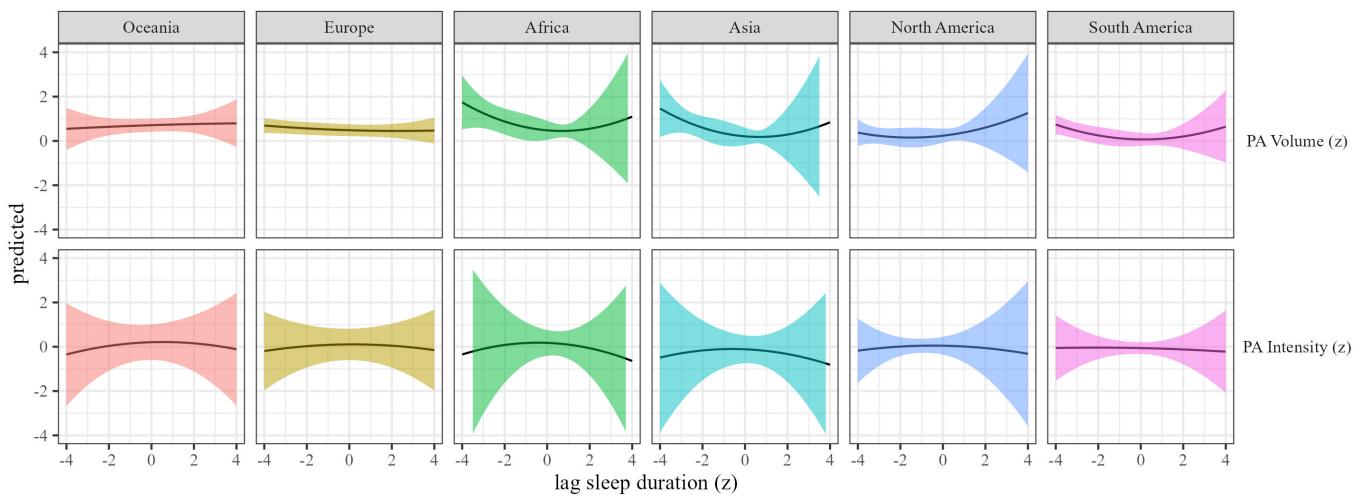


Figure 39. Physical activity by sleep duration moderated by region

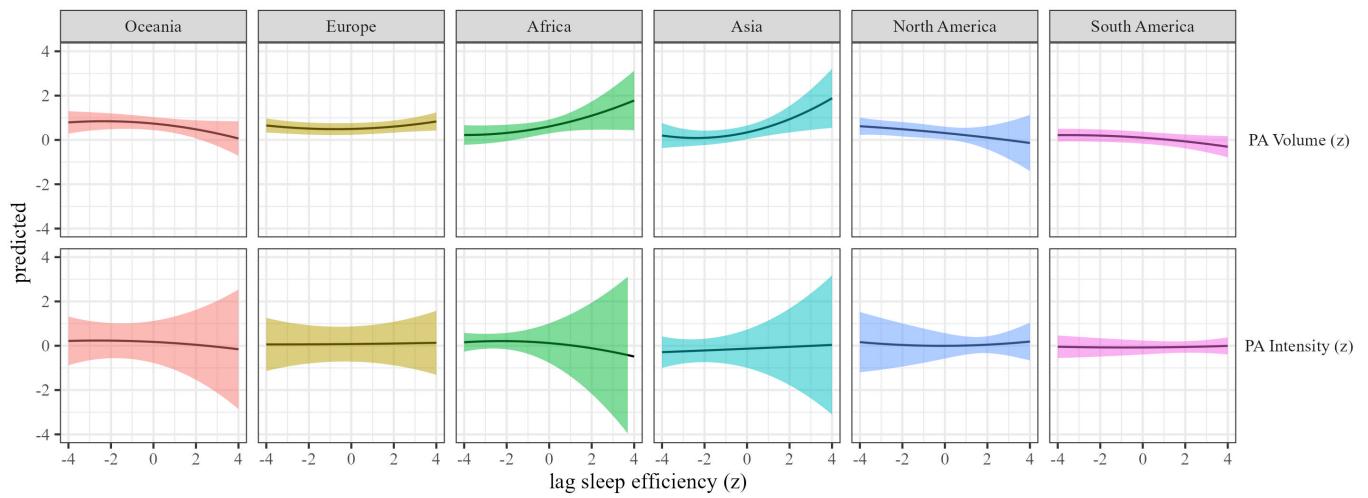


Figure 40. Physical activity by sleep efficiency moderated by region

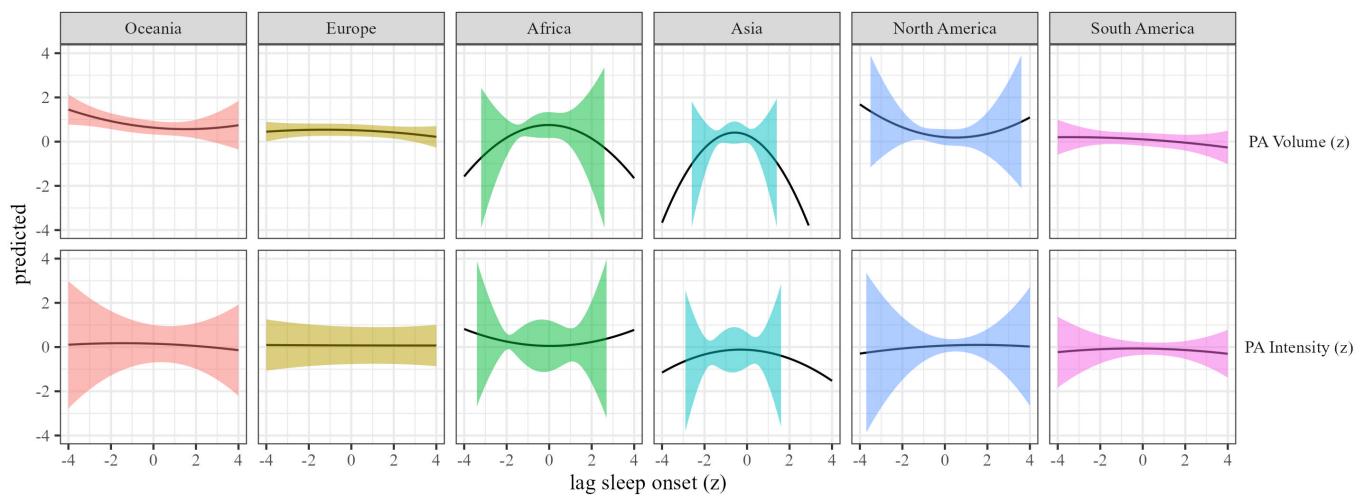


Figure 41. Physical activity by sleep onset moderated by region

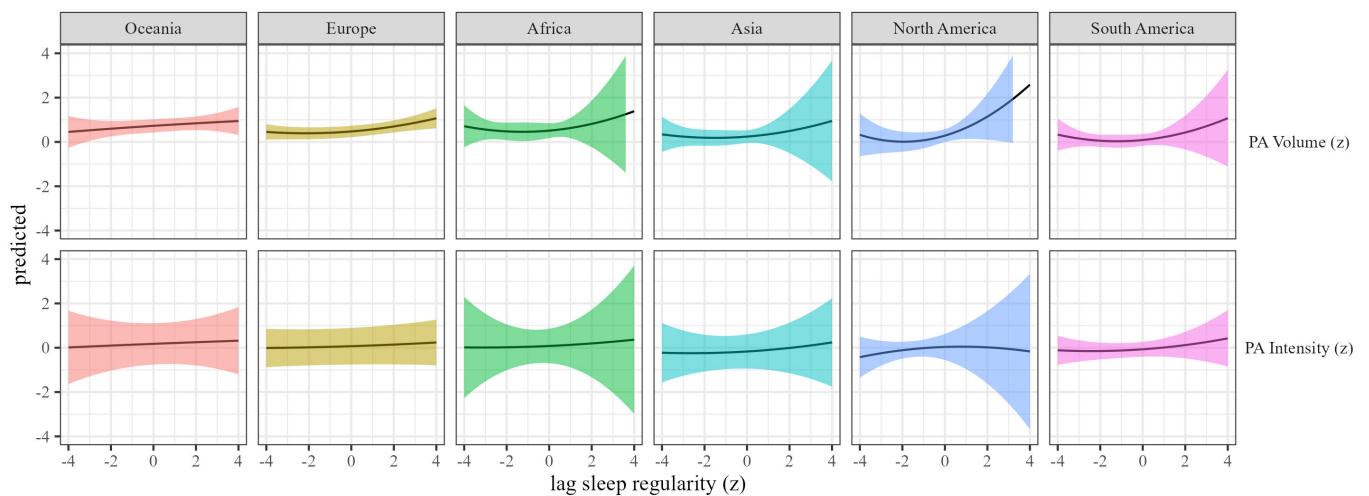


Figure 42. Physical activity by sleep regularity moderated by region

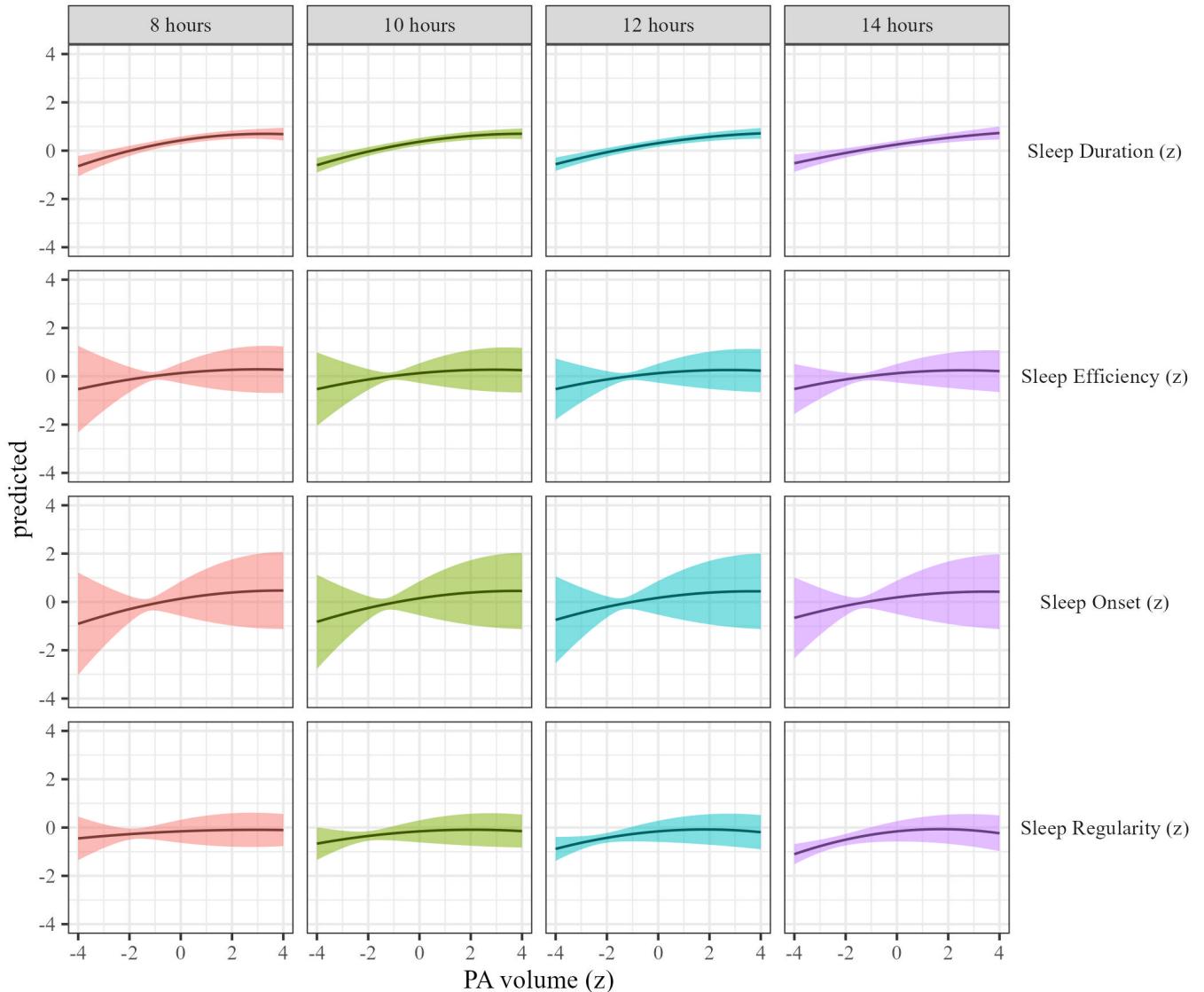


Figure 43. Sleep metrics on Physical activity volume by daylight hours

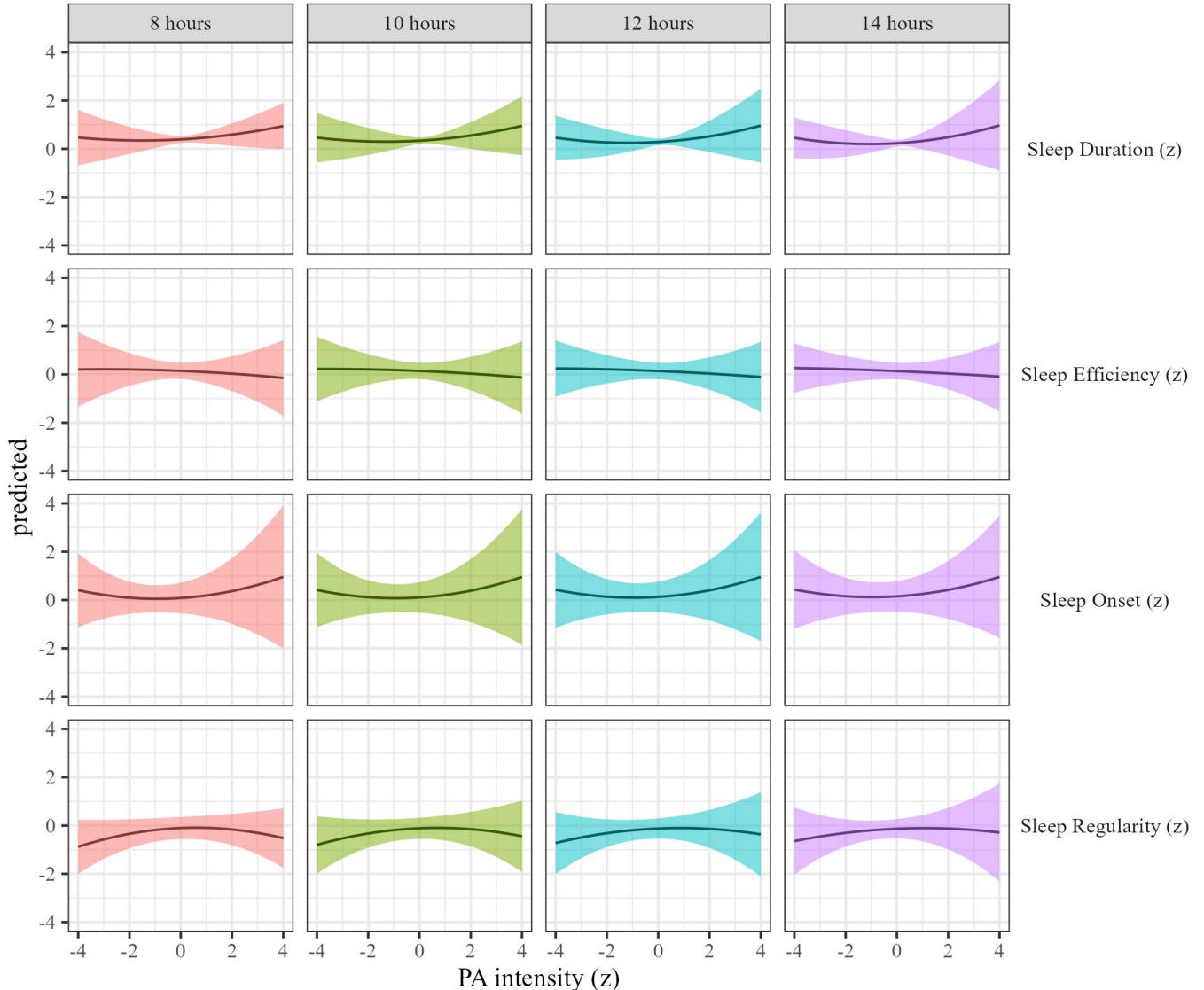


Figure 44. Sleep metrics on Physical activity intensity moderated by daylight hours

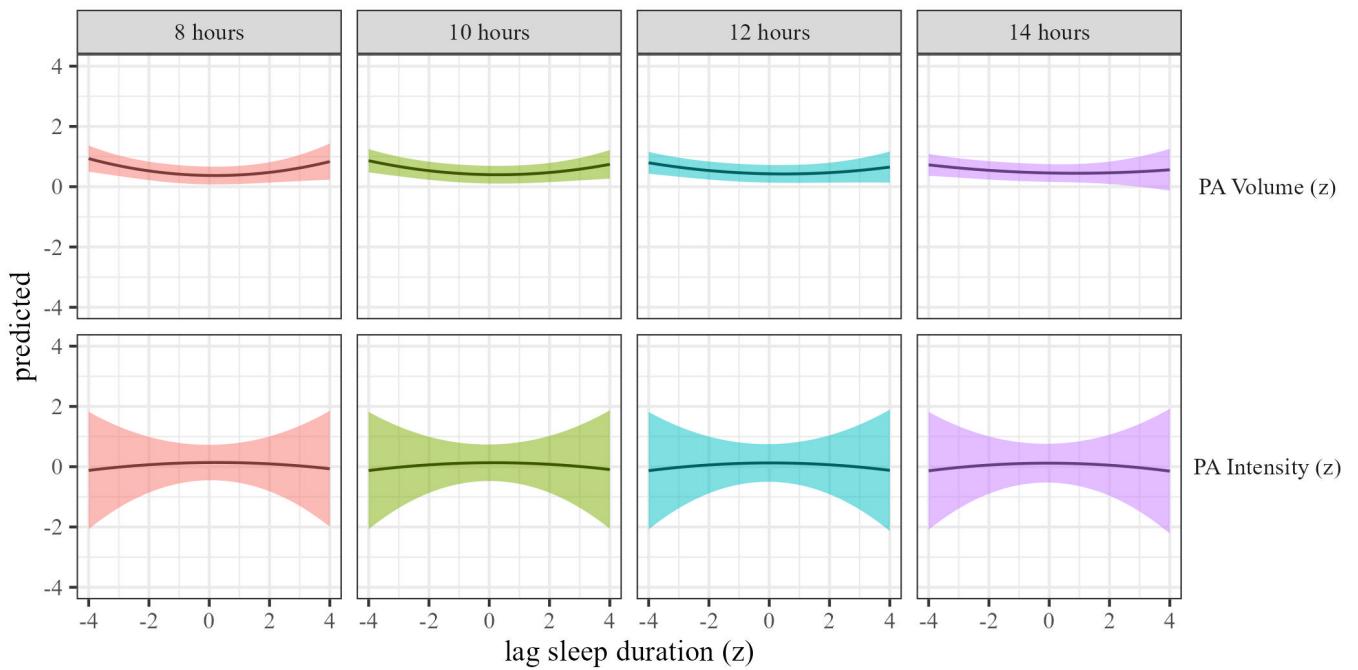


Figure 45. Physical activity by sleep duration moderated by daylight hours

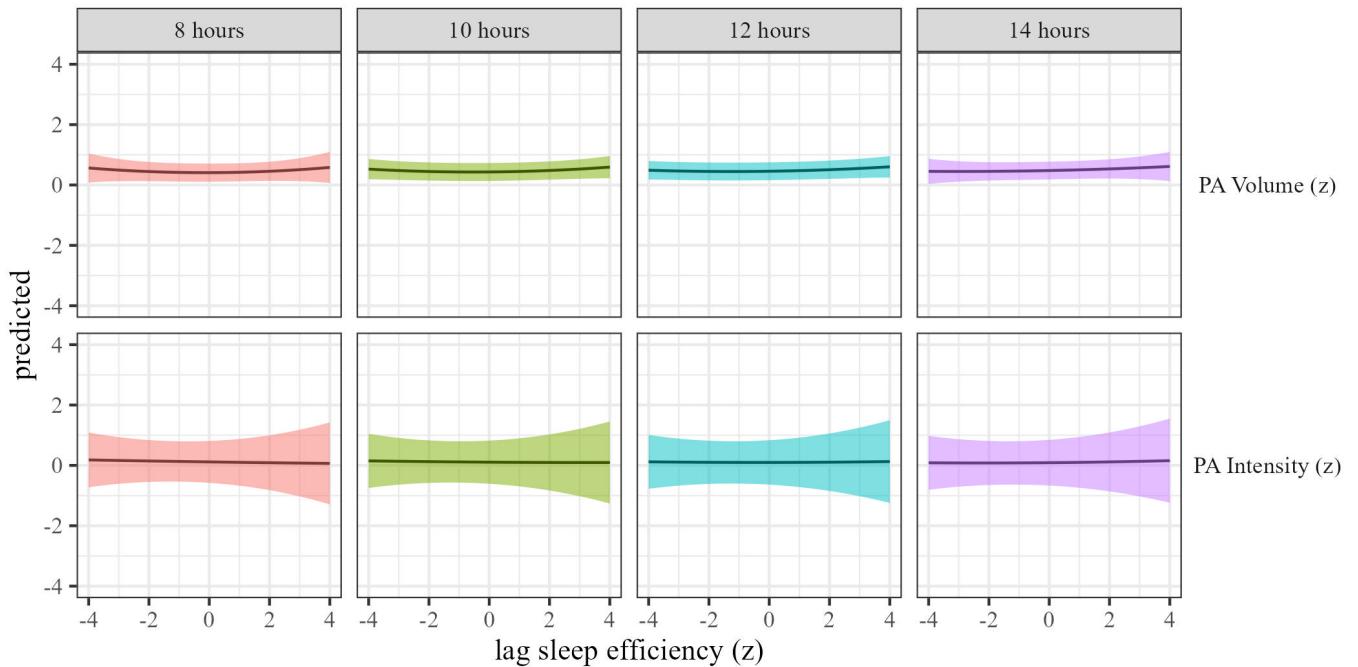
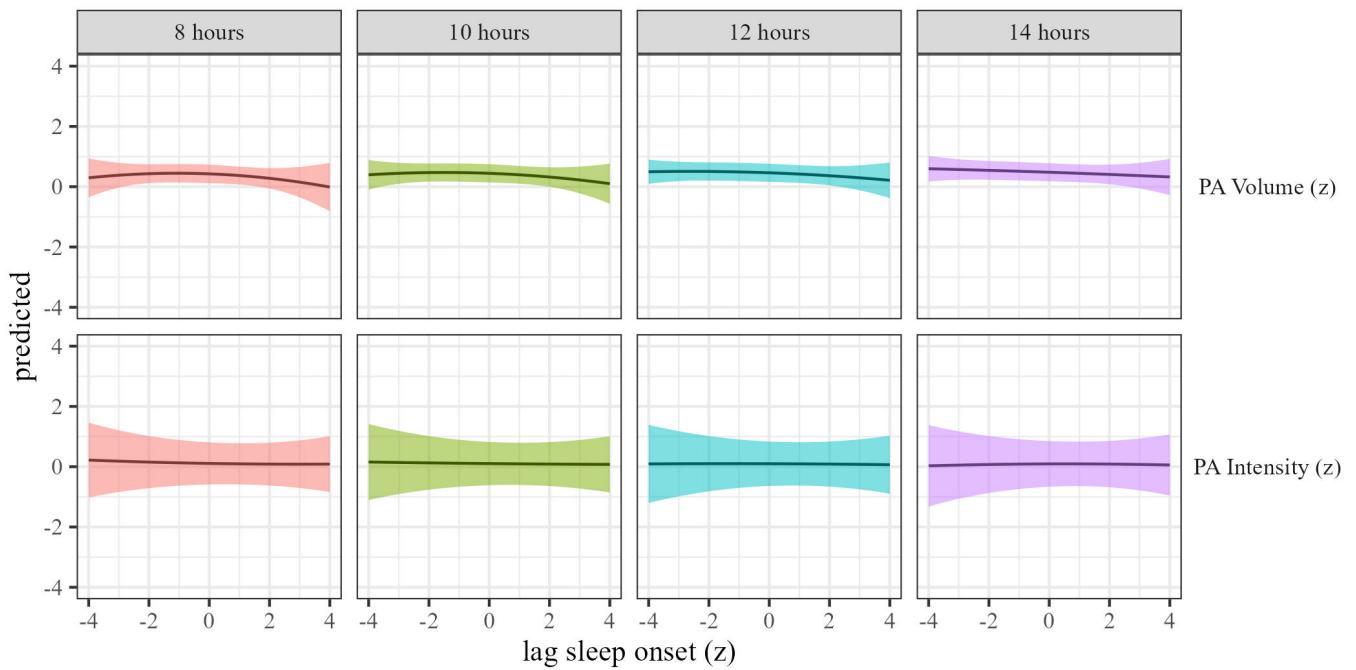
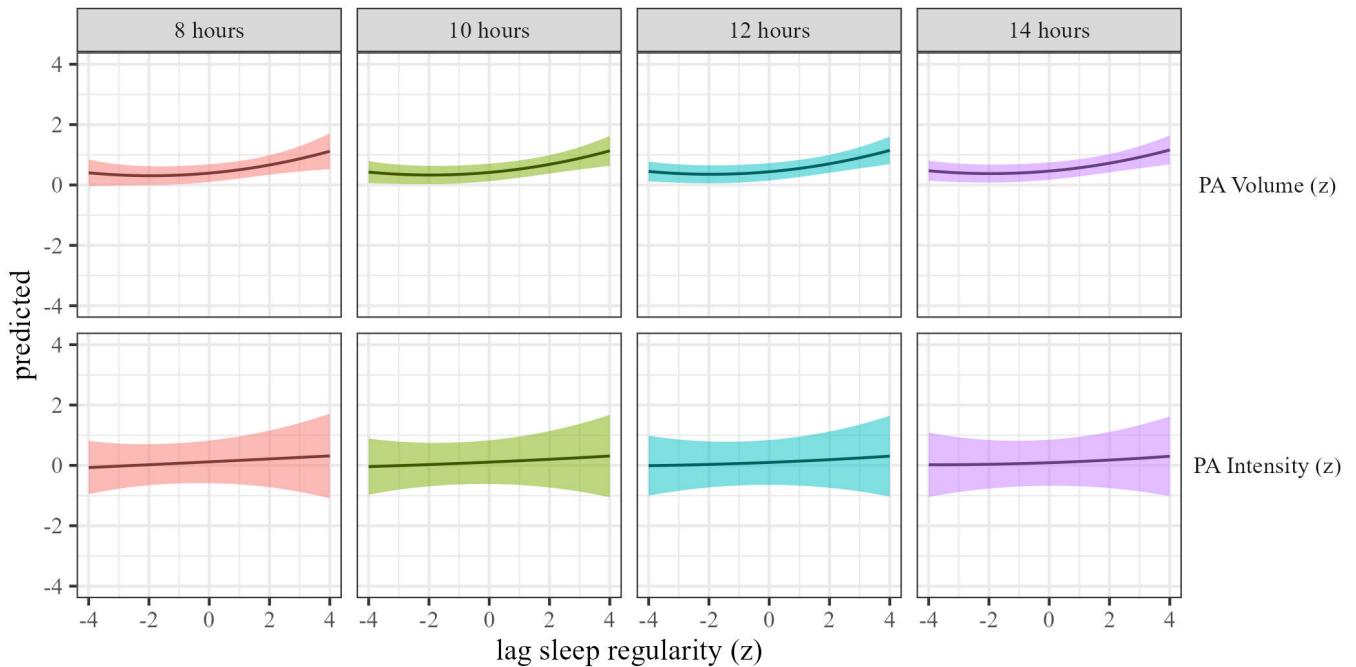


Figure 46. Physical activity by sleep efficiency moderated by daylight hours



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



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

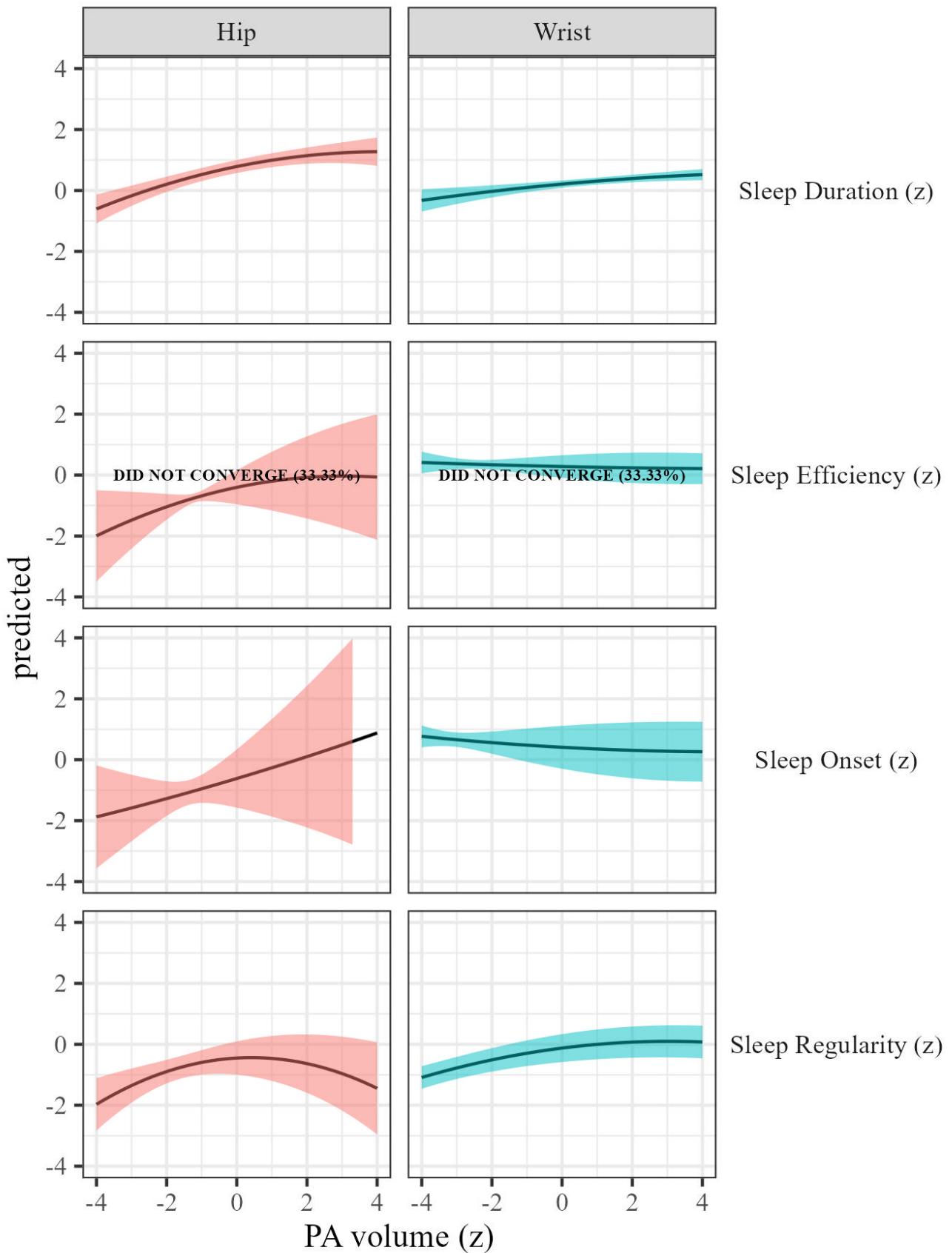


Figure 49. Sleep metrics on Physical activity volume by wear location

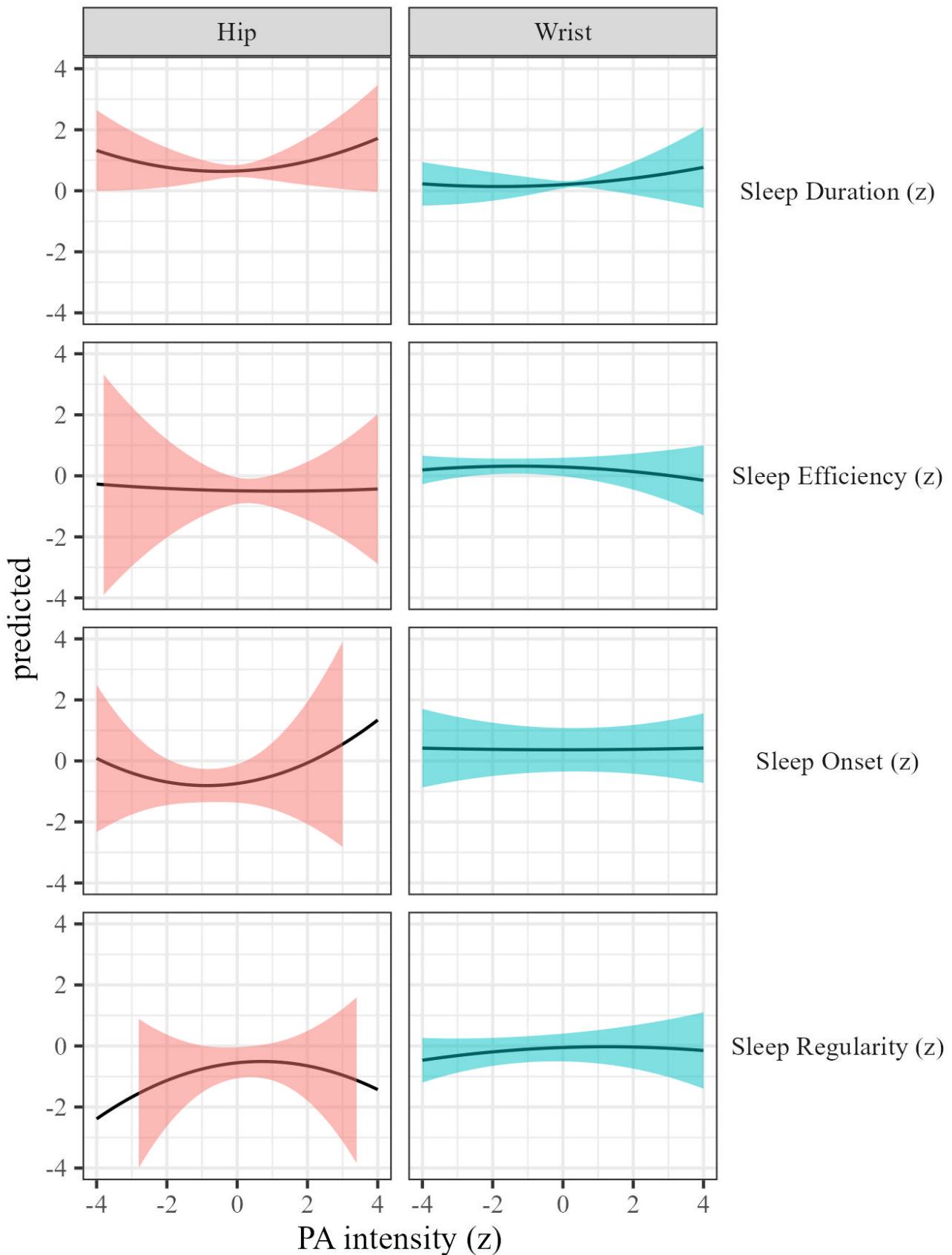


Figure 50. Sleep metrics on Physical activity intensity moderated by wear location

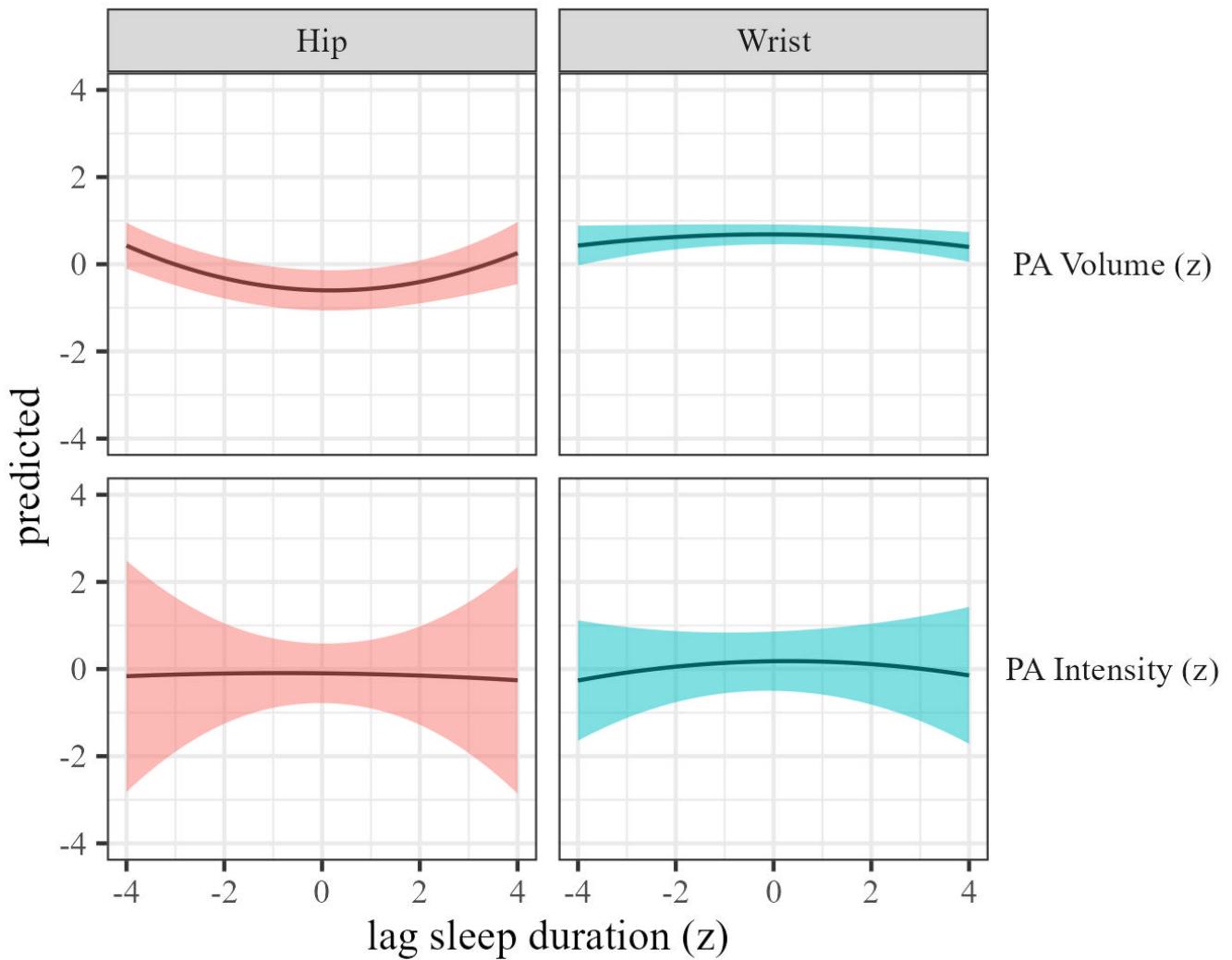


Figure 51. Physical activity by sleep duration moderated by wear location

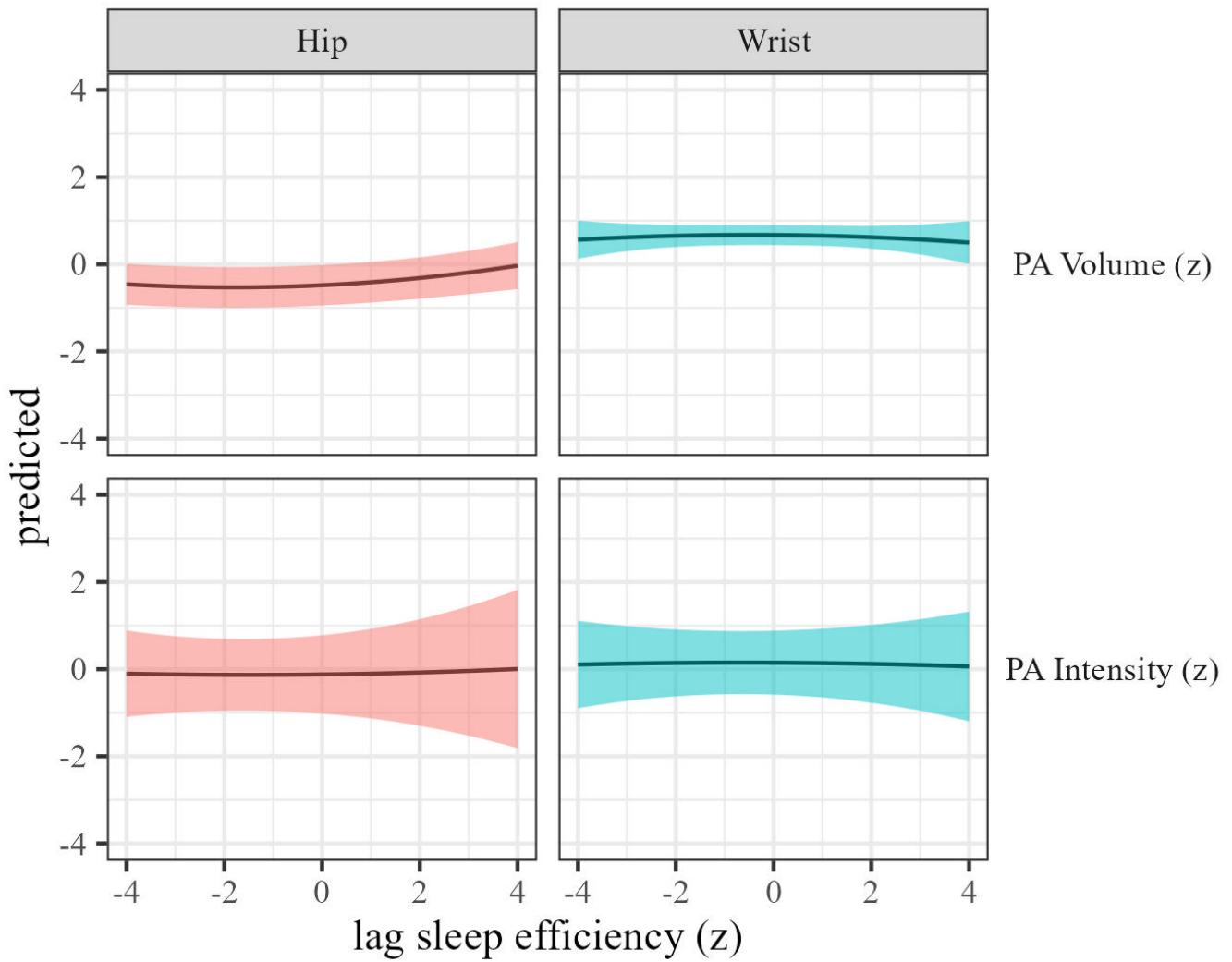


Figure 52. Physical activity by sleep efficiency moderated by wear location

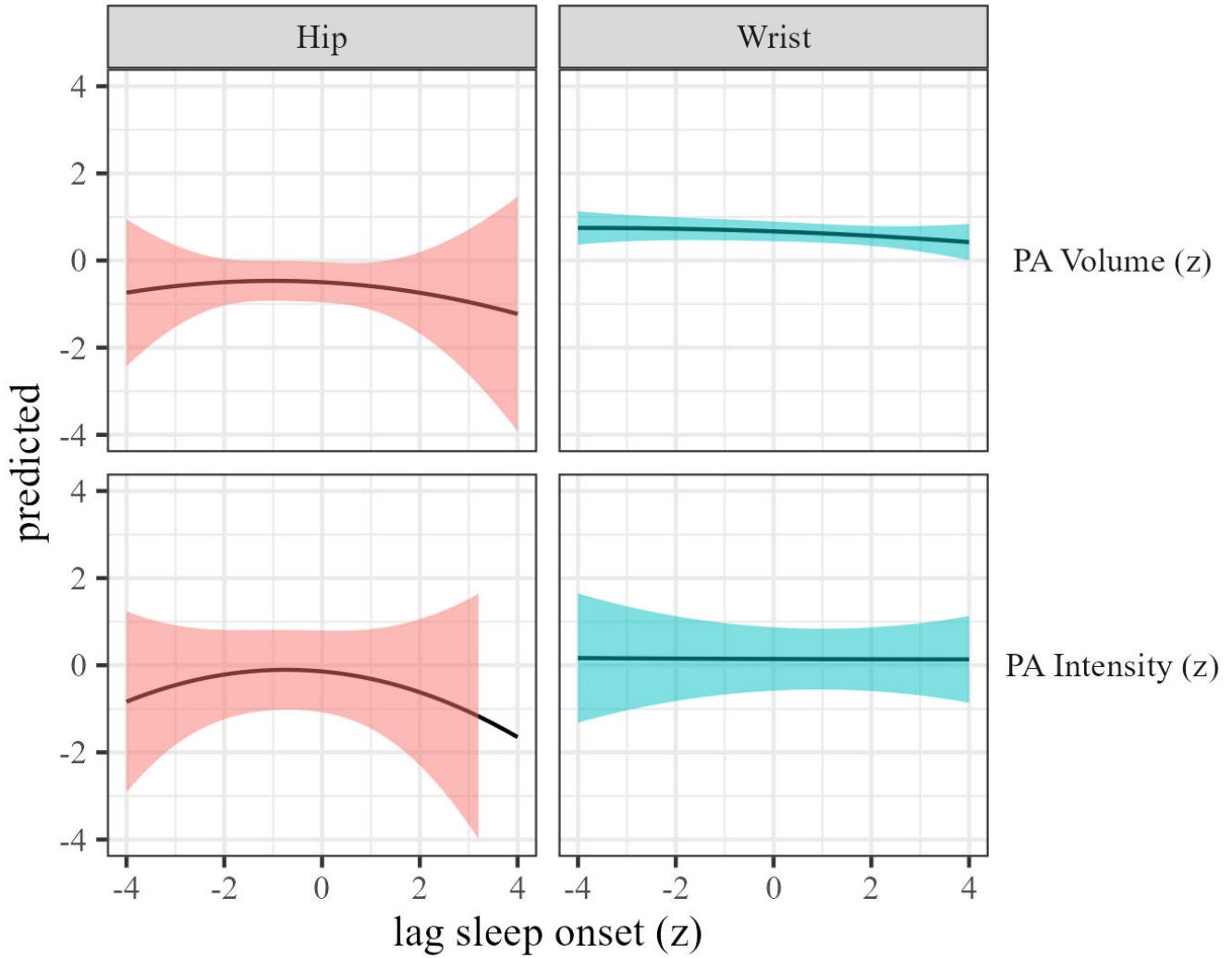


Figure 53. Physical activity by sleep onset moderated by wear location

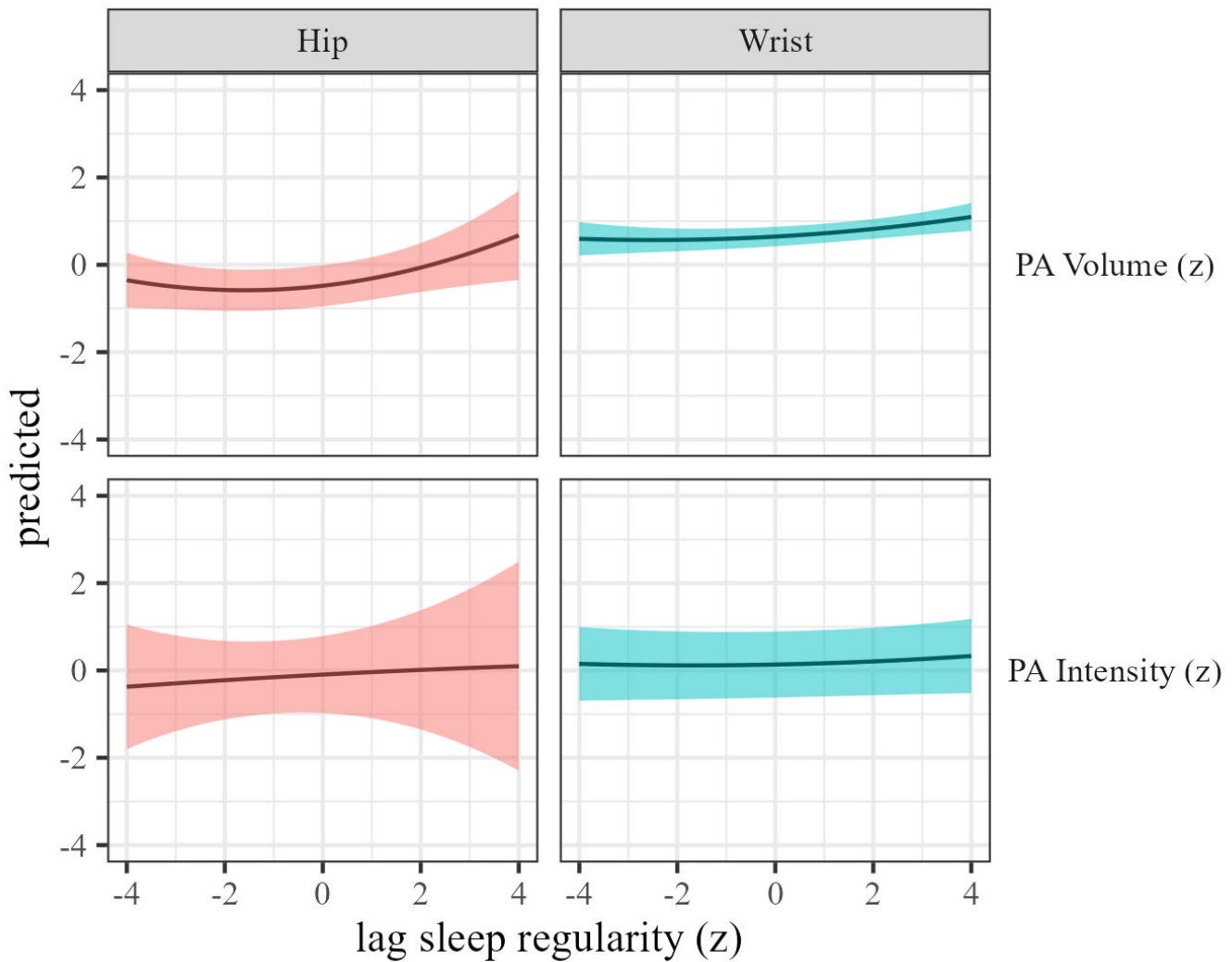


Figure 54. Physical activity by sleep regularity moderated by wear location