

## Multiverse analysis

First Author<sup>1</sup> & Ernst-August Doelle<sup>1,2</sup>

<sup>1</sup> Wilhelm-Wundt-University

<sup>2</sup> Konstanz Business School

### Author Note

Add complete departmental affiliations for each author here. Each new line herein must be indented, like this line.

Enter author note here.

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

Correspondence concerning this article should be addressed to First Author, Postal address. E-mail: my@email.com

### 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)	0.93 [0.67, 1.19]	0.13	7.12	.001	0.89 [0.61, 1.17]	0.14	6.16	.004
Physical activity	0.02 [-0.02, 0.05]	0.02	1.01	.352	0.04 [0.00, 0.08]	0.02	1.94	.053
Age	0.00 [-0.01, 0.00]	0.00	-1.50	.138	0.00 [-0.01, 0.00]	0.00	-1.23	.226
Physical activity <sup>2</sup>	0.00 [0.00, 0.01]	0.00	0.48	.633	0.02 [-0.01, 0.05]	0.02	1.24	.243
Physical activity × age	0.00 [0.00, 0.00]	0.00	0.69	.507	0.00 [0.00, 0.00]	0.00	-0.92	.360
Age × Physical activity <sup>2</sup>	0.00 [0.00, 0.00]	0.00	-0.04	.972	0.00 [0.00, 0.00]	0.00	-1.53	.163
<b>Sleep efficiency</b>								
(Intercept)	-0.28 [-0.45, -0.11]	0.09	-3.25	.002	-0.31 [-0.48, -0.13]	0.09	-3.38	.002
Physical activity	0.03 [0.00, 0.07]	0.02	1.94	.087	0.05 [0.00, 0.09]	0.02	2.09	.039
Age	0.00 [-0.01, 0.00]	0.00	-0.49	.629	0.00 [-0.01, 0.00]	0.00	-0.50	.621
Physical activity <sup>2</sup>	0.00 [-0.01, 0.01]	0.00	0.02	.982	-0.01 [-0.04, 0.02]	0.01	-0.77	.445
Physical activity × age	0.00 [0.00, 0.00]	0.00	-2.04	.063	0.00 [0.00, 0.00]	0.00	-2.12	.040
Age × Physical activity <sup>2</sup>	0.00 [0.00, 0.00]	0.00	-0.51	.616	0.00 [0.00, 0.00]	0.00	0.10	.921
<b>Sleep onset</b>								
(Intercept)	-1.15 [-1.31, -1.00]	0.08	-14.68	< .001	-1.12 [-1.28, -0.96]	0.08	-13.70	< .001
Physical activity	0.00 [-0.02, 0.02]	0.01	0.12	.904	-0.04 [-0.07, -0.01]	0.01	-2.69	.008
Age	0.00 [0.00, 0.00]	0.00	0.36	.716	0.00 [0.00, 0.00]	0.00	0.13	.897
Physical activity <sup>2</sup>	0.00 [-0.01, 0.00]	0.00	-1.34	.179	-0.02 [-0.04, 0.00]	0.01	-2.23	.026
Physical activity × age	0.00 [0.00, 0.00]	0.00	-3.83	.003	0.00 [0.00, 0.00]	0.00	-0.12	.904
Age × Physical activity <sup>2</sup>	0.00 [0.00, 0.00]	0.00	1.13	.262	0.00 [0.00, 0.00]	0.00	2.76	.006
<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)	0.18 [-0.03, 0.38]	0.11	1.67	.109	0.13 [-0.09, 0.34]	0.11	1.14	.272
Physical activity	0.08 [0.06, 0.11]	0.01	6.54	< .001	0.20 [0.16, 0.24]	0.02	9.05	< .001
Age	0.00 [-0.01, 0.00]	0.00	-0.71	.496	0.00 [-0.01, 0.00]	0.00	-1.17	.286
Physical activity <sup>2</sup>	0.00 [-0.01, 0.01]	0.00	0.85	.439	-0.04 [-0.07, -0.02]	0.01	-3.32	.001
Physical activity × age	0.00 [0.00, 0.00]	0.00	1.59	.122	0.00 [0.00, 0.00]	0.00	-4.85	.001
Age × Physical activity <sup>2</sup>	0.00 [0.00, 0.00]	0.00	-2.22	.067	0.00 [0.00, 0.00]	0.00	0.64	.529

*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
<b>Sleep duration</b>								
(Intercept)	0.16 [-0.03, 0.36]	0.10	1.62	.118	0.96 [0.76, 1.15]	0.10	9.63	< .001
Sleep duration	0.01 [-0.03, 0.04]	0.02	0.45	.672	0.00 [-0.02, 0.02]	0.01	0.05	.960
Age	-0.02 [-0.03, -0.02]	0.00	-7.49	< .001	-0.03 [-0.03, -0.02]	0.00	-7.61	.001
Sleep duration <sup>2</sup>	0.00 [-0.01, 0.01]	0.00	-0.73	.514	0.00 [-0.01, 0.00]	0.00	-0.53	.599
Sleep duration × age	0.00 [0.00, 0.00]	0.00	-0.94	.368	0.00 [0.00, 0.00]	0.00	0.95	.352
Age × Sleep duration <sup>2</sup>	0.00 [0.00, 0.00]	0.00	-0.46	.659	0.00 [0.00, 0.00]	0.00	-1.13	.258
<b>Sleep efficiency</b>								
(Intercept)	0.16 [-0.04, 0.36]	0.10	1.54	.139	0.96 [0.76, 1.16]	0.10	9.40	< .001
Sleep efficiency	0.00 [-0.02, 0.02]	0.01	-0.16	.876	0.00 [-0.02, 0.01]	0.01	-0.53	.599
Age	-0.02 [-0.03, -0.02]	0.00	-7.73	< .001	-0.03 [-0.03, -0.02]	0.00	-7.68	.001
Sleep efficiency <sup>2</sup>	0.00 [0.00, 0.01]	0.00	0.12	.906	0.00 [0.00, 0.00]	0.00	0.06	.950
Sleep efficiency × age	0.00 [0.00, 0.00]	0.00	0.56	.578	0.00 [0.00, 0.00]	0.00	0.96	.341
Age × Sleep efficiency <sup>2</sup>	0.00 [0.00, 0.00]	0.00	-0.58	.575	0.00 [0.00, 0.00]	0.00	-0.04	.969
<b>Sleep onset</b>								
(Intercept)	0.13 [-0.07, 0.33]	0.10	1.31	.200	0.94 [0.75, 1.14]	0.10	9.44	< .001
Sleep onset	-0.07 [-0.19, 0.04]	0.06	-1.28	.307	-0.05 [-0.08, -0.01]	0.02	-2.73	.009
Age	-0.02 [-0.03, -0.02]	0.00	-7.29	< .001	-0.03 [-0.03, -0.02]	0.00	-7.69	.001
Sleep onset <sup>2</sup>	-0.03 [-0.07, 0.01]	0.02	-1.50	.218	-0.01 [-0.03, 0.01]	0.01	-1.29	.200
Sleep onset × age	0.00 [0.00, 0.00]	0.00	1.09	.364	0.00 [0.00, 0.00]	0.00	2.55	.018
Age × Sleep onset <sup>2</sup>	0.00 [0.00, 0.00]	0.00	1.12	.297	0.00 [0.00, 0.00]	0.00	0.66	.521
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)	0.16 [-0.04, 0.36]	0.10	1.60	.123	0.97 [0.77, 1.17]	0.10	9.40	< .001
Sleep regularity	0.11 [0.07, 0.14]	0.02	5.61	.003	0.07 [0.04, 0.09]	0.01	5.87	< .001
Age	-0.02 [-0.03, -0.02]	0.00	-7.61	< .001	-0.03 [-0.03, -0.02]	0.00	-7.66	.001
Sleep regularity <sup>2</sup>	0.00 [-0.02, 0.02]	0.01	-0.25	.818	0.00 [-0.01, 0.01]	0.00	-0.81	.422
Sleep regularity × age	0.00 [0.00, 0.00]	0.00	-2.40	.064	0.00 [0.00, 0.00]	0.00	-2.94	.018
Age × Sleep regularity <sup>2</sup>	0.00 [0.00, 0.00]	0.00	0.39	.698	0.00 [0.00, 0.00]	0.00	0.45	.655

*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)	0.51 [0.20, 0.82]	0.16	3.20	.016	0.50 [0.14, 0.87]	0.18	2.73	.046
Physical activity	0.06 [-0.03, 0.15]	0.05	1.24	.257	0.07 [0.01, 0.14]	0.03	2.17	.030
Physical activity <sup>2</sup>	0.00 [-0.03, 0.03]	0.02	-0.29	.780	-0.02 [-0.09, 0.05]	0.04	-0.54	.621
Age	-0.01 [-0.01, 0.00]	0.00	-2.89	.007	-0.01 [-0.01, 0.00]	0.00	-2.85	.006
Physical activity × bmi	0.00 [-0.01, 0.00]	0.00	-0.74	.486	0.00 [0.00, 0.00]	0.00	-0.94	.350
<b>Sleep efficiency</b>								
(Intercept)	0.32 [0.07, 0.57]	0.13	2.51	.013	0.34 [0.07, 0.61]	0.14	2.45	.019
Physical activity	0.02 [-0.07, 0.11]	0.04	0.43	.677	-0.03 [-0.14, 0.08]	0.06	-0.59	.583
Physical activity <sup>2</sup>	0.01 [-0.02, 0.04]	0.01	0.57	.581	-0.01 [-0.07, 0.05]	0.03	-0.38	.720
Age	0.00 [0.00, 0.01]	0.00	0.77	.444	0.00 [0.00, 0.01]	0.00	0.70	.485
Physical activity × bmi	0.00 [0.00, 0.00]	0.00	-0.20	.848	0.00 [0.00, 0.01]	0.00	0.84	.433
<b>Sleep onset</b>								
(Intercept)	-0.19 [-0.53, 0.15]	0.17	-1.09	.282	-0.17 [-0.54, 0.21]	0.19	-0.87	.394
Physical activity	-0.02 [-0.10, 0.07]	0.04	-0.42	.700	-0.09 [-0.19, 0.02]	0.05	-1.56	.217
Physical activity <sup>2</sup>	0.00 [-0.02, 0.02]	0.01	-0.17	.873	0.00 [-0.05, 0.06]	0.03	0.03	.978
Age	0.00 [0.00, 0.01]	0.00	1.15	.261	0.00 [0.00, 0.01]	0.00	0.81	.424
Physical activity × bmi	0.00 [0.00, 0.00]	0.00	-0.21	.843	0.00 [0.00, 0.01]	0.00	0.64	.570
<b>Sleep regularity</b>								
(Intercept)	0.49 [0.23, 0.76]	0.13	3.67	.001	0.57 [0.27, 0.88]	0.16	3.68	.002
Physical activity	-0.06 [-0.33, 0.21]	0.14	-0.43	.705	0.14 [0.03, 0.26]	0.06	2.47	.059
Physical activity <sup>2</sup>	0.01 [-0.01, 0.04]	0.01	1.12	.268	0.00 [-0.08, 0.07]	0.04	-0.13	.905

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	-0.32	.754	0.00	[-0.01, 0.00]	0.00	-0.32	.757
Physical activity $\times$ bmi	0.01	[0.01, 0.02]	0.01	1.18	.350	0.00	[-0.01, 0.00]	0.00	-1.24	.260

*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)	1.40	[1.03, 1.76]	0.19	7.47	< .001	1.30	[1.05, 1.55]	0.13	10.09	< .001
Sleep duration	0.02	[-0.04, 0.08]	0.03	0.67	.528	0.01	[-0.03, 0.04]	0.02	0.40	.687
Sleep duration <sup>2</sup>	0.00	[-0.02, 0.02]	0.01	-0.35	.735	0.00	[-0.02, 0.01]	0.01	-0.54	.595
Age	-0.02	[-0.03, -0.02]	0.00	-7.86	< .001	-0.03	[-0.03, -0.02]	0.00	-8.76	.001
Sleep duration × bmi	0.00	[0.00, 0.00]	0.00	-0.73	.496	0.00	[0.00, 0.00]	0.00	-0.02	.983
Sleep efficiency										
(Intercept)	1.39	[1.02, 1.76]	0.19	7.32	< .001	1.30	[1.04, 1.55]	0.13	9.88	< .001
Sleep efficiency	0.00	[-0.06, 0.06]	0.03	0.09	.932	-0.01	[-0.05, 0.04]	0.02	-0.30	.768
Sleep efficiency <sup>2</sup>	0.00	[-0.01, 0.01]	0.01	-0.56	.579	0.00	[-0.01, 0.02]	0.01	0.19	.857
Age	-0.02	[-0.03, -0.02]	0.00	-7.80	< .001	-0.03	[-0.03, -0.02]	0.00	-8.75	.001
Sleep efficiency × bmi	0.00	[0.00, 0.00]	0.00	-0.05	.962	0.00	[0.00, 0.00]	0.00	0.41	.683
Sleep onset										
(Intercept)	1.41	[1.04, 1.78]	0.19	7.45	< .001	1.31	[1.07, 1.56]	0.13	10.47	< .001
Sleep onset	-0.04	[-0.13, 0.05]	0.05	-0.82	.450	-0.01	[-0.11, 0.08]	0.05	-0.32	.765
Sleep onset <sup>2</sup>	-0.02	[-0.08, 0.04]	0.03	-0.73	.516	-0.01	[-0.06, 0.03]	0.02	-0.64	.561
Age	-0.02	[-0.03, -0.02]	0.00	-7.97	< .001	-0.03	[-0.03, -0.02]	0.00	-8.69	.001
Sleep onset × bmi	0.00	[0.00, 0.00]	0.00	0.43	.681	0.00	[0.00, 0.00]	0.00	0.11	.914
Sleep regularity										
(Intercept)	1.35	[0.99, 1.70]	0.18	7.43	< .001	1.27	[1.00, 1.53]	0.14	9.37	< .001
Sleep regularity	0.07	[-0.10, 0.25]	0.09	0.84	.481	0.06	[-0.05, 0.17]	0.05	1.13	.356
Sleep regularity <sup>2</sup>	-0.02	[-0.05, 0.02]	0.02	-1.04	.351	0.00	[-0.02, 0.02]	0.01	0.15	.879

Term	Physical Activity Volume				Physical Activity Intensity					
	$\beta$	[95% CI]	SE	t	p	$\beta$	[95% CI]	SE	t	p
Age	-0.02	[-0.03, -0.02]	0.00	-7.87	< .001	-0.03	[-0.03, -0.02]	0.00	-8.90	< .001
Sleep regularity × bmi	0.00	[0.01, 0.01]	0.00	0.06	.956	0.00	[0.01, 0.00]	0.00	-0.39	.728

*Note.* Adjusted for SES, 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
<b>Sleep duration</b>								
(Intercept)	0.49 [0.17, 0.81]	0.16	2.98	.025	0.48 [0.17, 0.78]	0.16	3.07	.019
Physical activity	0.03 [-0.01, 0.07]	0.02	1.27	.225	0.03 [-0.01, 0.06]	0.02	1.52	.133
Physical activity <sup>2</sup>	0.00 [-0.01, 0.01]	0.01	0.62	.543	0.01 [-0.01, 0.03]	0.01	0.72	.482
Age	-0.01 [-0.01, 0.00]	0.00	-2.87	.008	-0.01 [-0.01, 0.00]	0.00	-2.87	.006
Physical activity × sesmedium	-0.01 [-0.06, 0.03]	0.02	-0.58	.567	0.02 [-0.02, 0.07]	0.02	0.98	.336
Physical activity × seshigh	0.01 [-0.04, 0.06]	0.02	0.32	.754	0.00 [-0.04, 0.05]	0.02	0.17	.869
<b>Sleep efficiency</b>								
(Intercept)	0.33 [0.07, 0.58]	0.13	2.53	.013	0.34 [0.08, 0.60]	0.13	2.59	.011
Physical activity	0.03 [-0.04, 0.10]	0.04	0.79	.482	-0.01 [-0.06, 0.05]	0.03	-0.23	.824
Physical activity <sup>2</sup>	-0.01 [-0.03, 0.02]	0.01	-0.52	.640	0.00 [-0.02, 0.02]	0.01	-0.16	.875
Age	0.00 [0.00, 0.01]	0.00	0.82	.411	0.00 [0.00, 0.01]	0.00	0.67	.506
Physical activity × sesmedium	-0.02 [-0.10, 0.06]	0.04	-0.58	.596	0.01 [-0.04, 0.05]	0.02	0.21	.836
Physical activity × seshigh	-0.01 [-0.07, 0.06]	0.04	-0.17	.874	0.03 [-0.03, 0.08]	0.03	1.02	.328
<b>Sleep onset</b>								
(Intercept)	-0.19 [-0.53, 0.14]	0.17	-1.13	.264	-0.16 [-0.50, 0.18]	0.17	-0.92	.364
Physical activity	-0.04 [-0.06, -0.01]	0.01	-2.88	.006	-0.05 [-0.08, -0.02]	0.02	-3.26	.006
Physical activity <sup>2</sup>	0.00 [-0.01, 0.01]	0.00	0.38	.706	0.00 [-0.02, 0.01]	0.01	-0.37	.715
Age	0.00 [0.00, 0.01]	0.00	1.22	.228	0.00 [0.00, 0.01]	0.00	0.90	.375
Physical activity × sesmedium	0.01 [-0.02, 0.04]	0.02	0.56	.582	-0.02 [-0.06, 0.02]	0.02	-1.07	.308
Physical activity × seshigh	0.02 [-0.01, 0.06]	0.02	1.15	.258	0.01 [-0.02, 0.05]	0.02	0.60	.552
<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)	0.54 [0.26, 0.83]	0.14	3.81	.001	0.59 [0.30, 0.88]	0.15	4.00	.001
Physical activity	0.12 [0.01, 0.22]	0.05	2.23	.130	0.07 [0.03, 0.12]	0.02	3.20	.007
Physical activity <sup>2</sup>	-0.01 [-0.04, 0.02]	0.02	-0.66	.566	-0.01 [-0.03, 0.01]	0.01	-1.12	.267
Age	0.00 [-0.01, 0.00]	0.00	-0.31	.761	0.00 [-0.01, 0.00]	0.00	-0.33	.752
Physical activity × sesmedium	-0.02 [-0.14, 0.09]	0.06	-0.40	.720	0.00 [-0.05, 0.05]	0.03	-0.06	.953
Physical activity × seshigh	-0.01 [-0.12, 0.10]	0.05	-0.15	.888	0.02 [-0.03, 0.06]	0.02	0.69	.492

*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
Sleep duration								
(Intercept)	1.40 [1.03, 1.77]	0.19	7.47	< .001	1.30 [1.04, 1.56]	0.13	9.85	< .001
Sleep duration	-0.01 [-0.04, 0.02]	0.02	-0.85	.423	0.01 [-0.02, 0.03]	0.01	0.55	.590
Sleep duration <sup>2</sup>	-0.01 [-0.02, 0.00]	0.00	-1.83	.104	0.00 [-0.01, 0.01]	0.00	-0.47	.645
Age	-0.02 [-0.03, -0.02]	0.00	-7.85	< .001	-0.03 [-0.03, -0.02]	0.00	-8.74	.001
Sleep duration × sesmedium	0.00 [-0.04, 0.05]	0.02	0.18	.864	0.00 [-0.04, 0.05]	0.02	0.08	.943
Sleep duration × seshigh	0.03 [-0.03, 0.09]	0.03	1.07	.353	0.00 [-0.04, 0.04]	0.02	-0.17	.874
Sleep efficiency								
(Intercept)	1.39 [1.01, 1.76]	0.19	7.29	< .001	1.30 [1.04, 1.55]	0.13	9.85	< .001
Sleep efficiency	0.01 [-0.04, 0.06]	0.02	0.36	.738	-0.01 [-0.03, 0.02]	0.01	-0.53	.600
Sleep efficiency <sup>2</sup>	0.00 [-0.01, 0.01]	0.00	0.10	.924	0.00 [-0.01, 0.01]	0.01	0.62	.571
Age	-0.02 [-0.03, -0.02]	0.00	-7.80	< .001	-0.03 [-0.03, -0.02]	0.00	-8.79	.001
Sleep efficiency × sesmedium	-0.01 [-0.07, 0.05]	0.03	-0.33	.757	0.02 [-0.02, 0.06]	0.02	0.97	.352
Sleep efficiency × seshigh	-0.01 [-0.08, 0.07]	0.04	-0.21	.848	0.00 [-0.03, 0.03]	0.01	0.23	.815
Sleep onset								
(Intercept)	1.41 [1.03, 1.79]	0.19	7.24	< .001	1.30 [1.03, 1.57]	0.14	9.48	< .001
Sleep onset	-0.01 [-0.05, 0.03]	0.02	-0.54	.606	0.00 [-0.02, 0.03]	0.01	0.16	.877
Sleep onset <sup>2</sup>	-0.02 [-0.03, 0.00]	0.01	-1.68	.118	0.00 [-0.01, 0.02]	0.01	0.44	.663
Age	-0.02 [-0.03, -0.02]	0.00	-7.94	< .001	-0.03 [-0.03, -0.02]	0.00	-8.84	.001
Sleep onset × sesmedium	-0.02 [-0.06, 0.02]	0.02	-0.88	.381	0.00 [-0.04, 0.03]	0.02	-0.12	.905
Sleep onset × seshigh	-0.02 [-0.09, 0.05]	0.03	-0.65	.546	-0.02 [-0.08, 0.03]	0.03	-0.77	.477
Sleep regularity								

Term	Physical Activity Volume			Physical Activity Intensity				
	$\beta$ [95% CI]	SE	t	p	$\beta$ [95% CI]	SE	t	p
(Intercept)	1.33 [0.98, 1.69]	0.18	7.33	< .001	1.27 [1.02, 1.53]	0.13	9.81	< .001
Sleep regularity	0.05 [0.03, 0.08]	0.01	4.16	< .001	0.03 [-0.02, 0.07]	0.02	1.18	.319
Sleep regularity <sup>2</sup>	0.00 [-0.04, 0.03]	0.02	-0.18	.869	0.00 [-0.01, 0.01]	0.01	-0.86	.405
Age	-0.02 [-0.03, -0.02]	0.00	-7.98	< .001	-0.03 [-0.03, -0.02]	0.00	-8.98	< .001
Sleep regularity × sesmedium	0.02 [-0.02, 0.06]	0.02	1.15	.266	0.02 [-0.04, 0.07]	0.03	0.61	.578
Sleep regularity × seshigh	0.03 [-0.02, 0.07]	0.02	1.22	.241	0.02 [-0.04, 0.07]	0.03	0.67	.545

*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)	0.49 [0.17, 0.82]	0.16	2.98	.025	0.47 [0.15, 0.79]	0.16	2.89	.029
Physical activity	0.03 [-0.01, 0.06]	0.02	1.52	.169	0.03 [-0.01, 0.06]	0.02	1.49	.157
Physical activity <sup>2</sup>	0.00 [0.00, 0.01]	0.00	0.65	.514	0.02 [-0.01, 0.04]	0.01	1.29	.233
Age	-0.01 [-0.01, 0.00]	0.00	-2.90	.007	-0.01 [-0.01, 0.00]	0.00	-2.77	.009
Physical activity × sexmale	0.00 [-0.05, 0.04]	0.02	-0.14	.887	0.02 [-0.02, 0.07]	0.02	0.98	.354
<b>Sleep efficiency</b>								
(Intercept)	0.33 [0.08, 0.57]	0.13	2.56	.011	0.33 [0.08, 0.58]	0.13	2.55	.012
Physical activity	0.01 [-0.03, 0.05]	0.02	0.52	.623	-0.02 [-0.06, 0.02]	0.02	-1.11	.299
Physical activity <sup>2</sup>	0.00 [-0.01, 0.01]	0.00	-0.63	.552	0.00 [-0.02, 0.02]	0.01	0.28	.781
Age	0.00 [0.00, 0.01]	0.00	0.78	.437	0.00 [0.00, 0.01]	0.00	0.77	.442
Physical activity × sexmale	0.01 [-0.04, 0.05]	0.03	0.22	.831	0.05 [0.01, 0.09]	0.02	2.68	.009
<b>Sleep onset</b>								
(Intercept)	-0.19 [-0.53, 0.15]	0.17	-1.11	.272	-0.16 [-0.50, 0.19]	0.18	-0.90	.373
Physical activity	-0.03 [-0.05, -0.01]	0.01	-2.46	.026	-0.05 [-0.07, -0.03]	0.01	-4.93	< .001
Physical activity <sup>2</sup>	0.00 [-0.01, 0.00]	0.00	-0.59	.568	-0.01 [-0.02, 0.01]	0.01	-1.00	.323
Age	0.00 [0.00, 0.01]	0.00	1.23	.224	0.00 [0.00, 0.01]	0.00	0.87	.387
Physical activity × sexmale	0.00 [-0.04, 0.04]	0.02	0.00	.997	0.00 [-0.03, 0.02]	0.01	-0.37	.709
<b>Sleep regularity</b>								
(Intercept)	0.54 [0.27, 0.81]	0.14	3.95	.001	0.58 [0.29, 0.88]	0.15	3.90	.001
Physical activity	0.10 [0.07, 0.13]	0.02	6.24	< .001	0.05 [0.02, 0.09]	0.02	2.86	.013
Physical activity <sup>2</sup>	0.00 [-0.01, 0.01]	0.01	-0.46	.672	-0.01 [-0.03, 0.01]	0.01	-1.10	.289

Table 7 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	-0.33	.747	0.00 [-0.01, 0.00]	0.00	-0.28	.783
Physical activity $\times$ sexmale	0.01 [-0.05, 0.07]	0.03	0.35	.746	0.05 [0.01, 0.08]	0.02	2.34	.021

*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)	1.40 [1.03, 1.77]	0.19	7.39	< .001	1.30 [1.04, 1.56]	0.13	9.87	< .001
Sleep duration	-0.01 [-0.03, 0.01]	0.01	-0.76	.471	0.00 [-0.02, 0.02]	0.01	0.06	.952
Sleep duration <sup>2</sup>	-0.01 [-0.01, 0.00]	0.00	-1.47	.208	0.00 [-0.01, 0.00]	0.00	-1.10	.287
Age	-0.02 [-0.03, -0.02]	0.00	-7.84	< .001	-0.03 [-0.03, -0.02]	0.00	-8.78	.001
Sleep duration × sexmale	0.02 [-0.03, 0.06]	0.02	0.70	.519	0.01 [-0.01, 0.03]	0.01	1.28	.201
Sleep efficiency								
(Intercept)	1.39 [1.02, 1.76]	0.19	7.32	< .001	1.30 [1.04, 1.56]	0.13	9.73	< .001
Sleep efficiency	0.00 [-0.02, 0.03]	0.01	0.31	.761	0.00 [-0.01, 0.02]	0.01	0.23	.817
Sleep efficiency <sup>2</sup>	0.00 [-0.01, 0.00]	0.00	-0.81	.426	0.00 [-0.01, 0.01]	0.00	0.19	.858
Age	-0.02 [-0.03, -0.02]	0.00	-7.83	< .001	-0.03 [-0.03, -0.02]	0.00	-8.78	.001
Sleep efficiency × sexmale	0.00 [-0.03, 0.03]	0.02	-0.20	.847	0.00 [-0.02, 0.02]	0.01	-0.01	.994
Sleep onset								
(Intercept)	1.40 [1.02, 1.79]	0.20	7.15	< .001	1.30 [1.04, 1.56]	0.13	9.73	< .001
Sleep onset	0.01 [-0.02, 0.05]	0.02	0.73	.487	0.00 [-0.03, 0.02]	0.01	-0.36	.724
Sleep onset <sup>2</sup>	-0.01 [-0.03, 0.01]	0.01	-0.76	.482	0.00 [-0.01, 0.01]	0.01	-0.06	.953
Age	-0.02 [-0.03, -0.02]	0.00	-7.78	< .001	-0.03 [-0.03, -0.02]	0.00	-8.81	.001
Sleep onset × sexmale	-0.07 [-0.11, -0.04]	0.02	-4.33	< .001	0.00 [-0.04, 0.04]	0.02	-0.02	.987
Sleep regularity								
(Intercept)	1.34 [0.98, 1.70]	0.19	7.24	< .001	1.28 [1.01, 1.54]	0.13	9.57	< .001
Sleep regularity	0.05 [0.04, 0.07]	0.01	5.48	< .001	0.04 [0.01, 0.06]	0.01	2.88	.037
Sleep regularity <sup>2</sup>	-0.01 [-0.02, 0.00]	0.01	-1.46	.157	0.00 [-0.01, 0.00]	0.00	-1.05	.299

Term	Physical Activity Volume				Physical Activity Intensity					
	$\beta$	[95% CI]	SE	t	p	$\beta$	[95% CI]	SE	t	p
Age	-0.02	[-0.03, -0.02]	0.00	-7.78	< .001	-0.03	[-0.03, -0.02]	0.00	-8.92	< .001
Sleep regularity $\times$ sexmale	0.03	[0.01, 0.06]	0.01	2.32	.023	0.00	[0.03, 0.03]	0.02	-0.09	.932

*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)	0.48 [0.19, 0.77]	0.15	3.23	.013	0.46 [0.16, 0.76]	0.15	3.00	.021
Physical activity	0.01 [-0.04, 0.05]	0.02	0.29	.773	0.06 [0.02, 0.10]	0.02	2.92	.007
Weekday xmonday	-0.03 [-0.09, 0.03]	0.03	-0.91	.378	-0.03 [-0.09, 0.04]	0.03	-0.80	.432
Weekday xsaturday	0.06 [0.01, 0.11]	0.03	2.25	.031	0.08 [0.02, 0.14]	0.03	2.65	.011
Weekday xsunday	0.04 [-0.01, 0.08]	0.02	1.63	.104	0.05 [0.00, 0.11]	0.03	1.94	.053
Weekday xthursday	-0.02 [-0.07, 0.02]	0.02	-0.89	.373	0.00 [-0.06, 0.05]	0.03	-0.12	.903
Weekday xtuesday	-0.02 [-0.08, 0.04]	0.03	-0.67	.520	-0.02 [-0.09, 0.05]	0.04	-0.65	.529
Weekday xwednesday	-0.02 [-0.08, 0.04]	0.03	-0.65	.536	-0.02 [-0.08, 0.04]	0.03	-0.72	.475
Physical activity <sup>2</sup>	0.00 [-0.01, 0.02]	0.01	0.70	.482	0.01 [-0.01, 0.04]	0.01	1.03	.306
Age	-0.01 [-0.01, 0.00]	0.00	-2.96	.005	-0.01 [-0.01, 0.00]	0.00	-2.81	.007
Physical activity × weekday xmonday	0.04 [-0.02, 0.09]	0.03	1.20	.234	-0.02 [-0.06, 0.03]	0.02	-0.75	.452
Physical activity × weekday xsaturday	0.03 [-0.03, 0.08]	0.03	1.01	.316	-0.05 [-0.10, -0.01]	0.02	-2.25	.031
Physical activity × weekday xsunday	0.05 [-0.02, 0.12]	0.04	1.38	.203	-0.05 [-0.09, 0.00]	0.02	-2.02	.047
Physical activity × weekday xtuesday	0.00 [-0.06, 0.06]	0.03	0.06	.954	-0.01 [-0.06, 0.05]	0.03	-0.21	.835
Physical activity × weekday xtuesday	0.02 [-0.03, 0.08]	0.03	0.77	.444	0.00 [-0.05, 0.05]	0.03	0.09	.933
Physical activity × weekday xwednesday	0.00 [-0.05, 0.05]	0.03	0.09	.929	-0.01 [-0.08, 0.05]	0.03	-0.43	.679
Weekday xmonday × Physical activity <sup>2</sup>	0.00 [-0.02, 0.02]	0.01	-0.11	.915	0.00 [-0.04, 0.03]	0.02	-0.24	.811
Weekday xsaturday × Physical activity <sup>2</sup>	-0.01 [-0.03, 0.01]	0.01	-1.03	.328	-0.03 [-0.08, 0.01]	0.02	-1.55	.150
Weekday xsunday × Physical activity <sup>2</sup>	-0.01 [-0.03, 0.01]	0.01	-0.65	.532	-0.03 [-0.06, 0.01]	0.02	-1.45	.156
Weekday xthursday × Physical activity <sup>2</sup>	0.01 [-0.01, 0.02]	0.01	0.73	.467	-0.01 [-0.04, 0.02]	0.02	-0.68	.497
Weekday xtuesday × Physical activity <sup>2</sup>	0.00 [-0.01, 0.01]	0.01	-0.22	.823	0.00 [-0.04, 0.04]	0.02	0.04	.969

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>	0.00 [-0.02, 0.01]	0.01	-0.33	.744	0.00 [-0.04, 0.04]	0.02	-0.05	.963
Sleep efficency								
(Intercept)	0.33 [0.08, 0.57]	0.13	2.62	.010	0.35 [0.10, 0.61]	0.13	2.75	.007
Physical activity	0.00 [-0.04, 0.04]	0.02	-0.01	.991	-0.01 [-0.05, 0.03]	0.02	-0.41	.683
Weekday xmunday	0.01 [-0.07, 0.09]	0.04	0.23	.827	-0.02 [-0.09, 0.06]	0.04	-0.47	.651
Weekday xsaturday	-0.05 [-0.11, 0.00]	0.03	-2.06	.049	-0.07 [-0.12, -0.01]	0.03	-2.33	.021
Weekday xsunday	-0.07 [-0.13, 0.00]	0.03	-2.00	.080	-0.09 [-0.16, -0.02]	0.04	-2.62	.022
Weekday xthursday	-0.02 [-0.07, 0.04]	0.03	-0.58	.567	-0.03 [-0.08, 0.03]	0.03	-1.05	.296
Weekday xtuesday	0.00 [-0.05, 0.05]	0.03	-0.11	.917	-0.02 [-0.08, 0.04]	0.03	-0.58	.565
Weekday xwednesday	0.02 [-0.05, 0.08]	0.03	0.57	.586	0.01 [-0.06, 0.08]	0.04	0.18	.857
Physical activity <sup>2</sup>	0.00 [-0.01, 0.02]	0.01	0.64	.523	-0.01 [-0.04, 0.02]	0.01	-0.63	.534
Age	0.00 [0.00, 0.01]	0.00	0.83	.407	0.00 [0.00, 0.01]	0.00	0.75	.451
Physical activity $\times$ weekday xmonday	0.02 [-0.04, 0.07]	0.03	0.61	.543	0.02 [-0.02, 0.07]	0.02	0.97	.333
Physical activity $\times$ weekday xsaturday	0.04 [-0.02, 0.10]	0.03	1.38	.175	-0.02 [-0.06, 0.03]	0.02	-0.71	.475
Physical activity $\times$ weekday xsunday	0.03 [-0.02, 0.09]	0.03	1.16	.246	0.02 [-0.03, 0.06]	0.02	0.71	.476
Physical activity $\times$ weekday xthursday	0.01 [-0.05, 0.08]	0.03	0.39	.700	0.03 [-0.01, 0.08]	0.02	1.46	.150
Physical activity $\times$ weekday xtuesday	-0.01 [-0.07, 0.05]	0.03	-0.37	.713	0.01 [-0.04, 0.06]	0.02	0.31	.755
Physical activity $\times$ weekday xwednesday	0.00 [-0.05, 0.06]	0.03	0.10	.921	0.01 [-0.05, 0.07]	0.03	0.33	.745
Weekday xmunday $\times$ Physical activity <sup>2</sup>	-0.01 [-0.03, 0.01]	0.01	-1.07	.308	0.01 [-0.02, 0.05]	0.02	0.87	.386
Weekday xsaturday $\times$ Physical activity <sup>2</sup>	-0.01 [-0.02, 0.01]	0.01	-0.89	.375	0.00 [-0.03, 0.04]	0.02	0.08	.937
Weekday xsunday $\times$ Physical activity <sup>2</sup>	-0.01 [-0.03, 0.01]	0.01	-1.10	.299	0.01 [-0.03, 0.05]	0.02	0.69	.501
Weekday xthursday $\times$ Physical activity <sup>2</sup>	-0.01 [-0.04, 0.02]	0.01	-0.54	.609	0.00 [-0.03, 0.04]	0.02	0.22	.827
Weekday xtuesday $\times$ Physical activity <sup>2</sup>	0.00 [-0.02, 0.01]	0.01	-0.70	.483	0.01 [-0.03, 0.04]	0.02	0.53	.596

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 [-0.02, 0.01]	0.01	-0.64	.528	0.01 [-0.03, 0.04]	0.02	0.35	.730
Sleep onset								
(Intercept)	-0.16 [-0.47, 0.16]	0.16	-0.98	.329	-0.12 [-0.44, 0.20]	0.16	-0.74	.460
Physical activity	-0.02 [-0.05, 0.01]	0.02	-1.39	.170	-0.03 [-0.05, -0.01]	0.01	-2.49	.013
Weekday xmunday	-0.07 [-0.10, -0.03]	0.02	-4.03	< .001	-0.08 [-0.11, -0.04]	0.02	-3.77	< .001
Weekday xsaturday	0.07 [0.03, 0.10]	0.02	3.86	.001	0.06 [0.02, 0.09]	0.02	3.08	.002
Weekday xsunday	0.06 [0.02, 0.09]	0.02	3.20	.003	0.02 [-0.01, 0.06]	0.02	1.24	.215
Weekday xthursday	-0.07 [-0.11, -0.03]	0.02	-3.37	.005	-0.07 [-0.13, -0.02]	0.03	-2.67	.037
Weekday xtuesday	-0.06 [-0.09, -0.03]	0.02	-3.57	< .001	-0.06 [-0.10, -0.02]	0.02	-3.10	.003
Weekday xwednesday	-0.06 [-0.10, -0.02]	0.02	-3.27	.005	-0.07 [-0.11, -0.03]	0.02	-3.21	.002
Physical activity <sup>2</sup>	0.00 [-0.01, 0.01]	0.00	0.56	.577	-0.01 [-0.02, 0.01]	0.01	-0.56	.578
Age	0.00 [0.00, 0.01]	0.00	1.26	.209	0.00 [0.00, 0.01]	0.00	0.89	.373
Physical activity $\times$ weekday xmonday	-0.04 [-0.08, 0.01]	0.02	-1.61	.129	-0.03 [-0.06, 0.00]	0.01	-1.96	.050
Physical activity $\times$ weekday xsaturday	0.05 [0.00, 0.09]	0.02	2.18	.040	0.00 [-0.03, 0.04]	0.02	0.28	.780
Physical activity $\times$ weekday xsunday	0.02 [-0.03, 0.06]	0.02	0.75	.471	-0.03 [-0.06, 0.00]	0.01	-2.22	.026
Physical activity $\times$ weekday xthursday	-0.03 [-0.07, 0.01]	0.02	-1.31	.201	-0.02 [-0.05, 0.01]	0.02	-1.52	.133
Physical activity $\times$ weekday xtuesday	-0.03 [-0.07, 0.01]	0.02	-1.26	.225	-0.02 [-0.05, 0.01]	0.01	-1.56	.119
Physical activity $\times$ weekday xwednesday	-0.02 [-0.06, 0.02]	0.02	-0.86	.400	-0.03 [-0.06, 0.01]	0.02	-1.55	.131
Weekday xmunday $\times$ Physical activity <sup>2</sup>	0.00 [-0.01, 0.01]	0.01	-0.30	.770	0.01 [-0.01, 0.03]	0.01	0.77	.440
Weekday xsaturday $\times$ Physical activity <sup>2</sup>	0.00 [-0.01, 0.01]	0.01	-0.60	.552	0.01 [-0.02, 0.04]	0.02	0.58	.576
Weekday xsunday $\times$ Physical activity <sup>2</sup>	-0.01 [-0.02, 0.00]	0.01	-1.41	.199	0.02 [-0.01, 0.04]	0.01	1.50	.141
Weekday xthursday $\times$ Physical activity <sup>2</sup>	0.00 [-0.01, 0.01]	0.01	-0.09	.931	0.01 [-0.02, 0.03]	0.01	0.63	.532
Weekday xtuesday $\times$ Physical activity <sup>2</sup>	0.00 [-0.01, 0.01]	0.00	-0.63	.532	0.00 [-0.02, 0.03]	0.01	0.33	.742

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>	0.00 [-0.01, 0.01]	0.01	-0.71	.489	0.00 [-0.02, 0.02]	0.01	0.11	.914
Sleep regularity								
(Intercept)	0.56 [0.32, 0.80]	0.12	4.64	< .001	0.61 [0.36, 0.87]	0.13	4.70	< .001
Physical activity	0.09 [0.04, 0.14]	0.02	3.82	< .001	0.03 [-0.01, 0.06]	0.02	1.41	.159
Weekday xmunday	0.01 [-0.05, 0.08]	0.03	0.43	.674	0.01 [-0.05, 0.07]	0.03	0.19	.849
Weekday xsaturday	-0.12 [-0.17, -0.07]	0.03	-4.38	< .001	-0.10 [-0.16, -0.05]	0.03	-3.71	< .001
Weekday xsunday	-0.15 [-0.21, -0.10]	0.03	-5.57	< .001	-0.17 [-0.24, -0.09]	0.04	-4.50	.001
Weekday xthursday	0.12 [0.07, 0.18]	0.03	4.42	< .001	0.12 [0.06, 0.18]	0.03	3.99	< .001
Weekday xtuesday	0.13 [0.06, 0.21]	0.04	3.40	.020	0.13 [0.02, 0.23]	0.05	2.36	.079
Weekday xwednesday	0.13 [0.08, 0.17]	0.02	5.44	< .001	0.13 [0.07, 0.20]	0.03	4.21	< .001
Physical activity <sup>2</sup>	0.00 [-0.01, 0.01]	0.01	-0.39	.695	-0.01 [-0.03, 0.02]	0.01	-0.55	.588
Age	0.00 [-0.01, 0.00]	0.00	-0.50	.625	0.00 [-0.01, 0.00]	0.00	-0.51	.623
Physical activity $\times$ weekday xmonday	0.05 [-0.01, 0.11]	0.03	1.62	.116	0.09 [0.04, 0.13]	0.02	3.84	< .001
Physical activity $\times$ weekday xsaturday	-0.01 [-0.07, 0.04]	0.03	-0.45	.656	-0.03 [-0.09, 0.02]	0.03	-1.16	.277
Physical activity $\times$ weekday xsunday	0.01 [-0.05, 0.08]	0.04	0.42	.681	-0.01 [-0.08, 0.05]	0.03	-0.35	.740
Physical activity $\times$ weekday xtursday	0.03 [-0.03, 0.08]	0.03	1.01	.313	0.09 [0.04, 0.14]	0.03	3.58	.002
Physical activity $\times$ weekday xtuesday	0.00 [-0.06, 0.06]	0.03	0.11	.914	0.08 [0.02, 0.15]	0.03	2.58	.036
Physical activity $\times$ weekday xwednesday	-0.04 [-0.11, 0.04]	0.04	-0.92	.394	0.05 [0.01, 0.10]	0.02	2.36	.019
Weekday xmunday $\times$ Physical activity <sup>2</sup>	-0.01 [-0.03, 0.01]	0.01	-1.02	.340	-0.02 [-0.05, 0.02]	0.02	-0.80	.431
Weekday xsaturday $\times$ Physical activity <sup>2</sup>	0.00 [-0.02, 0.01]	0.01	-0.25	.805	-0.03 [-0.06, 0.01]	0.02	-1.48	.144
Weekday xsunday $\times$ Physical activity <sup>2</sup>	0.00 [-0.02, 0.02]	0.01	0.20	.848	0.00 [-0.03, 0.04]	0.02	0.23	.822
Weekday xthursday $\times$ Physical activity <sup>2</sup>	-0.01 [-0.03, 0.01]	0.01	-0.84	.405	-0.01 [-0.05, 0.02]	0.02	-0.69	.494
Weekday xtuesday $\times$ Physical activity <sup>2</sup>	0.00 [-0.01, 0.01]	0.01	0.19	.851	0.00 [-0.04, 0.05]	0.02	0.20	.848

Table 9 continued

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>	0.00 [-0.02, 0.02]	0.01	0.05	.958	-0.01 [-0.06, 0.04]	0.03	-0.38	.718

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

Table 10

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

TITLE

Term	Physical Activity Volume			Physical Activity Intensity				
	$\beta$ [95% CI]	SE	t	p	$\beta$ [95% CI]	SE	t	p
<b>Sleep duration</b>								
(Intercept)	1.43 [1.06, 1.81]	0.19	7.51	< .001	1.36 [1.13, 1.59]	0.12	11.64	< .001
Sleep duration	0.01 [-0.03, 0.05]	0.02	0.46	.662	0.02 [0.00, 0.05]	0.01	1.96	.050
Weekday xmonday	-0.16 [-0.20, -0.12]	0.02	-7.17	< .001	-0.07 [-0.11, -0.04]	0.02	-4.01	< .001
Weekday xsaturday	-0.08 [-0.12, -0.03]	0.02	-3.34	.001	-0.06 [-0.10, -0.02]	0.02	-2.98	.006
Weekday xsunday	-0.17 [-0.21, -0.13]	0.02	-7.93	< .001	-0.13 [-0.16, -0.09]	0.02	-7.20	< .001
Weekday xthursday	-0.04 [-0.09, 0.02]	0.03	-1.20	.268	0.01 [-0.03, 0.04]	0.02	0.49	.626
Weekday xtuesday	-0.05 [-0.10, 0.01]	0.03	-1.64	.122	-0.01 [-0.04, 0.03]	0.02	-0.53	.596
Weekday xxwednesday	-0.06 [-0.11, -0.02]	0.02	-2.59	.014	-0.02 [-0.06, 0.02]	0.02	-0.93	.355
Sleep duration <sup>2</sup>	0.00 [-0.02, 0.01]	0.01	-0.68	.513	0.00 [-0.01, 0.01]	0.01	-0.53	.610
Age	-0.02 [-0.03, -0.02]	0.00	-8.01	< .001	-0.03 [-0.03, -0.02]	0.00	-8.58	.001
Sleep duration × weekday xmonday	-0.03 [-0.07, 0.01]	0.02	-1.27	.204	-0.05 [-0.08, -0.01]	0.02	-2.62	.009
Sleep duration × weekday xsaturday	-0.02 [-0.07, 0.03]	0.03	-0.59	.564	-0.03 [-0.07, 0.02]	0.02	-1.21	.251
Sleep duration × weekday xsunday	-0.03 [-0.08, 0.03]	0.03	-0.93	.381	-0.04 [-0.08, -0.01]	0.02	-2.26	.026
Sleep duration × weekday xthursday	0.01 [-0.05, 0.07]	0.03	0.23	.828	0.00 [-0.04, 0.04]	0.02	-0.07	.944
Sleep duration × weekday xtuesday	0.00 [-0.06, 0.05]	0.03	-0.15	.886	0.00 [-0.04, 0.04]	0.02	0.12	.908
Sleep duration × weekday xwednesday	-0.02 [-0.07, 0.03]	0.03	-0.78	.446	0.00 [-0.04, 0.04]	0.02	-0.19	.852
Weekday xmonday × Sleep duration <sup>2</sup>	0.00 [-0.02, 0.02]	0.01	-0.10	.923	0.00 [-0.02, 0.02]	0.01	0.03	.978
Weekday xsaturday × Sleep duration <sup>2</sup>	-0.01 [-0.04, 0.02]	0.02	-0.49	.657	-0.01 [-0.03, 0.01]	0.01	-1.11	.310
Weekday xsunday × Sleep duration <sup>2</sup>	0.00 [-0.02, 0.01]	0.01	-0.21	.832	0.00 [-0.02, 0.02]	0.01	-0.18	.861
Weekday xtuesday × Sleep duration <sup>2</sup>	0.00 [-0.03, 0.03]	0.01	-0.11	.921	0.00 [-0.01, 0.02]	0.01	0.24	.817
Weekday xtuesday × Sleep duration <sup>2</sup>	0.00 [-0.02, 0.02]	0.01	-0.29	.776	0.00 [-0.01, 0.02]	0.01	0.52	.623

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>	0.00 [-0.04, 0.03]	0.02	-0.11	.923	0.01 [-0.01, 0.02]	0.01	0.83	.405
Sleep efficiency								
(Intercept)	1.43 [1.06, 1.81]	0.19	7.54	< .001	1.36 [1.13, 1.60]	0.12	11.43	< .001
Sleep efficiency	-0.01 [-0.05, 0.02]	0.02	-0.81	.421	-0.02 [-0.05, 0.01]	0.02	-1.11	.276
Weekday xmunday	-0.17 [-0.21, -0.12]	0.02	-7.48	< .001	-0.08 [-0.11, -0.04]	0.02	-4.48	< .001
Weekday xsaturday	-0.09 [-0.13, -0.04]	0.02	-3.82	< .001	-0.08 [-0.11, -0.04]	0.02	-4.45	< .001
Weekday xsunday	-0.18 [-0.22, -0.14]	0.02	-8.39	< .001	-0.13 [-0.17, -0.10]	0.02	-7.44	< .001
Weekday xthursday	-0.04 [-0.09, 0.01]	0.03	-1.61	.128	0.01 [-0.02, 0.04]	0.02	0.53	.594
Weekday xtuesday	-0.05 [-0.11, 0.01]	0.03	-1.58	.151	-0.01 [-0.04, 0.03]	0.02	-0.30	.764
Weekday xwednesday	-0.07 [-0.11, -0.02]	0.02	-2.92	.005	-0.01 [-0.05, 0.02]	0.02	-0.75	.453
Sleep efficiency <sup>2</sup>	0.00 [-0.01, 0.01]	0.00	-0.69	.489	0.00 [-0.01, 0.01]	0.00	-0.35	.725
Age	-0.02 [-0.03, -0.02]	0.00	-8.00	< .001	-0.03 [-0.03, -0.02]	0.00	-8.60	.001
Sleep efficiency $\times$ weekday xmonday	0.02 [-0.03, 0.07]	0.03	0.76	.451	0.05 [0.00, 0.09]	0.02	2.19	.038
Sleep efficiency $\times$ weekday xsaturday	0.02 [-0.03, 0.07]	0.03	0.71	.483	0.03 [-0.02, 0.09]	0.03	1.17	.289
Sleep efficiency $\times$ weekday xsunday	0.02 [-0.03, 0.06]	0.02	0.85	.395	0.05 [0.01, 0.09]	0.02	2.42	.026
Sleep efficiency $\times$ weekday xthursday	0.02 [-0.02, 0.07]	0.02	1.00	.322	0.01 [-0.02, 0.05]	0.02	0.71	.478
Sleep efficiency $\times$ weekday xtuesday	0.02 [-0.04, 0.08]	0.03	0.67	.524	-0.01 [-0.05, 0.02]	0.02	-0.76	.447
Sleep efficiency $\times$ weekday xwednesday	0.01 [-0.04, 0.06]	0.02	0.31	.759	0.00 [-0.05, 0.05]	0.03	-0.11	.915
Weekday xmunday $\times$ Sleep efficiency <sup>2</sup>	0.00 [-0.01, 0.01]	0.01	0.67	.503	0.00 [-0.01, 0.02]	0.01	0.56	.596
Weekday xsaturday $\times$ Sleep efficiency <sup>2</sup>	0.00 [-0.01, 0.02]	0.01	0.30	.767	0.00 [-0.01, 0.02]	0.01	0.58	.578
Weekday xsunday $\times$ Sleep efficiency <sup>2</sup>	0.00 [-0.01, 0.02]	0.01	0.68	.499	0.00 [-0.01, 0.01]	0.00	0.49	.621
Weekday xthursday $\times$ Sleep efficiency <sup>2</sup>	0.00 [-0.01, 0.01]	0.01	0.49	.632	0.00 [-0.01, 0.01]	0.01	0.10	.919
Weekday xtuesday $\times$ Sleep efficiency <sup>2</sup>	0.00 [-0.01, 0.01]	0.01	-0.06	.953	0.00 [-0.01, 0.01]	0.00	0.21	.832

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>	0.00 [-0.01, 0.02]	0.01	0.43	.670	0.00 [-0.01, 0.01]	0.00	0.13	.896
Sleep onset								
(Intercept)	1.43 [1.05, 1.82]	0.20	7.34	< .001	1.36 [1.12, 1.60]	0.12	11.08	< .001
Sleep onset	-0.04 [-0.08, 0.00]	0.02	-2.15	.038	-0.04 [-0.07, -0.01]	0.01	-2.68	.008
Weekday xmunday	-0.14 [-0.20, -0.08]	0.03	-4.62	< .001	-0.06 [-0.11, -0.01]	0.03	-2.22	.044
Weekday xsaturday	-0.08 [-0.13, -0.03]	0.02	-3.37	.001	-0.06 [-0.11, -0.02]	0.02	-2.63	.018
Weekday xsunday	-0.17 [-0.22, -0.12]	0.03	-6.69	< .001	-0.12 [-0.17, -0.07]	0.02	-5.05	< .001
Weekday xthursday	-0.05 [-0.10, 0.01]	0.03	-1.64	.114	0.01 [-0.04, 0.05]	0.02	0.29	.774
Weekday xtuesday	-0.04 [-0.11, 0.02]	0.03	-1.27	.236	0.00 [-0.04, 0.05]	0.02	0.17	.869
Weekday xwednesday	-0.07 [-0.12, -0.02]	0.03	-2.63	.010	-0.01 [-0.06, 0.04]	0.02	-0.49	.629
Sleep onset <sup>2</sup>	-0.01 [-0.04, 0.02]	0.01	-0.66	.530	0.00 [-0.02, 0.03]	0.01	0.38	.713
Age	-0.02 [-0.03, -0.02]	0.00	-8.07	< .001	-0.03 [-0.03, -0.02]	0.00	-8.60	.001
Sleep onset $\times$ weekday xmonday	0.01 [-0.03, 0.06]	0.02	0.58	.564	0.08 [0.04, 0.12]	0.02	3.67	.002
Sleep onset $\times$ weekday xsaturday	0.03 [-0.01, 0.07]	0.02	1.61	.109	0.05 [0.01, 0.09]	0.02	2.48	.025
Sleep onset $\times$ weekday xsunday	0.05 [0.01, 0.09]	0.02	2.33	.021	0.09 [0.05, 0.12]	0.02	4.70	< .001
Sleep onset $\times$ weekday xtursday	0.01 [-0.03, 0.05]	0.02	0.61	.541	0.02 [-0.02, 0.05]	0.02	1.02	.307
Sleep onset $\times$ weekday xtuesday	0.02 [-0.02, 0.07]	0.02	0.96	.341	0.01 [-0.04, 0.06]	0.02	0.49	.639
Sleep onset $\times$ weekday xwednesday	0.03 [-0.02, 0.07]	0.02	1.28	.206	0.02 [-0.01, 0.06]	0.02	1.28	.202
Weekday xmunday $\times$ Sleep onset <sup>2</sup>	-0.02 [-0.07, 0.03]	0.02	-0.78	.473	-0.02 [-0.05, 0.02]	0.02	-0.91	.398
Weekday xsaturday $\times$ Sleep onset <sup>2</sup>	0.00 [-0.03, 0.03]	0.01	-0.22	.824	-0.01 [-0.04, 0.02]	0.02	-0.47	.653
Weekday xsunday $\times$ Sleep onset <sup>2</sup>	0.00 [-0.04, 0.03]	0.02	-0.27	.794	-0.02 [-0.04, 0.01]	0.01	-1.16	.263
Weekday xthursday $\times$ Sleep onset <sup>2</sup>	0.01 [-0.04, 0.06]	0.03	0.36	.737	0.00 [-0.03, 0.04]	0.02	0.27	.798
Weekday xtuesday $\times$ Sleep onset <sup>2</sup>	0.00 [-0.04, 0.03]	0.02	-0.27	.794	-0.01 [-0.04, 0.02]	0.01	-0.71	.489

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>	0.01 [-0.03, 0.04]	0.02	0.30	.766	0.00 [-0.03, 0.02]	0.01	-0.09	.928
Sleep regularity								
(Intercept)	1.37 [1.01, 1.74]	0.18	7.44	< .001	1.34 [1.10, 1.58]	0.12	10.88	< .001
Sleep regularity	0.07 [0.04, 0.11]	0.02	3.78	.004	0.04 [0.00, 0.08]	0.02	1.75	.145
Weekday xmunday	-0.16 [-0.21, -0.10]	0.03	-5.79	< .001	-0.07 [-0.12, -0.03]	0.02	-3.22	.005
Weekday xsaturday	-0.07 [-0.12, -0.02]	0.02	-2.72	.009	-0.06 [-0.10, -0.01]	0.02	-2.36	.038
Weekday xsunday	-0.16 [-0.21, -0.11]	0.02	-6.61	< .001	-0.12 [-0.17, -0.07]	0.02	-4.95	< .001
Weekday xthursday	-0.03 [-0.08, 0.01]	0.02	-1.40	.166	0.01 [-0.03, 0.06]	0.02	0.63	.535
Weekday xtuesday	-0.04 [-0.10, 0.01]	0.03	-1.50	.156	0.00 [-0.05, 0.04]	0.02	-0.16	.878
Weekday xwednesday	-0.07 [-0.11, -0.02]	0.02	-2.89	.004	-0.02 [-0.06, 0.03]	0.02	-0.69	.495
Sleep regularity <sup>2</sup>	0.00 [-0.03, 0.02]	0.01	-0.35	.732	0.00 [-0.02, 0.02]	0.01	-0.43	.687
Age	-0.02 [-0.03, -0.02]	0.00	-8.20	< .001	-0.03 [-0.03, -0.02]	0.00	-8.74	.001
Sleep regularity $\times$ weekday xmonday	-0.02 [-0.07, 0.04]	0.03	-0.54	.601	0.01 [-0.04, 0.05]	0.02	0.26	.799
Sleep regularity $\times$ weekday xsaturday	-0.01 [-0.06, 0.04]	0.03	-0.43	.675	0.01 [-0.04, 0.06]	0.03	0.30	.773
Sleep regularity $\times$ weekday xsunday	0.02 [-0.05, 0.08]	0.03	0.48	.650	0.01 [-0.05, 0.07]	0.03	0.41	.701
Sleep regularity $\times$ weekday xthursday	-0.02 [-0.07, 0.02]	0.02	-1.13	.264	-0.01 [-0.05, 0.03]	0.02	-0.44	.664
Sleep regularity $\times$ weekday xtuesday	0.00 [-0.05, 0.05]	0.02	0.04	.970	-0.01 [-0.06, 0.03]	0.02	-0.48	.643
Sleep regularity $\times$ weekday xwednesday	-0.03 [-0.07, 0.01]	0.02	-1.37	.177	-0.03 [-0.07, 0.01]	0.02	-1.60	.118
Weekday xmunday $\times$ Sleep regularity <sup>2</sup>	0.01 [-0.02, 0.04]	0.02	0.49	.645	0.01 [-0.02, 0.03]	0.01	0.70	.514
Weekday xsaturday $\times$ Sleep regularity <sup>2</sup>	-0.01 [-0.05, 0.03]	0.02	-0.51	.638	-0.01 [-0.04, 0.02]	0.02	-0.57	.598
Weekday xsunday $\times$ Sleep regularity <sup>2</sup>	0.00 [-0.02, 0.03]	0.01	0.30	.769	0.00 [-0.03, 0.03]	0.02	-0.02	.987
Weekday xthursday $\times$ Sleep regularity <sup>2</sup>	0.00 [-0.02, 0.02]	0.01	-0.01	.994	0.00 [-0.03, 0.03]	0.02	-0.18	.866
Weekday xtuesday $\times$ Sleep regularity <sup>2</sup>	0.00 [-0.02, 0.03]	0.01	0.26	.797	0.00 [-0.03, 0.04]	0.02	0.16	.881

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 [-0.02, 0.03]	0.01	0.38	.704	0.00 [-0.03, 0.04]	0.02	0.27	.800

*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)	0.47 [0.17, 0.78]	0.15	3.07	.019	0.47 [0.17, 0.77]	0.15	3.12	.017
Physical activity	0.04 [-0.01, 0.09]	0.02	1.68	.148	0.06 [0.03, 0.10]	0.02	3.44	.001
Seasonspring	-0.02 [-0.09, 0.05]	0.04	-0.50	.616	-0.03 [-0.10, 0.05]	0.04	-0.69	.493
Seasonsummer	-0.09 [-0.16, -0.02]	0.04	-2.47	.013	-0.11 [-0.18, -0.03]	0.04	-2.75	.006
Seasonwinter	0.06 [-0.02, 0.14]	0.04	1.55	.136	0.05 [-0.03, 0.13]	0.04	1.20	.239
Physical activity <sup>2</sup>	0.00 [-0.01, 0.01]	0.00	0.00	.997	-0.01 [-0.04, 0.01]	0.01	-1.10	.274
Age	-0.01 [-0.01, 0.00]	0.00	-2.78	.008	-0.01 [-0.01, 0.00]	0.00	-2.69	.010
Physical activity × seasonspring	-0.03 [-0.08, 0.02]	0.02	-1.28	.199	-0.04 [-0.09, 0.02]	0.03	-1.27	.219
Physical activity × seasonsummer	0.01 [-0.05, 0.07]	0.03	0.19	.850	-0.04 [-0.10, 0.01]	0.03	-1.48	.141
Physical activity × seasonwinter	-0.03 [-0.09, 0.03]	0.03	-0.98	.358	-0.02 [-0.07, 0.03]	0.02	-0.79	.429
Seasonspring × Physical activity <sup>2</sup>	0.01 [-0.01, 0.02]	0.01	0.95	.341	0.02 [-0.01, 0.05]	0.02	1.16	.247
Seasonsummer × Physical activity <sup>2</sup>	0.01 [-0.01, 0.02]	0.01	0.58	.562	0.03 [-0.01, 0.06]	0.02	1.44	.150
Seasonwinter × Physical activity <sup>2</sup>	0.00 [-0.01, 0.01]	0.01	0.33	.744	0.02 [-0.02, 0.05]	0.02	1.05	.300
Sleep efficiency								
(Intercept)	0.28 [0.04, 0.52]	0.12	2.25	.025	0.29 [0.04, 0.54]	0.13	2.30	.023
Physical activity	0.02 [-0.03, 0.07]	0.03	0.80	.458	0.05 [0.01, 0.09]	0.02	2.42	.018
Seasonspring	0.05 [-0.02, 0.12]	0.03	1.45	.146	0.05 [-0.02, 0.13]	0.04	1.39	.166
Seasonsummer	0.00 [-0.09, 0.09]	0.04	0.03	.973	-0.03 [-0.12, 0.05]	0.04	-0.73	.466
Seasonwinter	0.06 [-0.01, 0.13]	0.04	1.80	.072	0.07 [-0.01, 0.14]	0.04	1.74	.082
Physical activity <sup>2</sup>	0.00 [-0.01, 0.01]	0.00	-0.28	.790	-0.01 [-0.03, 0.02]	0.01	-0.65	.517
Age	0.00 [0.00, 0.01]	0.00	0.88	.378	0.00 [0.00, 0.01]	0.00	0.79	.431

Table 11 continued

TITLE

Term	Physical Activity Volume				Physical Activity Intensity			
	$\beta$ [95% CI]	SE	t	p	$\beta$ [95% CI]	SE	t	p
Physical activity $\times$ seasonspring	-0.02 [-0.08, 0.05]	0.03	-0.44	.671	-0.05 [-0.10, -0.01]	0.02	-2.22	.027
Physical activity $\times$ seasonsummer	0.04 [-0.06, 0.14]	0.05	0.77	.482	-0.05 [-0.11, 0.00]	0.03	-1.89	.059
Physical activity $\times$ seasonwinter	-0.02 [-0.08, 0.05]	0.03	-0.54	.605	-0.06 [-0.11, 0.00]	0.03	-2.07	.046
Seasonspring $\times$ Physical activity <sup>2</sup>	0.00 [-0.01, 0.01]	0.01	-0.01	.991	0.00 [-0.03, 0.03]	0.02	0.14	.885
Seasonsummer $\times$ Physical activity <sup>2</sup>	-0.01 [-0.04, 0.02]	0.01	-0.80	.444	0.03 [-0.01, 0.06]	0.02	1.47	.141
Seasonwinter $\times$ Physical activity <sup>2</sup>	0.00 [-0.01, 0.01]	0.01	-0.21	.832	0.00 [-0.03, 0.03]	0.02	0.16	.869
Sleep onset								
(Intercept)	-0.18 [-0.49, 0.14]	0.16	-1.10	.274	-0.15 [-0.48, 0.18]	0.17	-0.91	.366
Physical activity	-0.02 [-0.04, 0.00]	0.01	-1.94	.054	-0.05 [-0.07, -0.02]	0.01	-3.52	< .001
Seasonspring	0.02 [-0.04, 0.07]	0.03	0.60	.550	0.01 [-0.04, 0.07]	0.03	0.46	.644
Seasonsummer	0.06 [0.01, 0.12]	0.03	2.30	.022	0.07 [0.01, 0.13]	0.03	2.24	.025
Seasonwinter	0.00 [-0.05, 0.05]	0.03	-0.16	.874	0.01 [-0.05, 0.07]	0.03	0.36	.717
Physical activity <sup>2</sup>	0.00 [-0.01, 0.01]	0.00	0.03	.980	0.01 [-0.01, 0.03]	0.01	0.69	.503
Age	0.00 [0.00, 0.01]	0.00	1.13	.261	0.00 [0.00, 0.01]	0.00	0.72	.474
Physical activity $\times$ seasonspring	-0.02 [-0.06, 0.02]	0.02	-1.14	.272	-0.01 [-0.05, 0.03]	0.02	-0.56	.579
Physical activity $\times$ seasonsummer	0.01 [-0.03, 0.06]	0.02	0.71	.477	0.00 [-0.04, 0.03]	0.02	-0.21	.835
Physical activity $\times$ seasonwinter	-0.01 [-0.06, 0.04]	0.03	-0.35	.744	-0.02 [-0.06, 0.03]	0.02	-0.71	.494
Seasonspring $\times$ Physical activity <sup>2</sup>	0.00 [-0.01, 0.01]	0.01	-0.10	.919	0.00 [-0.02, 0.02]	0.01	-0.19	.850
Seasonsummer $\times$ Physical activity <sup>2</sup>	-0.01 [-0.03, 0.00]	0.01	-1.47	.154	-0.01 [-0.04, 0.02]	0.01	-0.89	.380
Seasonwinter $\times$ Physical activity <sup>2</sup>	0.00 [-0.01, 0.01]	0.01	0.41	.699	-0.01 [-0.04, 0.02]	0.02	-0.92	.387
Sleep regularity								
(Intercept)	0.59 [0.35, 0.83]	0.12	4.82	< .001	0.65 [0.38, 0.93]	0.14	4.63	< .001
Physical activity	0.07 [0.02, 0.13]	0.03	2.50	.069	0.08 [0.02, 0.13]	0.03	2.84	.026

Table 11 continued

Term	Physical Activity Volume				Physical Activity Intensity			
	$\beta$ [95% CI]	SE	t	p	$\beta$ [95% CI]	SE	t	p
Seasonspring	-0.10 [-0.18, -0.02]	0.04	-2.54	.012	-0.13 [-0.22, -0.04]	0.05	-2.82	.009
Seasonsummer	-0.02 [-0.12, 0.07]	0.05	-0.51	.619	-0.06 [-0.16, 0.04]	0.05	-1.16	.259
Seasonwinter	-0.03 [-0.12, 0.06]	0.05	-0.58	.571	-0.04 [-0.15, 0.07]	0.06	-0.79	.452
Physical activity <sup>2</sup>	-0.01 [-0.02, 0.01]	0.01	-0.75	.511	-0.03 [-0.06, 0.00]	0.02	-1.75	.107
Age	0.00 [-0.01, 0.00]	0.00	-0.25	.806	0.00 [-0.01, 0.00]	0.00	-0.27	.794
Physical activity × seasonspring	0.08 [-0.04, 0.19]	0.06	1.27	.296	0.00 [-0.05, 0.05]	0.03	-0.07	.940
Physical activity × seasonsummer	0.06 [-0.13, 0.25]	0.10	0.60	.599	0.01 [-0.06, 0.08]	0.03	0.30	.767
Physical activity × seasonwinter	0.03 [-0.08, 0.15]	0.06	0.53	.634	0.00 [-0.06, 0.05]	0.03	-0.12	.904
Seasonspring × Physical activity <sup>2</sup>	-0.01 [-0.04, 0.03]	0.02	-0.38	.733	0.03 [-0.01, 0.07]	0.02	1.37	.189
Seasonsummer × Physical activity <sup>2</sup>	-0.01 [-0.05, 0.03]	0.02	-0.45	.681	0.03 [-0.01, 0.07]	0.02	1.29	.209
Seasonwinter × Physical activity <sup>2</sup>	0.00 [-0.03, 0.03]	0.02	0.06	.957	0.02 [-0.03, 0.07]	0.02	0.86	.414

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

*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)	1.37 [1.00, 1.74]	0.19	7.22	< .001	1.35 [1.12, 1.58]	0.12	11.58	< .001
Sleep duration	-0.01 [-0.05, 0.04]	0.02	-0.39	.721	0.01 [-0.02, 0.04]	0.01	0.59	.574
Seasonspring	-0.01 [-0.08, 0.06]	0.04	-0.39	.700	-0.06 [-0.13, 0.01]	0.03	-1.76	.096
Seasonsummer	-0.03 [-0.10, 0.03]	0.03	-0.95	.341	-0.04 [-0.10, 0.02]	0.03	-1.37	.174
Seasonwinter	-0.04 [-0.11, 0.02]	0.03	-1.28	.204	-0.06 [-0.12, 0.00]	0.03	-1.82	.082
Sleep duration <sup>2</sup>	0.00 [-0.02, 0.01]	0.01	-0.44	.698	0.00 [-0.01, 0.01]	0.00	0.03	.973
Age	-0.02 [-0.03, -0.02]	0.00	-8.17	< .001	-0.03 [-0.03, -0.02]	0.00	-8.49	.001
Sleep duration × seasonspring	0.01 [-0.05, 0.06]	0.03	0.20	.851	0.00 [-0.03, 0.02]	0.01	-0.23	.816
Sleep duration × seasonsummer	-0.01 [-0.06, 0.04]	0.03	-0.31	.765	0.00 [-0.04, 0.03]	0.02	-0.23	.814
Sleep duration × seasonwinter	0.03 [-0.02, 0.09]	0.03	1.10	.319	0.00 [-0.03, 0.03]	0.02	-0.01	.994
Seasonspring × Sleep duration <sup>2</sup>	0.00 [-0.03, 0.02]	0.01	-0.20	.858	-0.01 [-0.02, 0.00]	0.01	-1.19	.273
Seasonsummer × Sleep duration <sup>2</sup>	0.00 [-0.02, 0.02]	0.01	-0.12	.910	0.00 [-0.01, 0.00]	0.00	-0.90	.367
Seasonwinter × Sleep duration <sup>2</sup>	0.00 [-0.02, 0.02]	0.01	0.39	.721	0.00 [-0.01, 0.01]	0.00	-0.18	.860
Sleep efficiency								
(Intercept)	1.36 [0.98, 1.74]	0.19	7.01	< .001	1.36 [1.13, 1.59]	0.12	11.45	< .001
Sleep efficiency	0.00 [-0.02, 0.03]	0.01	0.32	.751	0.00 [-0.02, 0.02]	0.01	-0.19	.852
Seasonspring	-0.01 [-0.08, 0.06]	0.04	-0.34	.739	-0.07 [-0.13, 0.00]	0.03	-2.10	.048
Seasonsummer	-0.03 [-0.09, 0.03]	0.03	-0.90	.367	-0.05 [-0.11, 0.01]	0.03	-1.55	.126
Seasonwinter	-0.03 [-0.10, 0.03]	0.03	-1.03	.306	-0.06 [-0.13, 0.00]	0.03	-1.85	.084
Sleep efficiency <sup>2</sup>	0.00 [-0.01, 0.01]	0.00	0.38	.711	0.00 [-0.01, 0.01]	0.00	0.02	.982
Age	-0.02 [-0.03, -0.02]	0.00	-8.04	< .001	-0.03 [-0.03, -0.02]	0.00	-8.52	.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 $\times$ seasonspring	-0.01 [-0.05, 0.02]	0.02	-0.76	.448	0.00 [-0.04, 0.03]	0.02	-0.06	.952
Sleep efficiency $\times$ seasonsummer	0.01 [-0.04, 0.06]	0.02	0.43	.670	0.02 [-0.02, 0.06]	0.02	1.15	.253
Sleep efficiency $\times$ seasonwinter	0.00 [-0.04, 0.05]	0.02	0.08	.941	0.00 [-0.03, 0.04]	0.02	0.21	.832
Seasonspring $\times$ Sleep efficiency <sup>2</sup>	0.00 [-0.01, 0.01]	0.00	-0.76	.459	0.00 [-0.01, 0.01]	0.00	0.24	.814
Seasonsummer $\times$ Sleep efficiency <sup>2</sup>	0.00 [-0.01, 0.01]	0.01	-0.39	.695	0.00 [-0.01, 0.01]	0.01	0.02	.982
Seasonwinter $\times$ Sleep efficiency <sup>2</sup>	0.00 [-0.02, 0.01]	0.01	-0.54	.602	0.00 [-0.01, 0.01]	0.00	0.38	.706
Sleep onset								
(Intercept)	1.38 [1.00, 1.75]	0.19	7.20	< .001	1.35 [1.12, 1.59]	0.12	11.44	< .001
Sleep onset	-0.01 [-0.08, 0.05]	0.03	-0.43	.689	0.00 [-0.02, 0.03]	0.01	0.26	.795
Seasonspring	-0.01 [-0.09, 0.06]	0.04	-0.40	.687	-0.05 [-0.12, 0.02]	0.04	-1.29	.214
Seasonsummer	-0.04 [-0.11, 0.04]	0.04	-0.98	.327	-0.04 [-0.11, 0.03]	0.04	-1.25	.221
Seasonwinter	-0.05 [-0.13, 0.04]	0.04	-1.14	.281	-0.07 [-0.13, -0.01]	0.03	-2.19	.032
Sleep onset <sup>2</sup>	-0.01 [-0.05, 0.02]	0.02	-0.82	.460	0.00 [-0.01, 0.02]	0.01	0.40	.690
Age	-0.02 [-0.03, -0.02]	0.00	-8.06	< .001	-0.03 [-0.03, -0.02]	0.00	-8.46	.001
Sleep onset $\times$ seasonspring	-0.01 [-0.08, 0.05]	0.03	-0.42	.684	0.00 [-0.04, 0.03]	0.02	-0.14	.890
Sleep onset $\times$ seasonsummer	0.02 [-0.04, 0.08]	0.03	0.60	.556	0.01 [-0.05, 0.06]	0.03	0.24	.815
Sleep onset $\times$ seasonwinter	-0.03 [-0.08, 0.03]	0.03	-0.94	.370	-0.02 [-0.07, 0.02]	0.02	-1.12	.274
Seasonspring $\times$ Sleep onset <sup>2</sup>	0.00 [-0.04, 0.04]	0.02	-0.04	.967	-0.02 [-0.04, 0.00]	0.01	-1.88	.070
Seasonsummer $\times$ Sleep onset <sup>2</sup>	0.00 [-0.04, 0.04]	0.02	-0.02	.982	-0.01 [-0.03, 0.02]	0.01	-0.42	.679
Seasonwinter $\times$ Sleep onset <sup>2</sup>	0.01 [-0.05, 0.07]	0.03	0.32	.769	0.01 [-0.02, 0.03]	0.01	0.43	.674
Sleep regularity								
(Intercept)	1.30 [0.94, 1.67]	0.19	6.98	< .001	1.33 [1.10, 1.56]	0.12	11.36	< .001
Sleep regularity	0.06 [0.03, 0.10]	0.02	3.30	.011	0.03 [0.00, 0.05]	0.01	1.81	.095

Table 12 continued

Term	Physical Activity Volume				Physical Activity Intensity			
	$\beta$ [95% CI]	SE	t	p	$\beta$ [95% CI]	SE	t	p
Seasonspring	-0.01 [-0.07, 0.06]	0.03	-0.20	.844	-0.07 [-0.13, -0.01]	0.03	-2.28	.024
Seasonsummer	-0.03 [-0.10, 0.04]	0.04	-0.77	.441	-0.04 [-0.10, 0.02]	0.03	-1.30	.194
Seasonwinter	-0.02 [-0.09, 0.04]	0.03	-0.65	.515	-0.06 [-0.13, 0.01]	0.03	-1.72	.103
Sleep regularity <sup>2</sup>	0.00 [-0.02, 0.02]	0.01	0.08	.936	0.00 [-0.02, 0.01]	0.01	-0.31	.764
Age	-0.02 [-0.03, -0.02]	0.00	-8.29	< .001	-0.03 [-0.03, -0.02]	0.00	-8.73	.001
Sleep regularity $\times$ seasonspring	0.02 [-0.03, 0.07]	0.02	0.89	.391	0.02 [-0.01, 0.06]	0.02	1.19	.252
Sleep regularity $\times$ seasonsummer	-0.02 [-0.07, 0.03]	0.02	-0.68	.504	-0.01 [-0.06, 0.04]	0.03	-0.33	.755
Sleep regularity $\times$ seasonwinter	0.02 [-0.04, 0.08]	0.03	0.61	.572	0.02 [-0.02, 0.07]	0.02	0.98	.368
Seasonspring $\times$ Sleep regularity <sup>2</sup>	-0.01 [-0.03, 0.01]	0.01	-0.51	.613	0.00 [-0.02, 0.02]	0.01	0.16	.876
Seasonsummer $\times$ Sleep regularity <sup>2</sup>	0.00 [-0.03, 0.03]	0.01	0.03	.973	0.00 [-0.02, 0.01]	0.01	-0.47	.639
Seasonwinter $\times$ Sleep regularity <sup>2</sup>	-0.01 [-0.04, 0.02]	0.01	-0.80	.443	0.00 [-0.02, 0.02]	0.01	0.04	.966

*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)	0.42 [0.15, 0.69]	0.14	3.06	.005	0.41 [0.16, 0.67]	0.13	3.20	.002
Physical activity	0.00 [-0.04, 0.03]	0.02	-0.24	.815	-0.04 [-0.12, 0.05]	0.04	-0.87	.386
Regioneurope	-0.22 [-0.42, -0.02]	0.10	-2.12	.041	-0.21 [-0.41, -0.02]	0.10	-2.20	.029
Regionafrica	-0.21 [-0.44, 0.02]	0.12	-1.81	.077	-0.28 [-0.53, -0.03]	0.13	-2.23	.035
Regionasia	-0.46 [-0.73, -0.20]	0.14	-3.38	.003	-0.53 [-0.78, -0.28]	0.13	-4.18	< .001
Regionnorth america	-0.07 [-0.31, 0.17]	0.12	-0.56	.578	-0.11 [-0.36, 0.14]	0.13	-0.83	.412
Regionsouth america	-0.37 [-0.59, -0.14]	0.11	-3.22	.004	-0.40 [-0.61, -0.18]	0.11	-3.60	.001
Physical activity <sup>2</sup>	0.00 [0.00, 0.01]	0.00	0.67	.516	0.04 [0.00, 0.08]	0.02	1.91	.069
Age	-0.01 [-0.01, 0.00]	0.00	-2.95	.008	-0.01 [-0.01, 0.00]	0.00	-2.91	.007
Physical activity × regioneurope	0.04 [0.00, 0.09]	0.02	1.88	.068	0.07 [-0.02, 0.15]	0.04	1.61	.112
Physical activity × regionafrica	0.08 [0.05, 0.21]	0.07	1.25	.228	0.15 [0.00, 0.30]	0.08	2.02	.047
Physical activity × regionasia	0.12 [-0.03, 0.27]	0.08	1.55	.126	0.07 [-0.10, 0.24]	0.09	0.81	.420
Physical activity × regionnorth america	0.02 [-0.13, 0.18]	0.08	0.30	.772	0.07 [-0.10, 0.25]	0.09	0.85	.402
Physical activity × regionsouth america	0.06 [-0.01, 0.13]	0.04	1.63	.102	0.04 [-0.07, 0.15]	0.06	0.71	.483
Regioneurope × Physical activity <sup>2</sup>	0.00 [-0.01, 0.01]	0.00	0.29	.771	-0.05 [-0.10, 0.00]	0.03	-1.93	.078
Regionafrica × Physical activity <sup>2</sup>	0.01 [-0.07, 0.09]	0.04	0.20	.845	-0.03 [-0.11, 0.05]	0.04	-0.70	.483
Regionasia × Physical activity <sup>2</sup>	-0.03 [-0.14, 0.07]	0.05	-0.62	.537	-0.05 [-0.18, 0.09]	0.07	-0.67	.501
Regionnorth america × Physical activity <sup>2</sup>	0.00 [-0.05, 0.04]	0.02	-0.10	.921	0.01 [-0.09, 0.11]	0.05	0.18	.855
Regionsouth america × Physical activity <sup>2</sup>	-0.02 [-0.04, 0.01]	0.01	-1.25	.212	-0.01 [-0.08, 0.05]	0.03	-0.42	.678
Sleep efficiency								
(Intercept)	0.34 [0.11, 0.57]	0.12	2.87	.004	0.35 [0.12, 0.58]	0.12	2.95	.003

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	-0.01 [-0.05, 0.03]	0.02	-0.56	.581	0.03 [-0.06, 0.12]	0.05	0.76	.456
Regioneurope	-0.19 [-0.37, -0.01]	0.09	-2.04	.041	-0.19 [-0.37, -0.01]	0.09	-2.02	.043
Regionafrica	-0.11 [-0.32, 0.10]	0.11	-0.98	.325	-0.13 [-0.37, 0.11]	0.12	-1.03	.311
Regionasia	-0.24 [-0.50, 0.03]	0.14	-1.75	.092	-0.44 [-0.67, -0.20]	0.12	-3.62	< .001
Regionnorth america	-0.05 [-0.27, 0.17]	0.11	-0.43	.667	-0.10 [-0.31, 0.12]	0.11	-0.86	.388
Regionsouth america	-0.38 [-0.59, -0.18]	0.10	-3.71	< .001	-0.46 [-0.66, -0.27]	0.10	-4.68	< .001
Physical activity <sup>2</sup>	0.00 [-0.01, 0.00]	0.00	-0.17	.863	-0.03 [-0.06, 0.01]	0.02	-1.46	.144
Age	0.00 [0.00, 0.00]	0.00	0.42	.674	0.00 [0.00, 0.00]	0.00	0.46	.644
Physical activity × regioneurope	0.01 [-0.03, 0.05]	0.02	0.44	.658	-0.03 [-0.12, 0.05]	0.04	-0.74	.462
Physical activity × regionafrica	0.02 [-0.12, 0.15]	0.07	0.24	.816	-0.01 [-0.17, 0.16]	0.08	-0.07	.946
Physical activity × regionasia	0.24 [0.08, 0.40]	0.08	2.99	.004	0.04 [-0.15, 0.24]	0.10	0.43	.676
Physical activity × regionnorth america	0.07 [-0.09, 0.24]	0.08	0.88	.400	-0.02 [-0.19, 0.16]	0.09	-0.20	.845
Physical activity × regionsouth america	0.15 [0.01, 0.28]	0.07	2.09	.110	-0.07 [-0.18, 0.03]	0.05	-1.36	.175
Regioneurope × Physical activity <sup>2</sup>	0.00 [-0.01, 0.01]	0.00	0.10	.924	0.03 [-0.01, 0.07]	0.02	1.29	.199
Regionafrica × Physical activity <sup>2</sup>	0.01 [-0.07, 0.08]	0.04	0.20	.840	0.03 [-0.07, 0.13]	0.05	0.59	.565
Regionasia × Physical activity <sup>2</sup>	-0.12 [-0.36, 0.12]	0.12	-1.00	.386	-0.03 [-0.20, 0.15]	0.09	-0.33	.746
Regionnorth america × Physical activity <sup>2</sup>	0.00 [-0.05, 0.04]	0.02	-0.09	.927	0.05 [-0.07, 0.16]	0.06	0.76	.454
Regionsouth america × Physical activity <sup>2</sup>	-0.02 [-0.07, 0.04]	0.03	-0.59	.596	0.06 [0.00, 0.13]	0.03	1.89	.065
Sleep onset								
(Intercept)	-0.12 [-0.45, 0.21]	0.17	-0.73	.468	-0.08 [-0.41, 0.25]	0.17	-0.48	.629
Physical activity	-0.01 [-0.03, 0.01]	0.01	-1.29	.200	-0.04 [-0.09, 0.01]	0.03	-1.44	.151
Regioneurope	0.15 [-0.01, 0.31]	0.08	1.86	.063	0.13 [-0.03, 0.29]	0.08	1.62	.104
Regionafrica	0.06 [-0.12, 0.23]	0.09	0.66	.508	0.05 [-0.13, 0.22]	0.09	0.53	.599

Table 13 continued

TITLE

Term	Physical Activity Volume				Physical Activity Intensity			
	$\beta$ [95% CI]	SE	t	p	$\beta$ [95% CI]	SE	t	p
Regionasia	0.29 [0.08, 0.49]	0.10	2.74	.008	0.17 [-0.05, 0.39]	0.11	1.53	.140
Regionnorth america	0.03 [-0.15, 0.21]	0.09	0.35	.729	0.00 [-0.19, 0.18]	0.09	-0.02	.984
Regionsouth america	0.05 [-0.12, 0.22]	0.09	0.56	.575	0.00 [-0.17, 0.17]	0.09	0.00	.998
Physical activity <sup>2</sup>	0.00 [0.00, 0.00]	0.00	-0.90	.369	-0.03 [-0.06, -0.01]	0.01	-2.36	.020
Age	0.00 [0.00, 0.01]	0.00	1.27	.213	0.00 [0.00, 0.01]	0.00	0.95	.350
Physical activity × regioneurope	-0.04 [-0.07, -0.01]	0.01	-2.61	.010	-0.01 [-0.07, 0.04]	0.03	-0.39	.694
Physical activity × regionafrica	-0.03 [-0.14, 0.09]	0.06	-0.48	.651	-0.04 [-0.15, 0.07]	0.05	-0.70	.489
Physical activity × regionasia	0.05 [-0.05, 0.15]	0.05	1.03	.303	0.02 [-0.10, 0.14]	0.06	0.32	.752
Physical activity × regionnorth america	0.02 [-0.06, 0.11]	0.04	0.56	.575	0.04 [-0.07, 0.14]	0.05	0.67	.503
Physical activity × regionsouth america	0.03 [-0.02, 0.08]	0.03	1.14	.256	-0.02 [-0.10, 0.06]	0.04	-0.52	.607
Regioneurope × Physical activity <sup>2</sup>	0.00 [0.00, 0.01]	0.00	0.53	.596	0.04 [0.01, 0.07]	0.01	2.67	.008
Regionafrica × Physical activity <sup>2</sup>	-0.01 [-0.07, 0.06]	0.03	-0.16	.876	0.04 [-0.02, 0.10]	0.03	1.42	.155
Regionasia × Physical activity <sup>2</sup>	-0.04 [-0.12, 0.05]	0.04	-0.86	.397	0.07 [-0.03, 0.18]	0.05	1.39	.173
Regionnorth america × Physical activity <sup>2</sup>	0.01 [-0.02, 0.03]	0.01	0.52	.603	0.00 [-0.08, 0.07]	0.04	-0.12	.906
Regionsouth america × Physical activity <sup>2</sup>	0.00 [-0.01, 0.02]	0.01	0.43	.670	0.05 [0.00, 0.10]	0.03	1.88	.073
Sleep regularity								
(Intercept)	0.10 [-0.16, 0.35]	0.13	0.76	.454	0.14 [-0.14, 0.42]	0.14	0.97	.342
Physical activity	0.06 [0.01, 0.10]	0.02	2.41	.054	0.12 [0.01, 0.23]	0.06	2.13	.065
Regioneurope	0.22 [0.03, 0.41]	0.10	2.30	.022	0.21 [0.01, 0.41]	0.10	2.02	.044
Regionafrica	0.39 [0.15, 0.63]	0.12	3.21	.002	0.37 [0.12, 0.61]	0.13	2.93	.004
Regionasia	0.36 [0.09, 0.62]	0.14	2.63	.011	0.17 [-0.08, 0.41]	0.12	1.35	.177
Regionnorth america	0.06 [-0.17, 0.29]	0.12	0.51	.608	0.07 [-0.17, 0.32]	0.12	0.57	.568
Regionsouth america	-0.07 [-0.27, 0.14]	0.10	-0.66	.508	-0.13 [-0.34, 0.08]	0.11	-1.22	.222

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 <sup>2</sup>	0.00 [-0.01, 0.01]	0.00	0.45	.672	-0.04 [-0.09, 0.01]	0.03	-1.43	.182
Age	0.00 [-0.01, 0.00]	0.00	-1.43	.163	0.00 [-0.01, 0.00]	0.00	-1.38	.189
Physical activity × regioneurope	0.07 [0.00, 0.13]	0.03	1.99	.101	-0.06 [-0.19, 0.08]	0.07	-0.82	.452
Physical activity × regionafrica	0.03 [-0.09, 0.15]	0.06	0.51	.613	0.06 [-0.11, 0.22]	0.08	0.68	.499
Physical activity × regionasia	0.08 [-0.07, 0.23]	0.07	1.08	.282	0.09 [-0.09, 0.26]	0.09	1.00	.322
Physical activity × regionnorth america	0.06 [-0.16, 0.27]	0.11	0.51	.637	-0.04 [-0.22, 0.14]	0.09	-0.40	.691
Physical activity × regionsouth america	0.14 [0.03, 0.24]	0.05	2.56	.035	0.06 [-0.08, 0.20]	0.07	0.88	.400
Regioneurope × Physical activity <sup>2</sup>	-0.01 [-0.03, 0.01]	0.01	-1.36	.249	0.03 [-0.02, 0.08]	0.03	1.32	.206
Regionafrica × Physical activity <sup>2</sup>	-0.04 [-0.15, 0.06]	0.05	-0.80	.456	-0.04 [-0.15, 0.06]	0.05	-0.77	.451
Regionasia × Physical activity <sup>2</sup>	-0.20 [-0.39, -0.01]	0.09	-2.12	.093	0.02 [-0.12, 0.15]	0.07	0.21	.832
Regionnorth america × Physical activity <sup>2</sup>	-0.03 [-0.07, 0.02]	0.02	-1.15	.261	-0.03 [-0.13, 0.07]	0.05	-0.53	.595
Regionsouth america × Physical activity <sup>2</sup>	-0.01 [-0.06, 0.05]	0.03	-0.27	.806	-0.02 [-0.11, 0.06]	0.05	-0.53	.609

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)	1.21 [0.86, 1.56]	0.18	6.81	< .001	1.11 [0.90, 1.32]	0.11	10.23	< .001
Sleep duration	0.06 [-0.06, 0.17]	0.06	0.98	.415	0.01 [-0.02, 0.04]	0.01	0.76	.446
Regioneurope	-0.21 [-0.41, -0.02]	0.10	-2.21	.029	-0.12 [-0.27, 0.04]	0.08	-1.45	.148
Regionafrica	-0.19 [-0.39, 0.02]	0.11	-1.77	.078	-0.05 [-0.25, 0.15]	0.10	-0.48	.634
Regionasia	-0.44 [-0.65, -0.23]	0.11	-4.12	< .001	-0.38 [-0.56, -0.20]	0.09	-4.15	< .001
Regionnorth america	-0.30 [-0.51, -0.08]	0.11	-2.73	.007	-0.20 [-0.40, 0.00]	0.10	-1.98	.054
Regionsouth america	-0.36 [-0.55, -0.18]	0.09	-3.87	< .001	-0.28 [-0.44, -0.12]	0.08	-3.44	.001
Sleep duration <sup>2</sup>	-0.01 [-0.02, 0.01]	0.01	-0.87	.414	0.00 [-0.01, 0.01]	0.00	-0.29	.775
Age	-0.02 [-0.03, -0.02]	0.00	-8.90	< .001	-0.03 [-0.03, -0.02]	0.00	-11.07	< .001
Sleep duration × regioneurope	-0.06 [-0.18, 0.06]	0.06	-1.05	.385	0.00 [-0.03, 0.03]	0.02	0.20	.841
Sleep duration × regionafrica	-0.05 [-0.14, 0.04]	0.05	-1.07	.302	-0.04 [-0.13, 0.05]	0.05	-0.83	.440
Sleep duration × regionasia	-0.06 [-0.17, 0.05]	0.06	-1.08	.302	0.00 [-0.09, 0.08]	0.04	-0.05	.962
Sleep duration × regiornnorth america	-0.08 [-0.24, 0.08]	0.08	-0.95	.415	-0.01 [-0.11, 0.09]	0.05	-0.28	.793
Sleep duration × regionsouth america	-0.07 [-0.18, 0.05]	0.06	-1.10	.358	-0.03 [-0.08, 0.03]	0.03	-1.02	.334
Regioneurope × Sleep duration <sup>2</sup>	0.00 [-0.02, 0.02]	0.01	0.14	.892	0.00 [-0.01, 0.01]	0.01	-0.26	.795
Regionafrica × Sleep duration <sup>2</sup>	0.00 [-0.04, 0.03]	0.02	-0.13	.897	-0.02 [-0.06, 0.02]	0.02	-1.10	.301
Regionasia × Sleep duration <sup>2</sup>	0.01 [-0.02, 0.05]	0.02	0.75	.467	0.00 [-0.03, 0.04]	0.02	0.19	.859
Regionnorth america × Sleep duration <sup>2</sup>	-0.01 [-0.04, 0.03]	0.02	-0.43	.687	-0.01 [-0.03, 0.02]	0.01	-0.49	.641
Regionsouth america × Sleep duration <sup>2</sup>	0.01 [-0.01, 0.02]	0.01	0.98	.327	-0.01 [-0.03, 0.01]	0.01	-0.73	.501
Sleep efficiency								
(Intercept)	1.23 [0.88, 1.57]	0.18	6.88	< .001	1.10 [0.89, 1.32]	0.11	10.25	< .001

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	-0.03 [-0.14, 0.08]	0.06	-0.50	.656	0.00 [-0.04, 0.04]	0.02	-0.06	.950
Regioneurope	-0.24 [-0.42, -0.07]	0.09	-2.69	.007	-0.11 [-0.27, 0.04]	0.08	-1.40	.163
Regionafrica	-0.21 [-0.41, -0.01]	0.10	-2.03	.044	-0.08 [-0.26, 0.09]	0.09	-0.92	.360
Regionasia	-0.44 [-0.64, -0.25]	0.10	-4.37	< .001	-0.35 [-0.53, -0.17]	0.09	-3.78	< .001
Regionnorth america	-0.34 [-0.54, -0.14]	0.10	-3.37	.001	-0.22 [-0.39, -0.04]	0.09	-2.46	.014
Regionsouth america	-0.38 [-0.56, -0.19]	0.09	-4.05	< .001	-0.30 [-0.46, -0.14]	0.08	-3.79	< .001
Sleep efficiency <sup>2</sup>	-0.01 [-0.03, 0.01]	0.01	-0.68	.544	0.00 [-0.01, 0.01]	0.01	0.61	.563
Age	-0.02 [-0.03, -0.02]	0.00	-8.82	< .001	-0.03 [-0.03, -0.02]	0.00	-11.14	< .001
Sleep efficiency × regioneurope	0.04 [-0.07, 0.15]	0.06	0.64	.569	0.01 [-0.03, 0.05]	0.02	0.67	.505
Sleep efficiency × regionafrica	0.03 [-0.11, 0.18]	0.07	0.44	.688	-0.04 [-0.15, 0.07]	0.06	-0.68	.532
Sleep efficiency × regionasia	0.04 [-0.09, 0.17]	0.07	0.58	.595	0.02 [-0.06, 0.09]	0.04	0.42	.686
Sleep efficiency × regionnorth america	0.03 [-0.10, 0.16]	0.07	0.47	.657	-0.01 [-0.08, 0.06]	0.04	-0.37	.713
Sleep efficiency × regionsouth america	0.02 [-0.11, 0.16]	0.07	0.36	.743	-0.01 [-0.06, 0.04]	0.03	-0.36	.722
Regioneurope × Sleep efficiency <sup>2</sup>	0.01 [-0.01, 0.03]	0.01	0.66	.556	0.00 [-0.01, 0.01]	0.01	-0.65	.526
Regionafrica × Sleep efficiency <sup>2</sup>	0.01 [-0.02, 0.03]	0.01	0.49	.640	-0.01 [-0.04, 0.01]	0.01	-1.14	.303
Regionasia × Sleep efficiency <sup>2</sup>	0.01 [-0.02, 0.03]	0.01	0.63	.549	-0.01 [-0.03, 0.00]	0.01	-1.45	.159
Regionnorth america × Sleep efficiency <sup>2</sup>	0.00 [-0.02, 0.03]	0.01	0.38	.721	0.00 [-0.02, 0.01]	0.01	-0.42	.678
Regionsouth america × Sleep efficiency <sup>2</sup>	0.00 [-0.02, 0.03]	0.01	0.37	.739	0.00 [-0.01, 0.01]	0.01	-0.55	.591
Sleep onset								
(Intercept)	1.13 [0.78, 1.48]	0.18	6.30	< .001	1.11 [0.88, 1.34]	0.12	9.41	< .001
Sleep onset	-0.13 [-0.23, -0.03]	0.05	-2.61	.056	-0.04 [-0.16, 0.08]	0.06	-0.64	.568
Regioneurope	-0.10 [-0.30, 0.09]	0.10	-1.04	.298	-0.12 [-0.33, 0.09]	0.11	-1.08	.305
Regionafrica	-0.08 [-0.34, 0.18]	0.13	-0.62	.536	-0.12 [-0.35, 0.12]	0.12	-0.95	.352

Table 14 continued

TITLE

Term	Physical Activity Volume				Physical Activity Intensity			
	$\beta$ [95% CI]	SE	t	p	$\beta$ [95% CI]	SE	t	p
Regionasia	-0.27 [-0.51, -0.03]	0.12	-2.19	.029	-0.35 [-0.60, -0.11]	0.13	-2.81	.012
Regionnorth america	-0.17 [-0.43, 0.09]	0.13	-1.29	.203	-0.21 [-0.50, 0.09]	0.15	-1.37	.214
Regionsouth america	-0.26 [-0.49, -0.03]	0.12	-2.22	.031	-0.32 [-0.52, -0.12]	0.10	-3.14	.004
Sleep onset <sup>2</sup>	0.00 [-0.05, 0.05]	0.02	0.05	.965	-0.03 [-0.05, 0.00]	0.01	-2.31	.021
Age	-0.02 [-0.03, -0.02]	0.00	-9.11	< .001	-0.03 [-0.03, -0.02]	0.00	-11.42	< .001
Sleep onset × regioneurope	0.13 [0.03, 0.23]	0.05	2.48	.055	0.04 [-0.07, 0.16]	0.06	0.70	.535
Sleep onset × regionafrica	0.14 [-0.07, 0.34]	0.10	1.30	.201	0.02 [-0.15, 0.19]	0.09	0.24	.810
Sleep onset × regionasia	0.17 [-0.07, 0.41]	0.12	1.38	.171	0.04 [-0.17, 0.25]	0.11	0.37	.713
Sleep onset × regionnorth america	0.16 [-0.02, 0.33]	0.09	1.73	.107	0.11 [-0.04, 0.27]	0.08	1.48	.168
Sleep onset × regionsouth america	0.10 [-0.01, 0.21]	0.06	1.70	.117	0.00 [-0.14, 0.15]	0.07	0.01	.996
Regioneurope × Sleep onset <sup>2</sup>	-0.01 [-0.07, 0.04]	0.03	-0.55	.612	0.03 [0.00, 0.05]	0.01	2.12	.034
Regionafrica × Sleep onset <sup>2</sup>	0.01 [-0.15, 0.16]	0.08	0.07	.950	0.04 [-0.07, 0.15]	0.06	0.65	.523
Regionasia × Sleep onset <sup>2</sup>	-0.01 [-0.16, 0.13]	0.07	-0.19	.846	0.00 [-0.14, 0.14]	0.07	0.03	.976
Regionnorth america × Sleep onset <sup>2</sup>	-0.02 [-0.11, 0.07]	0.05	-0.43	.674	0.08 [-0.02, 0.18]	0.05	1.53	.186
Regionsouth america × Sleep onset <sup>2</sup>	-0.02 [-0.08, 0.03]	0.03	-0.82	.433	0.02 [-0.02, 0.06]	0.02	0.80	.436
Sleep regularity								
(Intercept)	1.24 [0.89, 1.59]	0.18	6.96	< .001	1.11 [0.90, 1.32]	0.11	10.41	< .001
Sleep regularity	0.12 [0.00, 0.24]	0.06	1.92	.172	0.03 [-0.02, 0.07]	0.02	1.05	.338
Regioneurope	-0.31 [-0.48, -0.13]	0.09	-3.36	.001	-0.13 [-0.29, 0.03]	0.08	-1.61	.110
Regionafrica	-0.26 [-0.47, -0.06]	0.11	-2.49	.015	-0.10 [-0.28, 0.07]	0.09	-1.16	.245
Regionasia	-0.51 [-0.72, -0.29]	0.11	-4.62	< .001	-0.38 [-0.56, -0.20]	0.09	-4.11	< .001
Regionnorth america	-0.38 [-0.58, -0.19]	0.10	-3.79	< .001	-0.20 [-0.38, -0.02]	0.09	-2.23	.026
Regionsouth america	-0.42 [-0.61, -0.24]	0.09	-4.48	< .001	-0.29 [-0.45, -0.13]	0.08	-3.57	< .001

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>	-0.02 [-0.04, 0.00]	0.01	-1.72	.102	-0.01 [-0.02, 0.01]	0.01	-0.58	.568
Age	-0.02 [-0.03, -0.02]	0.00	-9.09	< .001	-0.03 [-0.03, -0.02]	0.00	-11.20	< .001
Sleep regularity × regioneurope	-0.06 [-0.19, 0.07]	0.07	-0.87	.461	0.01 [-0.06, 0.07]	0.03	0.23	.829
Sleep regularity × regionafrica	-0.07 [-0.20, 0.06]	0.07	-1.08	.342	0.04 [-0.02, 0.10]	0.03	1.24	.213
Sleep regularity × regionasia	-0.05 [-0.17, 0.08]	0.06	-0.74	.489	0.04 [-0.04, 0.12]	0.04	1.05	.299
Sleep regularity × regionnorth america	-0.07 [-0.24, 0.10]	0.09	-0.79	.484	0.01 [-0.11, 0.14]	0.06	0.22	.840
Sleep regularity × regionsouth america	-0.03 [-0.17, 0.11]	0.07	-0.42	.706	0.03 [-0.04, 0.11]	0.04	0.86	.432
Regioneurope × Sleep regularity <sup>2</sup>	0.02 [-0.02, 0.06]	0.02	0.90	.428	0.00 [-0.02, 0.02]	0.01	0.27	.792
Regionafrica × Sleep regularity <sup>2</sup>	0.00 [-0.07, 0.07]	0.03	0.04	.973	0.01 [-0.02, 0.04]	0.02	0.55	.586
Regionasia × Sleep regularity <sup>2</sup>	0.02 [-0.04, 0.08]	0.03	0.66	.534	0.00 [-0.03, 0.04]	0.02	0.13	.900
Regionnorth america × Sleep regularity <sup>2</sup>	0.00 [-0.07, 0.07]	0.03	0.06	.958	-0.01 [-0.06, 0.03]	0.02	-0.54	.598
Regionsouth america × Sleep regularity <sup>2</sup>	0.03 [0.00, 0.06]	0.02	1.92	.074	0.01 [-0.01, 0.03]	0.01	0.86	.392

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)	0.80 [0.42, 1.18]	0.19	4.15	.007	0.82 [0.47, 1.17]	0.18	4.56	.002
Physical activity	0.02 [-0.08, 0.13]	0.05	0.48	.630	0.13 [0.03, 0.22]	0.05	2.61	.009
Daylight hours	-0.03 [-0.04, -0.01]	0.01	-4.13	< .001	-0.03 [-0.04, -0.02]	0.01	-4.41	< .001
Physical activity <sup>2</sup>	0.00 [-0.03, 0.03]	0.01	-0.03	.979	-0.01 [-0.07, 0.05]	0.03	-0.37	.714
Age	-0.01 [-0.01, 0.00]	0.00	-2.71	.010	-0.01 [-0.01, 0.00]	0.00	-2.61	.012
Physical activity × daylight hours	0.00 [-0.01, 0.01]	0.00	0.00	.999	-0.01 [-0.02, 0.00]	0.00	-1.86	.064
Daylight hours × Physical activity <sup>2</sup>	0.00 [0.00, 0.00]	0.00	0.14	.892	0.00 [0.00, 0.01]	0.00	0.45	.651
<b>Sleep efficiency</b>								
(Intercept)	0.33 [0.06, 0.60]	0.14	2.40	.017	0.34 [0.06, 0.62]	0.14	2.40	.016
Physical activity	-0.02 [-0.15, 0.10]	0.06	-0.36	.723	0.04 [-0.06, 0.15]	0.05	0.81	.425
Daylight hours	0.00 [-0.01, 0.01]	0.01	-0.23	.819	0.00 [-0.02, 0.01]	0.01	-0.36	.719
Physical activity <sup>2</sup>	0.00 [-0.04, 0.04]	0.02	0.10	.926	0.00 [-0.06, 0.06]	0.03	0.07	.947
Age	0.00 [0.00, 0.01]	0.00	0.86	.392	0.00 [0.00, 0.01]	0.00	0.82	.412
Physical activity × daylight hours	0.00 [-0.01, 0.01]	0.01	0.57	.583	0.00 [-0.01, 0.00]	0.00	-0.77	.443
Daylight hours × Physical activity <sup>2</sup>	0.00 [0.00, 0.00]	0.00	-0.18	.861	0.00 [0.00, 0.00]	0.00	-0.09	.927
<b>Sleep onset</b>								
(Intercept)	-0.31 [-0.64, 0.02]	0.17	-1.84	.067	-0.28 [-0.61, 0.06]	0.17	-1.61	.108
Physical activity	-0.03 [-0.11, 0.06]	0.04	-0.59	.567	-0.05 [-0.14, 0.04]	0.04	-1.14	.276
Daylight hours	0.01 [0.00, 0.02]	0.00	2.64	.008	0.01 [0.00, 0.02]	0.01	2.34	.020
Physical activity <sup>2</sup>	0.00 [-0.03, 0.04]	0.02	0.31	.775	0.00 [-0.06, 0.06]	0.03	0.12	.908
Age	0.00 [0.00, 0.01]	0.00	1.02	.308	0.00 [0.00, 0.01]	0.00	0.64	.526

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	0.00	[0.01, 0.01]	0.00	0.00	.998	0.00	[-0.01, 0.01]	0.00	-0.06	.951
Daylight hours $\times$ Physical activity <sup>2</sup>	0.00	[0.00, 0.00]	0.00	-0.39	.719	0.00	[0.00, 0.00]	0.00	-0.12	.908
Sleep regularity										
(Intercept)	0.56	[0.25, 0.87]	0.16	3.52	.001	0.63	[0.28, 0.97]	0.18	3.54	.002
Physical activity	-0.01	[-0.23, 0.21]	0.11	-0.07	.948	0.08	[-0.03, 0.18]	0.05	1.39	.169
Daylight hours	0.00	[-0.01, 0.01]	0.01	0.15	.884	0.00	[-0.02, 0.01]	0.01	-0.25	.807
Physical activity <sup>2</sup>	0.02	[-0.04, 0.07]	0.03	0.53	.631	-0.03	[-0.09, 0.03]	0.03	-0.96	.338
Age	0.00	[-0.01, 0.00]	0.00	-0.41	.684	0.00	[-0.01, 0.00]	0.00	-0.38	.714
Physical activity $\times$ daylight hours	0.01	[-0.01, 0.03]	0.01	0.92	.422	0.00	[-0.01, 0.01]	0.00	0.03	.978
Daylight hours $\times$ Physical activity <sup>2</sup>	0.00	[-0.01, 0.00]	0.00	-0.66	.553	0.00	[0.00, 0.01]	0.00	0.69	.489

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)	1.24 [0.84, 1.64]	0.20	6.04	< .001	1.33 [1.06, 1.61]	0.14	9.55	< .001
Sleep duration	0.03 [-0.09, 0.15]	0.06	0.50	.641	0.02 [-0.07, 0.10]	0.04	0.45	.670
Daylight hours	0.01 [0.00, 0.02]	0.01	1.88	.061	0.00 [-0.01, 0.01]	0.01	-0.26	.793
Sleep duration <sup>2</sup>	0.00 [-0.02, 0.03]	0.01	0.32	.761	0.00 [-0.02, 0.03]	0.01	0.31	.766
Age	-0.02 [-0.03, -0.02]	0.00	-8.02	< .001	-0.03 [-0.03, -0.02]	0.00	-8.47	.001
Sleep duration × daylight hours	0.00 [-0.01, 0.01]	0.00	-0.57	.591	0.00 [-0.01, 0.01]	0.00	-0.28	.788
Daylight hours × Sleep duration <sup>2</sup>	0.00 [0.00, 0.00]	0.00	-0.77	.455	0.00 [0.00, 0.00]	0.00	-0.54	.601
Sleep efficiency								
(Intercept)	1.24 [0.82, 1.65]	0.21	5.89	< .001	1.35 [1.06, 1.65]	0.15	9.11	< .001
Sleep efficiency	0.02 [-0.06, 0.10]	0.04	0.52	.605	-0.04 [-0.10, 0.03]	0.03	-1.14	.256
Daylight hours	0.01 [0.00, 0.02]	0.01	1.77	.079	0.00 [-0.01, 0.01]	0.01	-0.51	.618
Sleep efficiency <sup>2</sup>	0.00 [-0.02, 0.02]	0.01	0.27	.791	-0.01 [-0.02, 0.01]	0.01	-0.61	.549
Age	-0.02 [-0.03, -0.02]	0.00	-8.00	< .001	-0.03 [-0.03, -0.02]	0.00	-8.50	.001
Sleep efficiency × daylight hours	0.00 [-0.01, 0.00]	0.00	-0.47	.640	0.00 [0.00, 0.01]	0.00	1.18	.240
Daylight hours × Sleep efficiency <sup>2</sup>	0.00 [0.00, 0.00]	0.00	-0.37	.711	0.00 [0.00, 0.00]	0.00	0.66	.513
Sleep onset								
(Intercept)	1.25 [0.82, 1.68]	0.22	5.67	< .001	1.31 [1.02, 1.60]	0.15	8.90	< .001
Sleep onset	-0.07 [-0.23, 0.08]	0.08	-0.95	.387	-0.04 [-0.14, 0.05]	0.05	-0.90	.385
Daylight hours	0.01 [0.00, 0.02]	0.01	1.46	.155	0.00 [-0.01, 0.01]	0.01	0.17	.865
Sleep onset <sup>2</sup>	0.00 [-0.06, 0.05]	0.03	-0.08	.934	0.04 [-0.01, 0.10]	0.03	1.48	.182
Age	-0.02 [-0.03, -0.02]	0.00	-7.99	< .001	-0.03 [-0.03, -0.02]	0.00	-8.52	.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, 0.02]	0.01	0.73	.495	0.00 [0.00, 0.01]	0.00	0.86	.402
Daylight hours × Sleep onset <sup>2</sup>	0.00 [-0.01, 0.00]	0.00	-0.31	.761	0.00 [-0.01, 0.00]	0.00	-1.49	.187
Sleep regularity								
(Intercept)	1.20 [0.78, 1.62]	0.21	5.65	< .001	1.32 [1.02, 1.62]	0.16	8.50	< .001
Sleep regularity	0.11 [0.02, 0.21]	0.05	2.34	.037	0.09 [0.02, 0.15]	0.03	2.73	.006
Daylight hours	0.01 [0.00, 0.02]	0.01	1.24	.234	0.00 [-0.01, 0.01]	0.01	-0.34	.741
Sleep regularity <sup>2</sup>	-0.02 [-0.09, 0.05]	0.04	-0.59	.591	-0.01 [-0.05, 0.04]	0.02	-0.34	.746
Age	-0.02 [-0.03, -0.02]	0.00	-8.18	< .001	-0.03 [-0.03, -0.02]	0.00	-8.72	.001
Sleep regularity × daylight hours	0.00 [-0.01, 0.00]	0.00	-0.93	.365	0.00 [-0.01, 0.00]	0.00	-1.60	.111
Daylight hours × Sleep regularity <sup>2</sup>	0.00 [-0.01, 0.01]	0.00	0.43	.700	0.00 [0.00, 0.00]	0.00	0.21	.840

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)	0.83	[0.51, 1.16]	0.17	5.04	< .001	0.79	[0.46, 1.12]	0.17	4.65	.001
Physical activity	0.05	[0.01, 0.08]	0.02	2.41	.016	0.04	[0.00, 0.09]	0.02	1.90	.062
Wrist	-0.46	[-0.73, -0.19]	0.14	-3.37	.001	-0.42	[-0.69, -0.16]	0.14	-3.10	.002
Physical activity <sup>2</sup>	0.00	[-0.02, 0.01]	0.01	-0.15	.884	0.01	[-0.03, 0.05]	0.02	0.56	.588
Age	-0.01	[-0.01, 0.00]	0.00	-2.86	.007	-0.01	[-0.01, 0.00]	0.00	-2.76	.008
Physical activity × wrist	-0.03	[-0.07, 0.02]	0.02	-1.26	.208	-0.01	[-0.06, 0.04]	0.03	-0.32	.753
Wrist × Physical activity <sup>2</sup>	0.00	[-0.01, 0.02]	0.01	0.52	.601	-0.01	[-0.05, 0.03]	0.02	-0.45	.658
<b>Sleep efficiency</b>										
(Intercept)	-0.34	[-0.49, -0.18]	0.08	-4.25	.001	-0.38	[-0.55, -0.22]	0.08	-4.55	.001
Physical activity	0.10	[0.05, 0.15]	0.02	4.11	.001	0.05	[0.00, 0.09]	0.02	2.14	.035
Wrist	0.78	[0.66, 0.89]	0.06	13.35	< .001	0.83	[0.71, 0.94]	0.06	14.04	< .001
Physical activity <sup>2</sup>	0.00	[-0.04, 0.03]	0.02	-0.13	.904	-0.01	[-0.04, 0.02]	0.02	-0.47	.644
Age	0.00	[0.00, 0.00]	0.00	0.99	.322	0.00	[0.00, 0.00]	0.00	0.78	.442
Physical activity × wrist	-0.12	[-0.17, -0.06]	0.03	-3.95	.002	-0.06	[-0.12, 0.00]	0.03	-1.99	.071
Wrist × Physical activity <sup>2</sup>	0.00	[-0.03, 0.04]	0.02	0.11	.917	0.00	[-0.03, 0.04]	0.02	0.09	.927
<b>Sleep onset</b>										
(Intercept)	-1.09	[-1.51, -0.67]	0.21	-5.09	< .001	-1.06	[-1.48, -0.65]	0.21	-5.04	< .001
Physical activity	0.02	[-0.03, 0.06]	0.02	0.71	.506	-0.03	[-0.06, 0.00]	0.02	-1.99	.052
Wrist	1.14	[0.70, 1.58]	0.23	5.05	< .001	1.14	[0.71, 1.58]	0.22	5.15	< .001
Physical activity <sup>2</sup>	0.00	[-0.01, 0.02]	0.01	0.49	.636	0.00	[-0.02, 0.02]	0.01	0.11	.916
Age	0.00	[0.00, 0.01]	0.00	1.10	.276	0.00	[0.00, 0.00]	0.00	0.68	.497

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	-0.05 [-0.10, 0.00]	0.03	-2.10	.090	-0.03 [-0.07, 0.00]	0.02	-1.85	.069
Wrist $\times$ Physical activity <sup>2</sup>	0.00 [-0.01, 0.01]	0.01	-0.67	.505	0.00 [-0.03, 0.02]	0.01	-0.41	.685
Sleep regularity								
(Intercept)	0.21 [-0.09, 0.52]	0.15	1.37	.174	0.14 [-0.16, 0.45]	0.16	0.91	.362
Physical activity	0.14 [0.07, 0.21]	0.04	3.90	.016	0.18 [0.14, 0.23]	0.02	7.84	< .001
Wrist	0.49 [0.18, 0.79]	0.15	3.13	.002	0.62 [0.30, 0.95]	0.17	3.73	< .001
Physical activity <sup>2</sup>	-0.02 [-0.07, 0.04]	0.03	-0.58	.614	-0.06 [-0.10, -0.02]	0.02	-3.19	.011
Age	0.00 [-0.01, 0.00]	0.00	-0.88	.392	0.00 [-0.01, 0.00]	0.00	-1.08	.300
Physical activity $\times$ wrist	-0.06 [-0.14, 0.02]	0.04	-1.37	.241	-0.14 [-0.19, -0.08]	0.03	-4.62	< .001
Wrist $\times$ Physical activity <sup>2</sup>	0.01 [-0.04, 0.07]	0.03	0.50	.661	0.06 [0.02, 0.10]	0.02	2.70	.020

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

Table 18

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

Term	Physical Activity Volume				Physical Activity Intensity			
	$\beta$ [95% CI]	SE	t	p	$\beta$ [95% CI]	SE	t	p
Sleep duration								
(Intercept)	0.27 [-0.20, 0.75]	0.24	1.13	.261	1.01 [0.65, 1.37]	0.18	5.50	< .001
Sleep duration	0.00 [-0.03, 0.03]	0.02	-0.26	.802	0.00 [-0.02, 0.03]	0.01	0.16	.880
Wrist	1.34 [0.84, 1.84]	0.26	5.25	< .001	0.40 [0.03, 0.77]	0.19	2.13	.033
Sleep duration <sup>2</sup>	0.00 [-0.01, 0.00]	0.00	-0.32	.750	0.00 [-0.01, 0.00]	0.00	-0.45	.661
Age	-0.02 [-0.03, -0.02]	0.00	-8.48	< .001	-0.03 [-0.03, -0.02]	0.00	-8.65	.001
Sleep duration × wrist	0.00 [-0.02, 0.03]	0.01	0.31	.758	0.01 [-0.02, 0.03]	0.01	0.75	.461
Wrist × Sleep duration <sup>2</sup>	-0.01 [-0.02, 0.00]	0.00	-2.65	.008	0.00 [-0.01, 0.01]	0.00	-0.83	.438
Sleep efficiency								
(Intercept)	0.28 [-0.19, 0.75]	0.24	1.16	.248	1.01 [0.64, 1.38]	0.19	5.41	< .001
Sleep efficiency	0.01 [-0.01, 0.03]	0.01	0.96	.360	0.00 [-0.01, 0.02]	0.01	0.14	.890
Wrist	1.33 [0.83, 1.84]	0.26	5.19	< .001	0.40 [0.03, 0.77]	0.19	2.09	.036
Sleep efficiency <sup>2</sup>	0.00 [0.00, 0.00]	0.00	0.32	.750	0.00 [0.00, 0.00]	0.00	0.30	.763
Age	-0.02 [-0.03, -0.02]	0.00	-8.44	< .001	-0.03 [-0.03, -0.02]	0.00	-8.64	.001
Sleep efficiency × wrist	-0.02 [-0.07, 0.03]	0.03	-0.83	.451	0.00 [-0.02, 0.03]	0.01	0.08	.934
Wrist × Sleep efficiency <sup>2</sup>	-0.01 [-0.02, 0.01]	0.01	-0.92	.411	0.00 [-0.01, 0.01]	0.00	0.13	.900
Sleep onset								
(Intercept)	0.28 [-0.20, 0.76]	0.24	1.13	.258	0.98 [0.61, 1.35]	0.19	5.14	< .001
Sleep onset	0.02 [-0.25, 0.28]	0.14	0.12	.914	-0.06 [-0.13, 0.00]	0.04	-1.82	.101
Wrist	1.34 [0.82, 1.85]	0.26	5.09	< .001	0.43 [0.06, 0.81]	0.19	2.25	.025
Sleep onset <sup>2</sup>	0.00 [-0.12, 0.13]	0.07	0.06	.954	-0.02 [-0.07, 0.02]	0.02	-1.17	.278
Age	-0.02 [-0.03, -0.02]	0.00	-8.54	< .001	-0.03 [-0.03, -0.02]	0.00	-8.61	.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	-0.05 [-0.32, 0.22]	0.14	-0.35	.758	0.07 [-0.01, 0.15]	0.04	1.70	.129
Wrist × Sleep onset <sup>2</sup>	-0.01 [-0.14, 0.11]	0.06	-0.22	.844	0.02 [-0.02, 0.06]	0.02	1.02	.331
Sleep regularity								
(Intercept)	0.26 [-0.21, 0.73]	0.24	1.09	.275	1.01 [0.65, 1.38]	0.19	5.46	< .001
Sleep regularity	0.07 [0.04, 0.11]	0.02	3.80	.010	0.08 [0.06, 0.10]	0.01	6.87	< .001
Wrist	1.28 [0.79, 1.78]	0.25	5.05	< .001	0.37 [0.00, 0.74]	0.19	1.96	.050
Sleep regularity <sup>2</sup>	-0.01 [-0.03, 0.02]	0.01	-0.42	.703	0.00 [-0.02, 0.01]	0.01	-0.88	.381
Age	-0.02 [-0.03, -0.02]	0.00	-8.68	< .001	-0.03 [-0.03, -0.02]	0.00	-8.77	.001
Sleep regularity × wrist	-0.01 [-0.06, 0.05]	0.03	-0.22	.836	-0.06 [-0.09, -0.03]	0.02	-3.91	.002
Wrist × Sleep regularity <sup>2</sup>	0.01 [-0.01, 0.02]	0.01	0.69	.503	0.01 [-0.01, 0.02]	0.01	0.89	.376

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

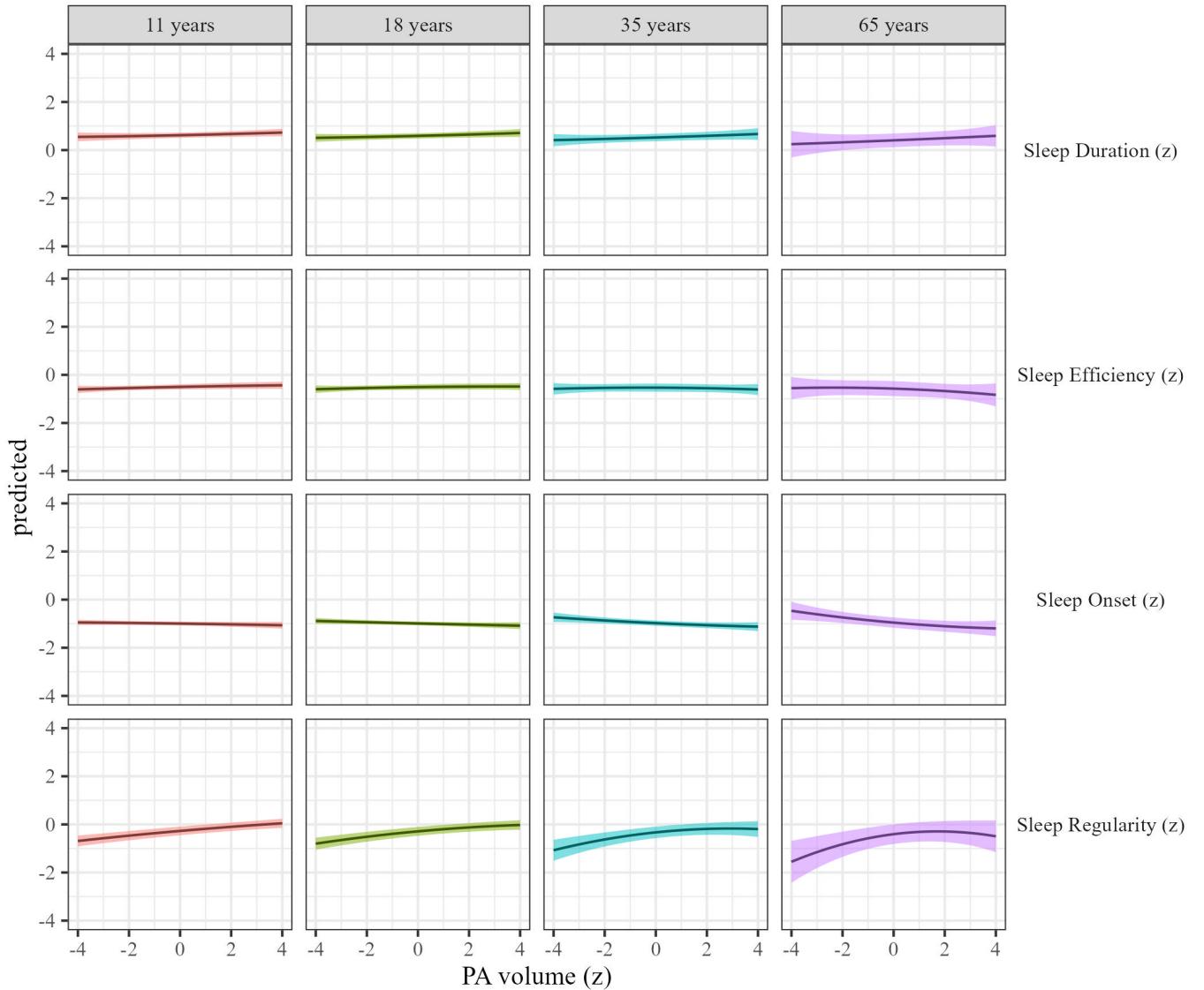


Figure 1. Sleep metrics on Physical activity volume

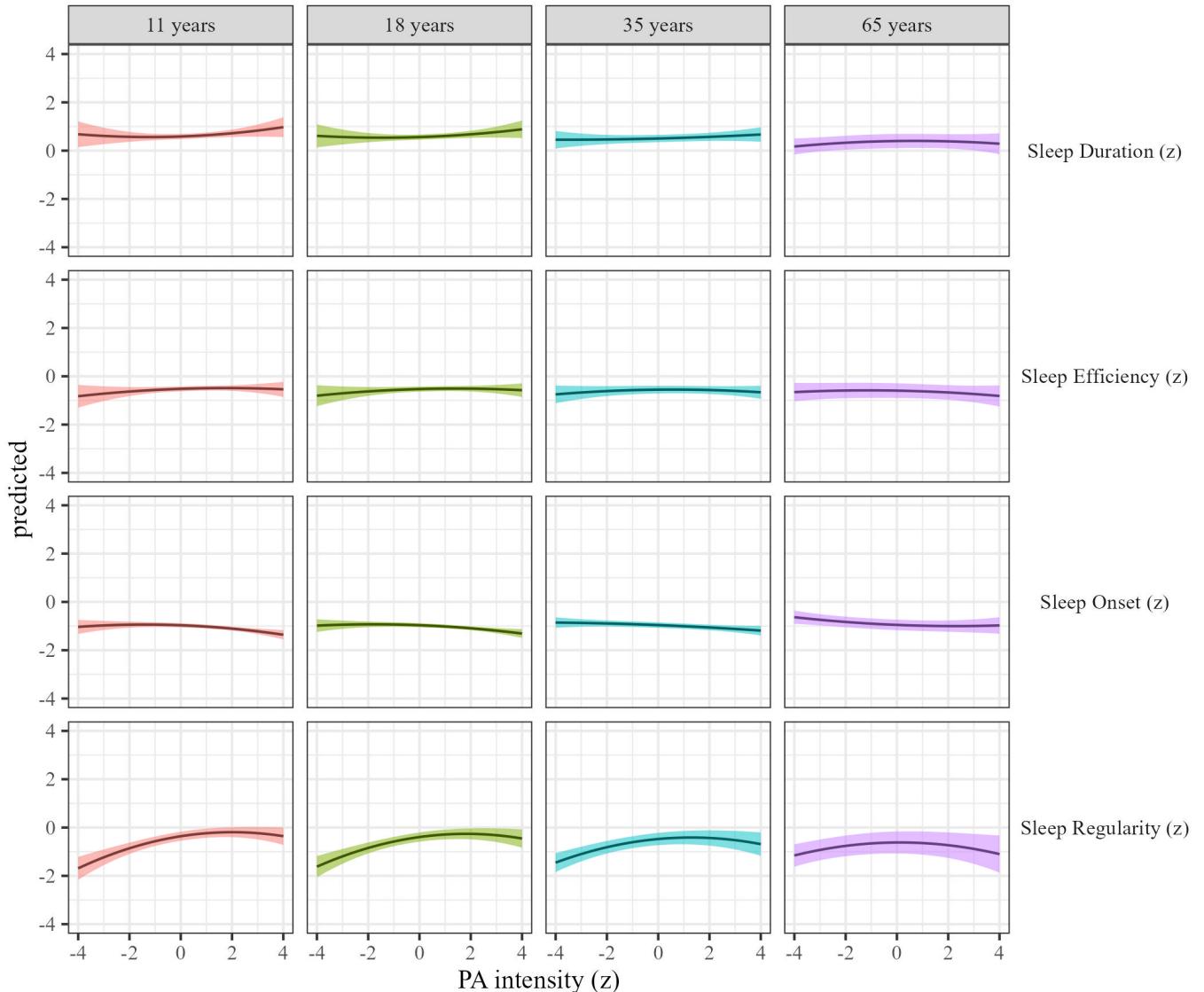


Figure 2. Sleep metrics on Physical activity intensity

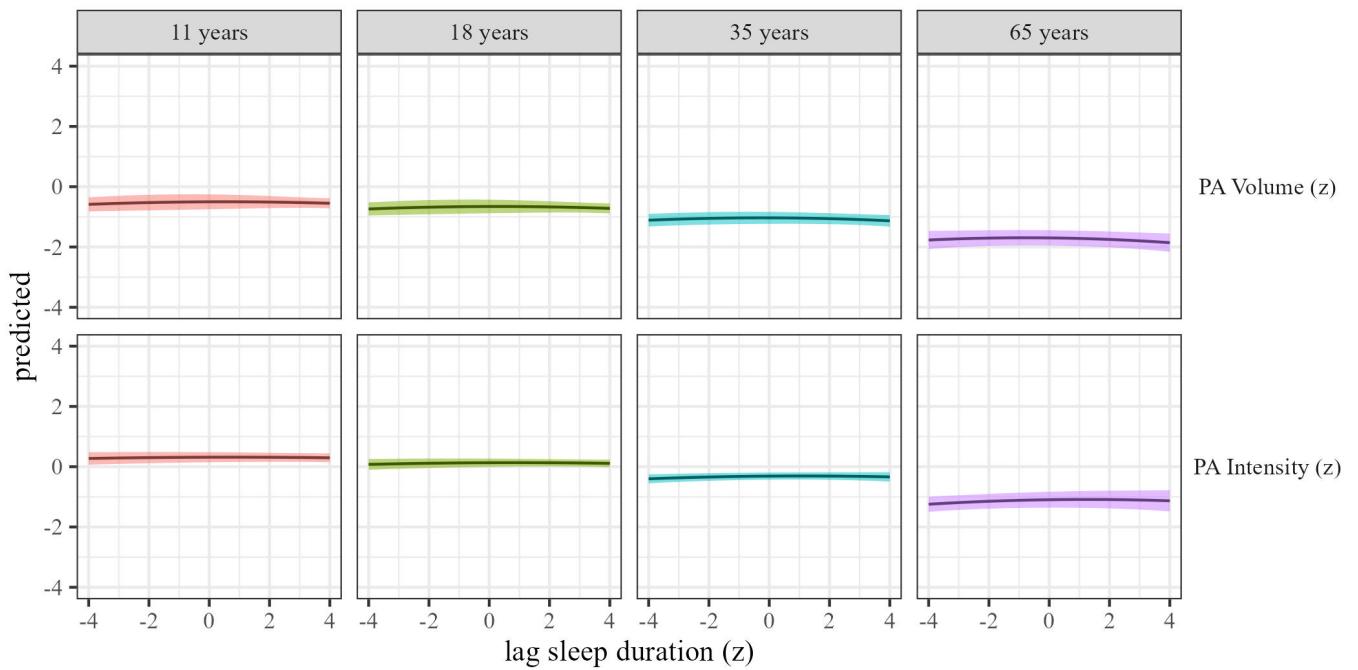


Figure 3. Physical activity by sleep duration

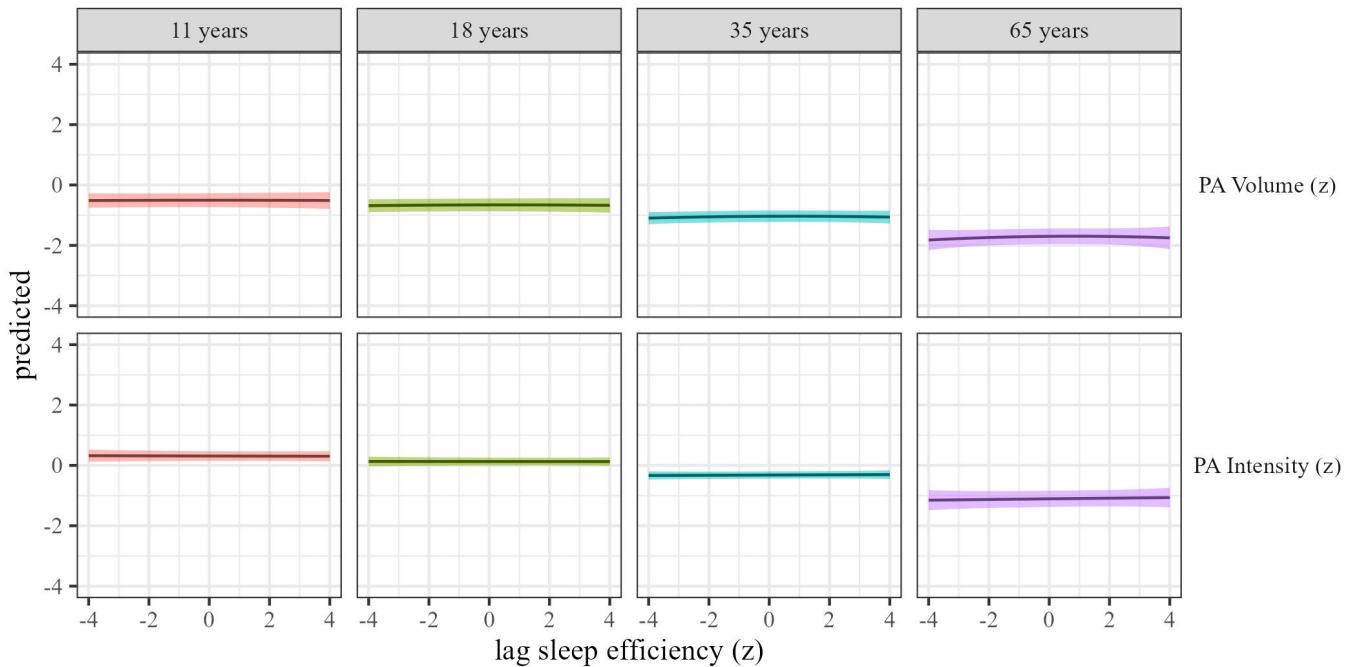


Figure 4. Physical activity by sleep efficiency

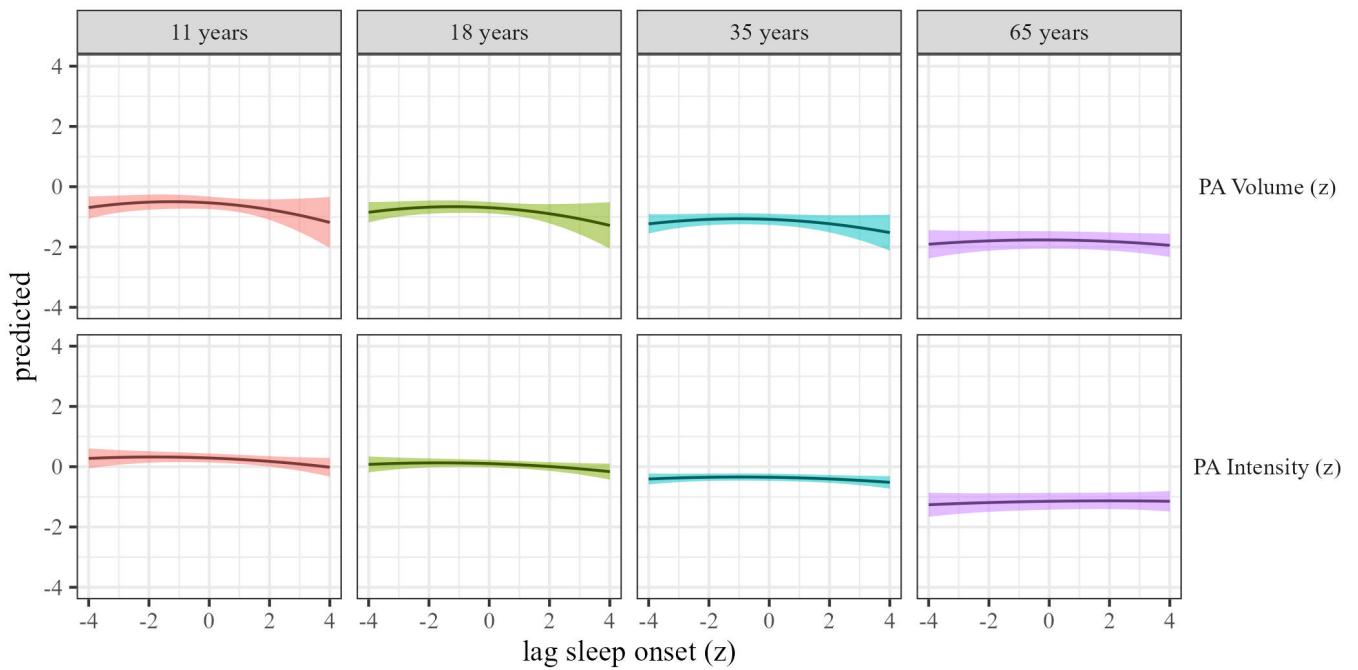


Figure 5. Physical activity by sleep onset

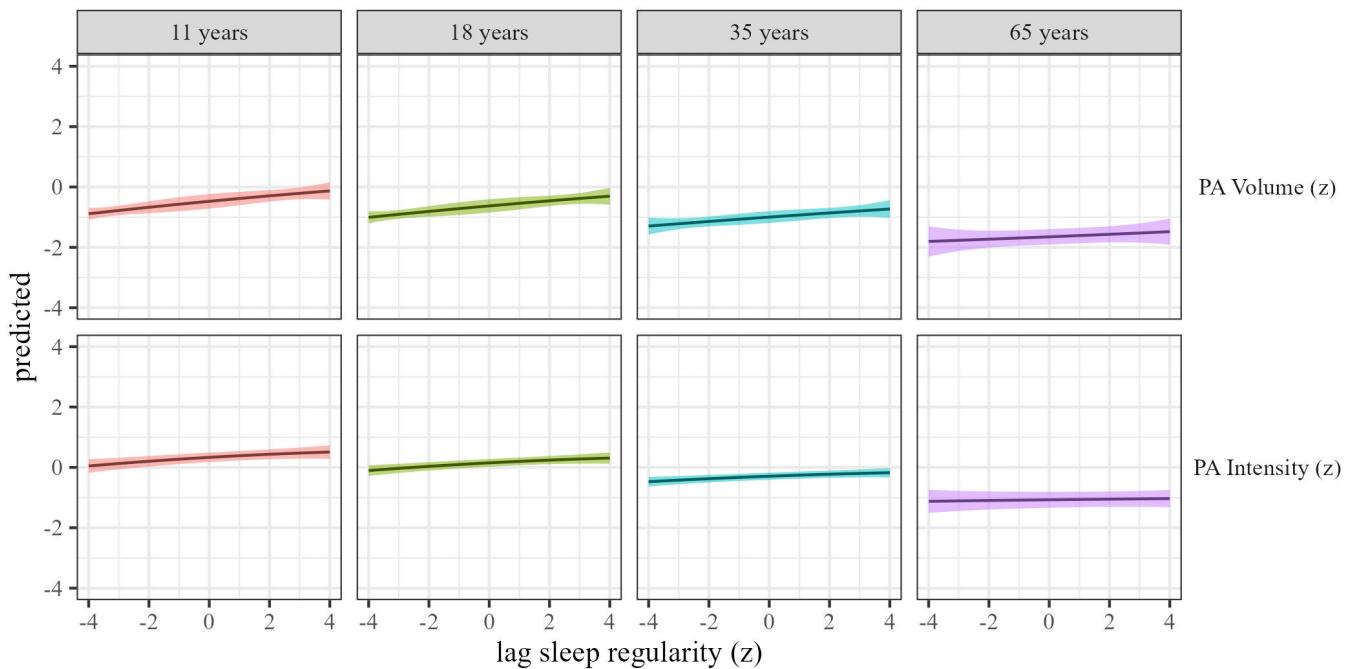


Figure 6. Physical activity by sleep regularity

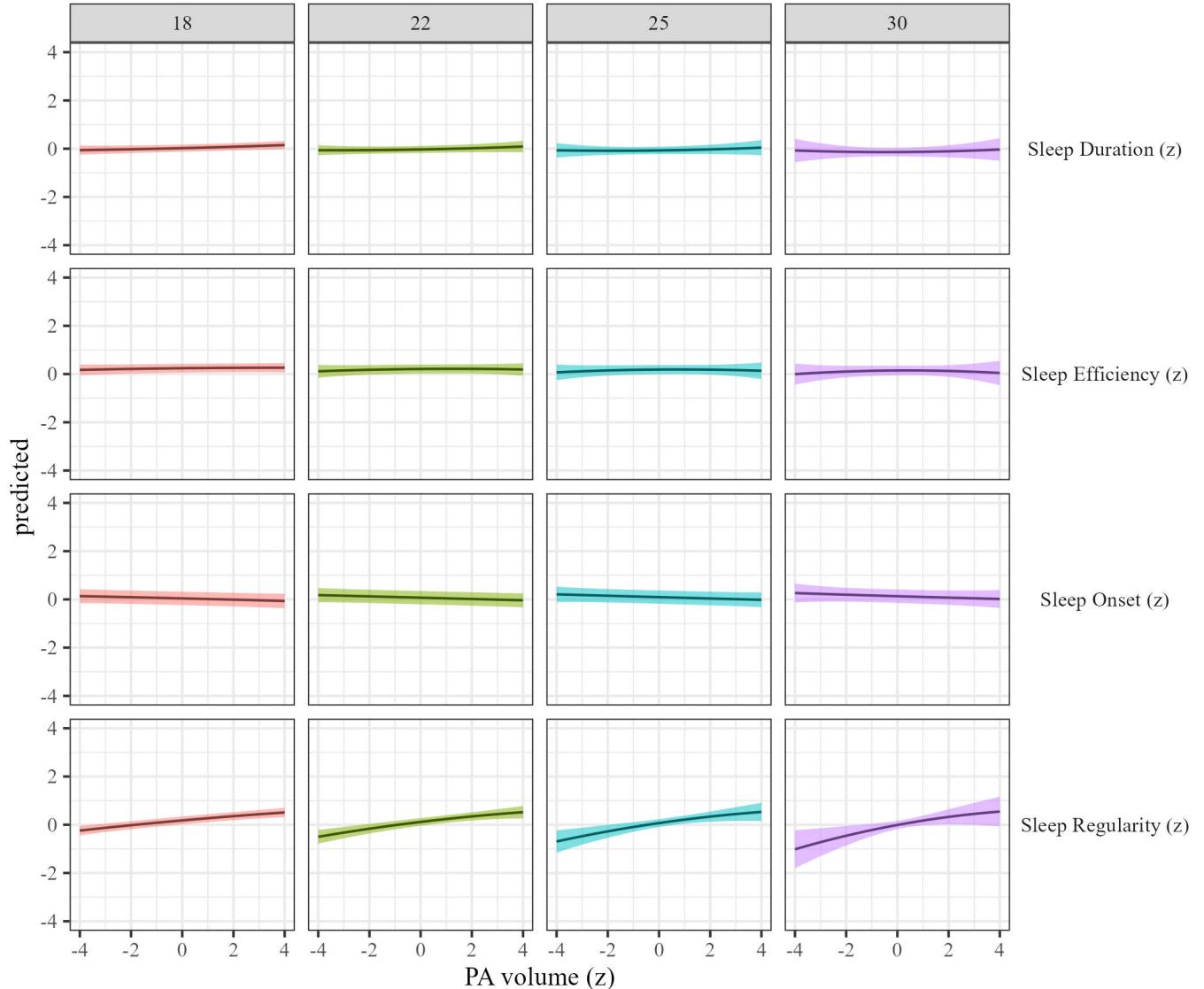


Figure 7. Sleep metrics on Physical activity volume by BMI

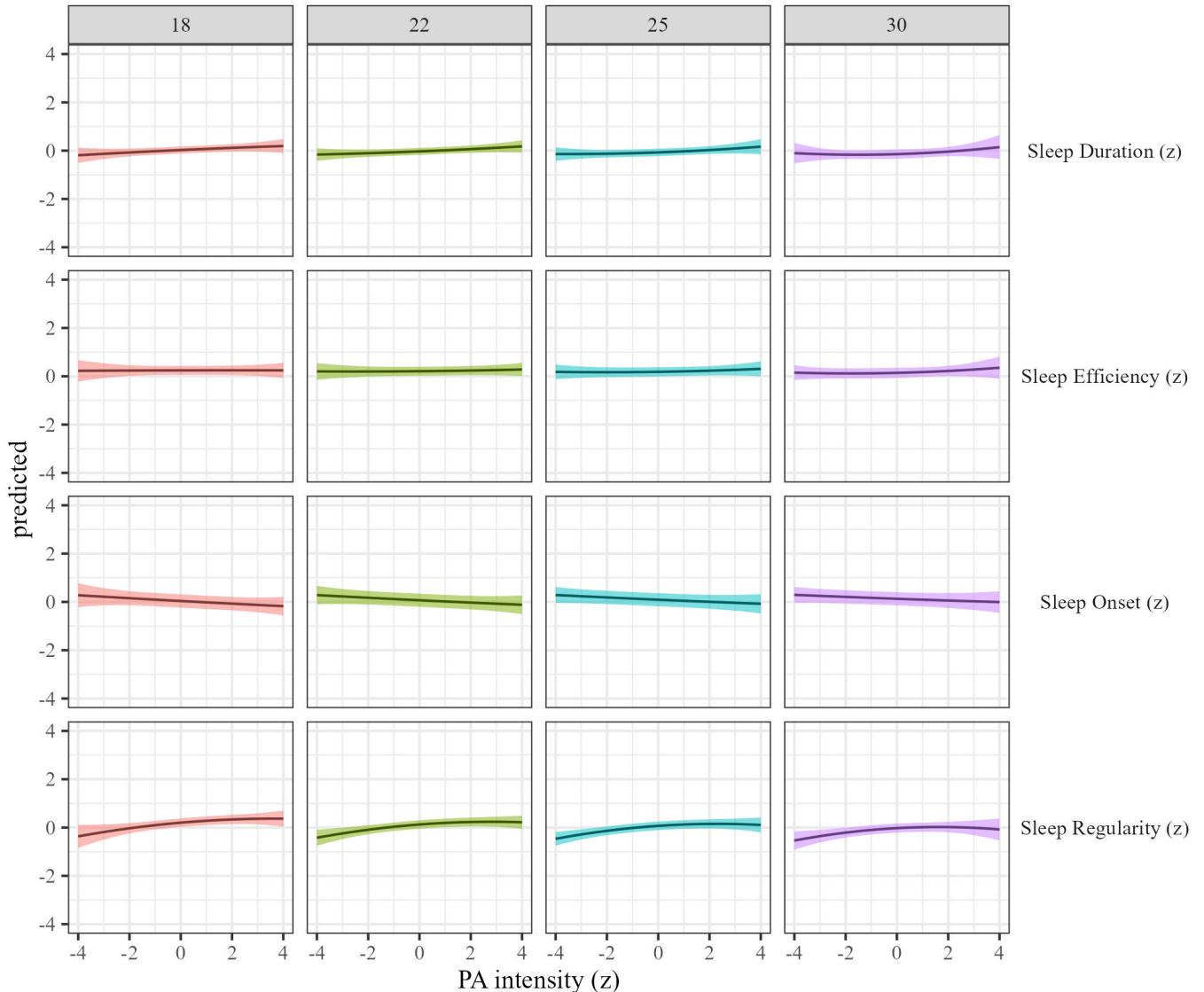


Figure 8. Sleep metrics on Physical activity intensity moderated by BMI

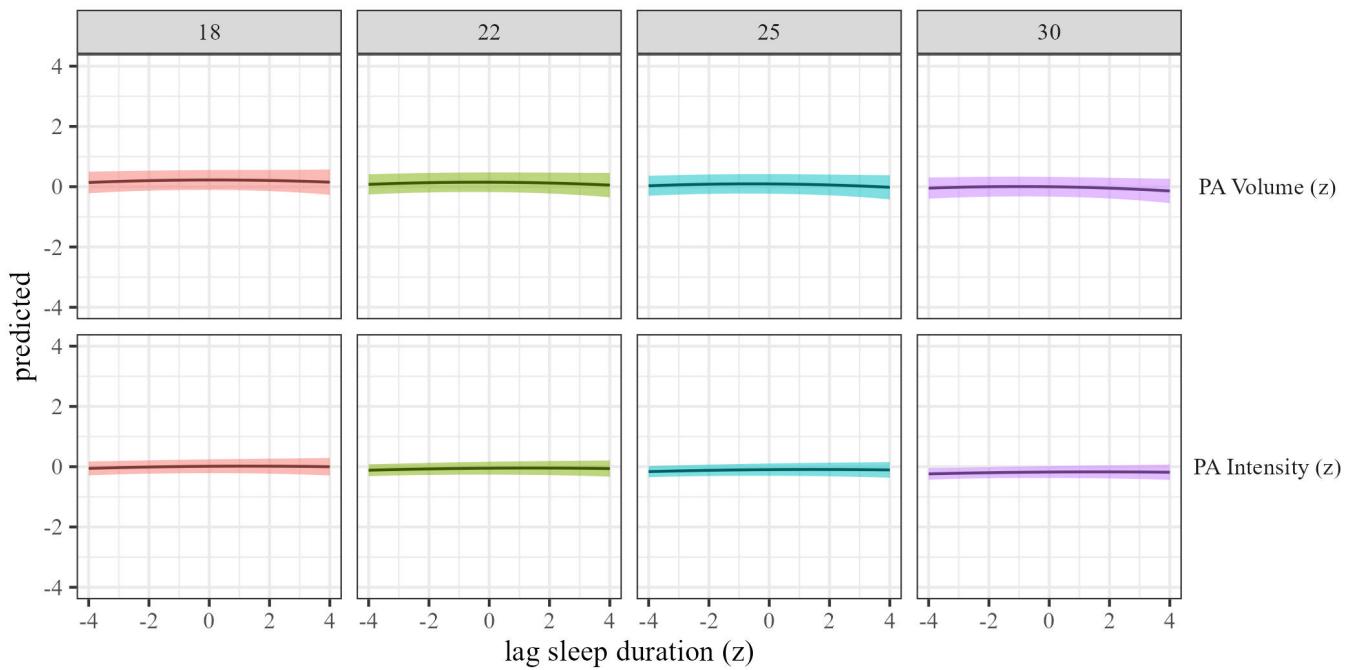


Figure 9. Physical activity by sleep duration moderated by BMI

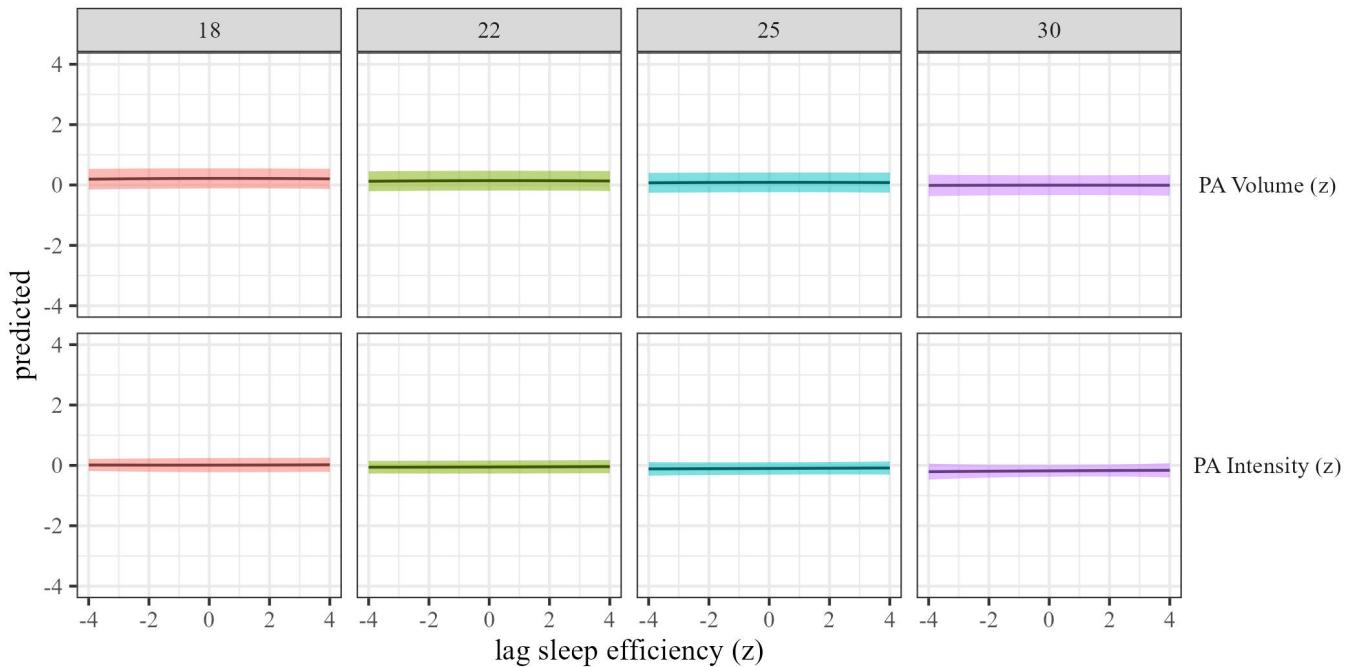
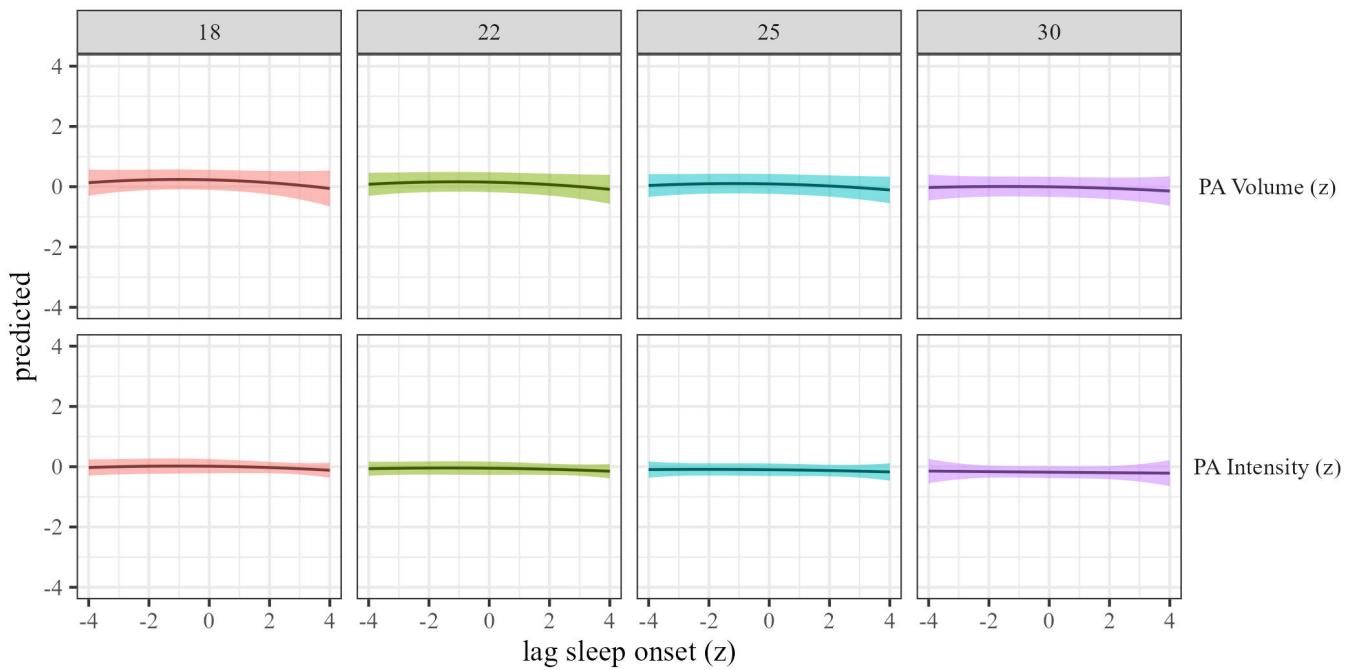
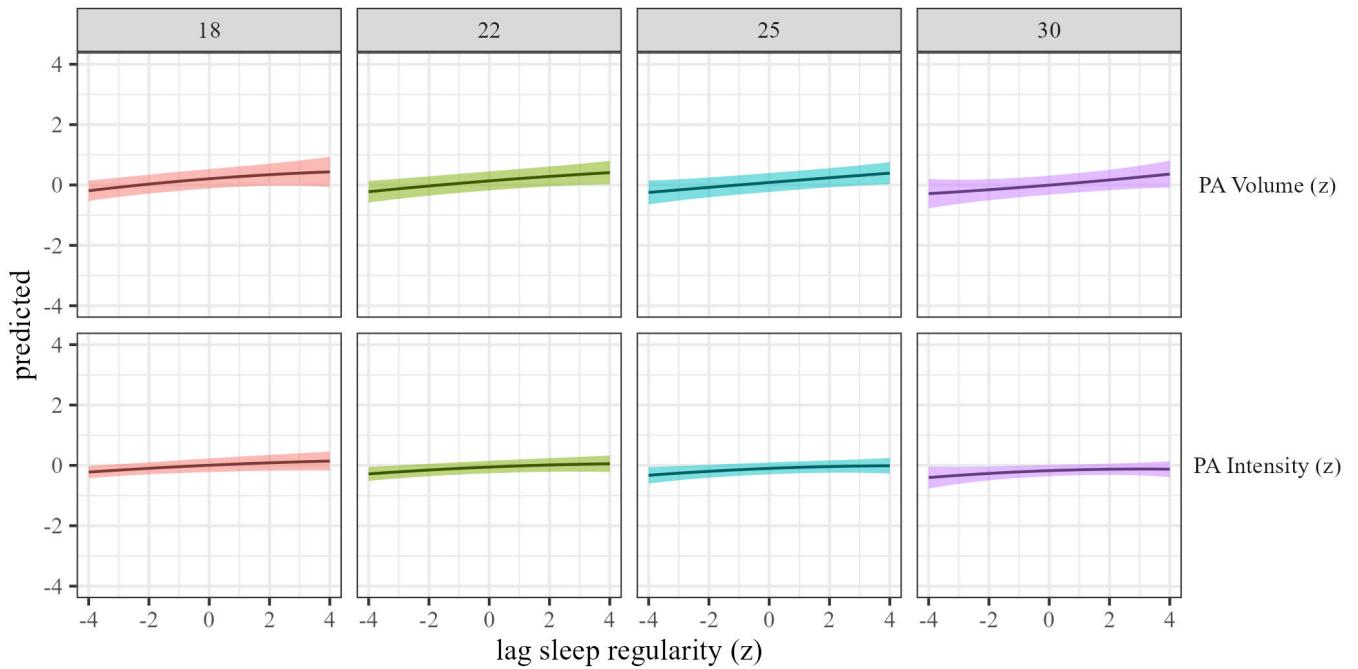


Figure 10. Physical activity by sleep efficiency moderated by BMI



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



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

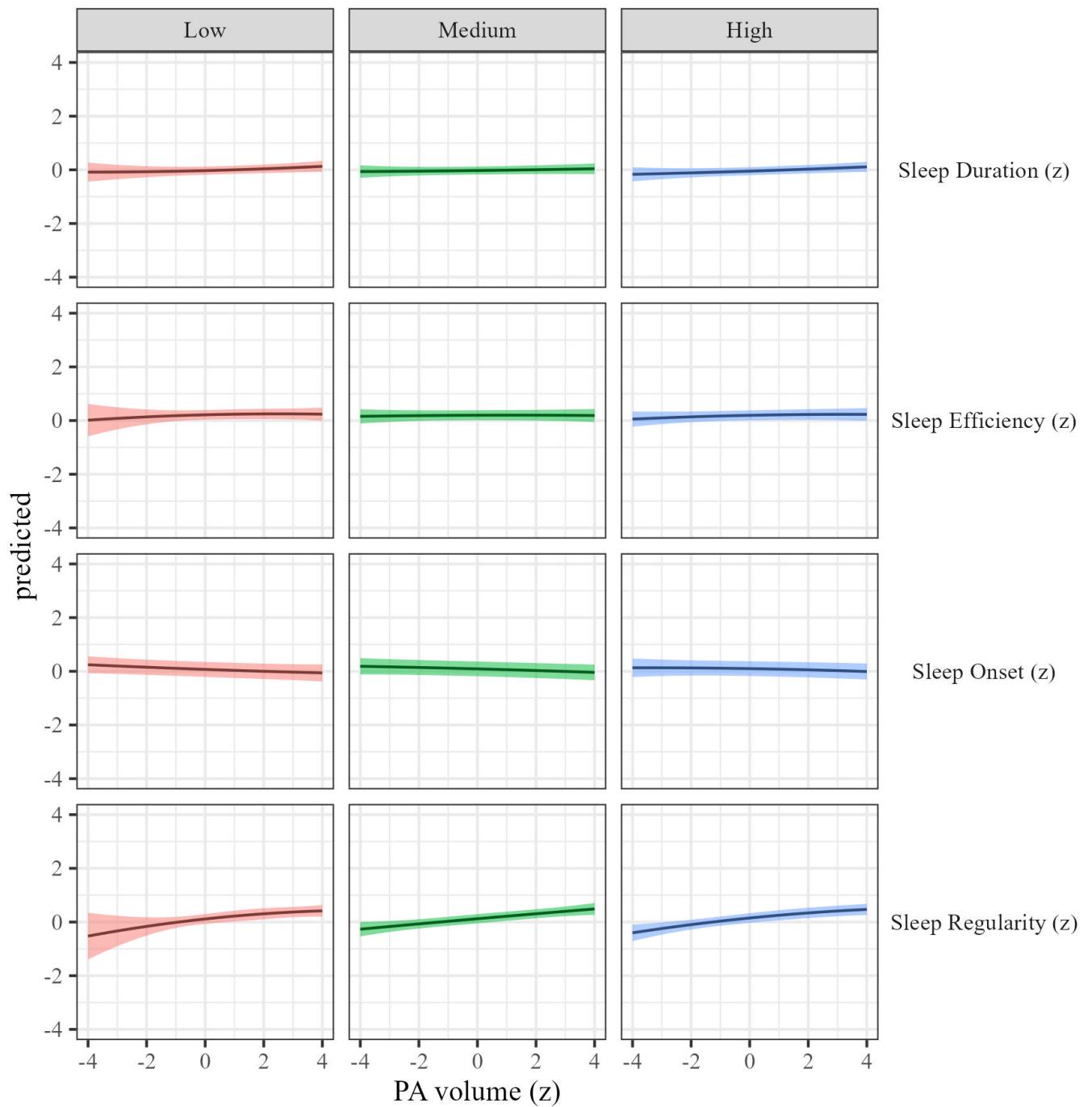


Figure 13. Sleep metrics on Physical activity volume by SES

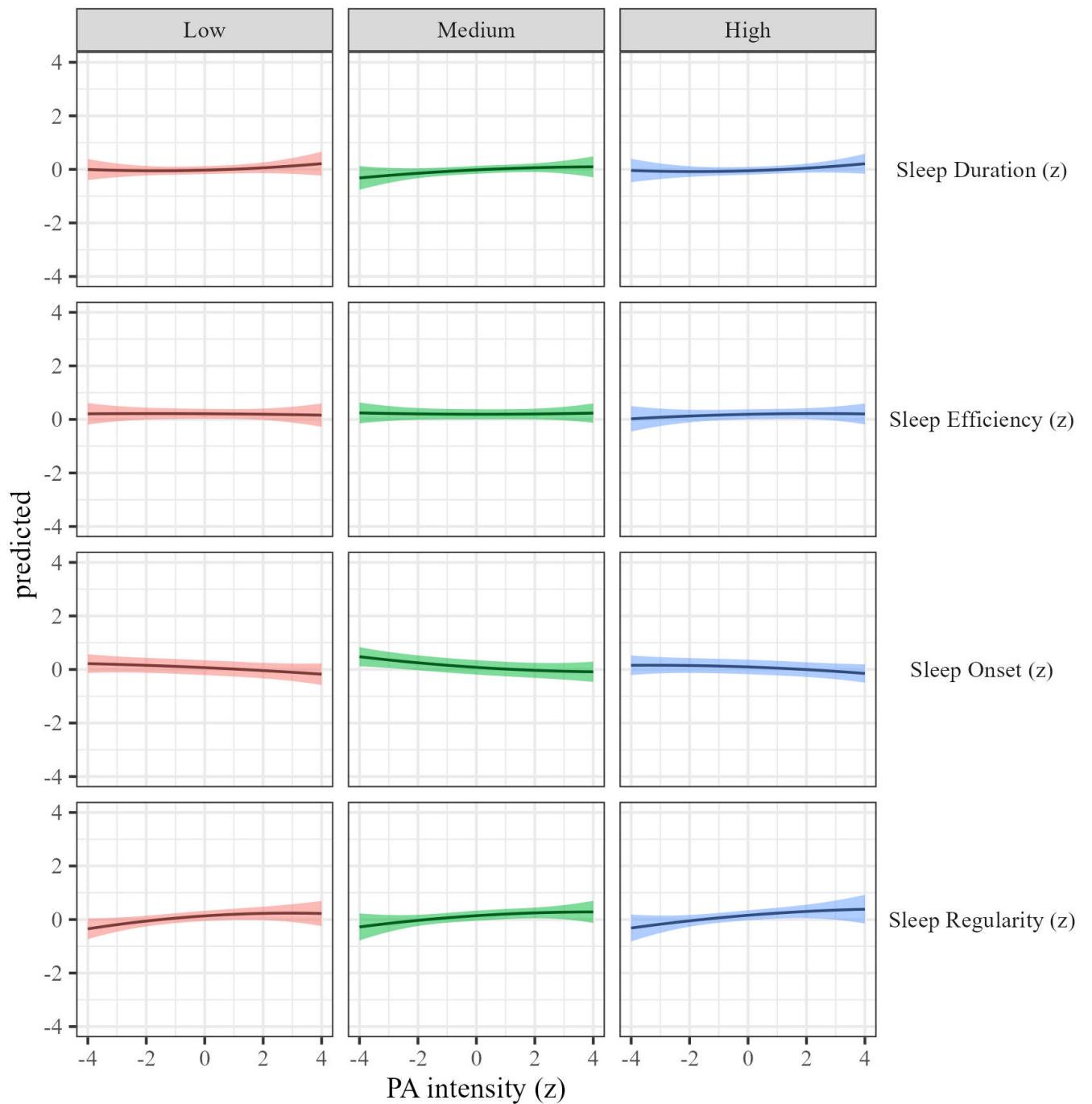


Figure 14. Sleep metrics on Physical activity intensity moderated by SES

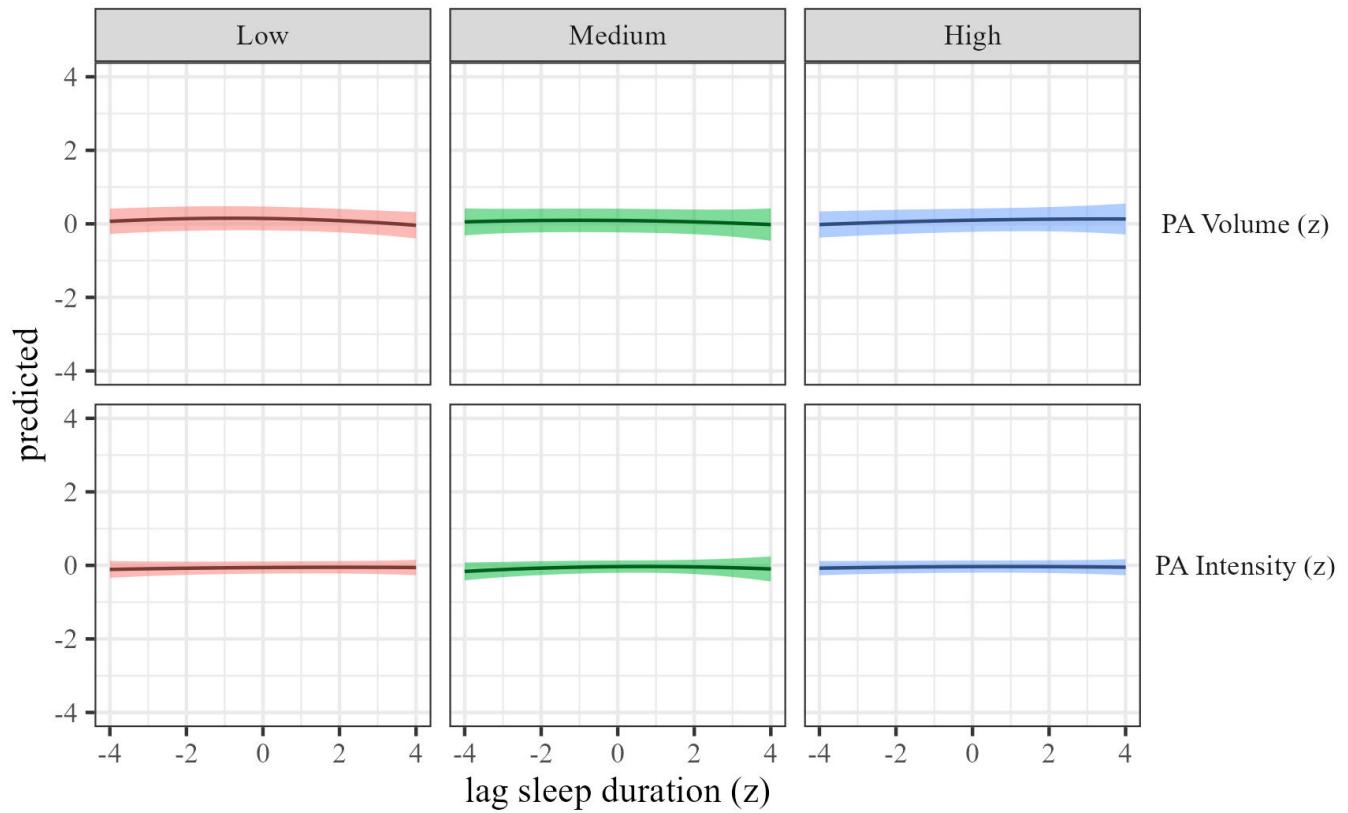


Figure 15. Physical activity by sleep duration moderated by SES

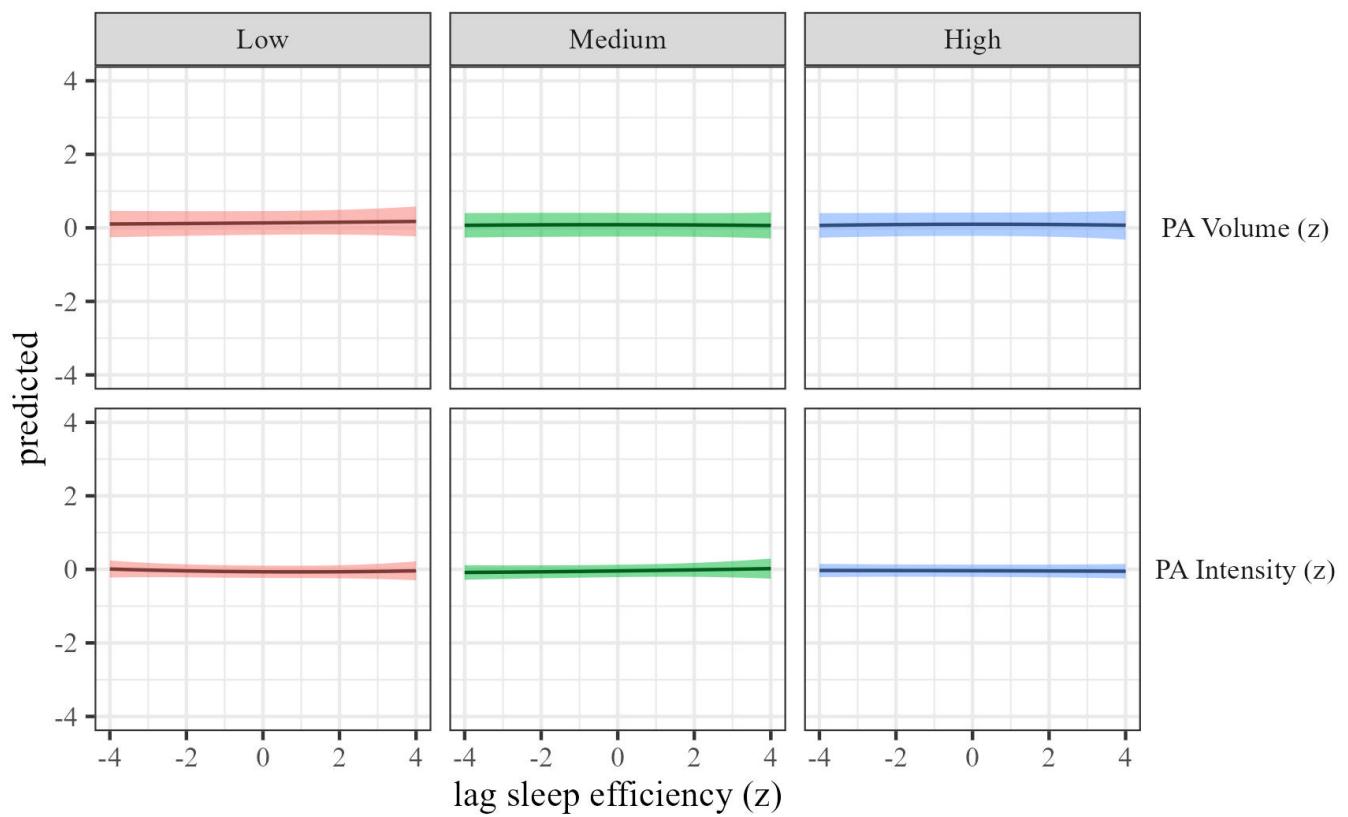


Figure 16. Physical activity by sleep efficiency moderated by SES

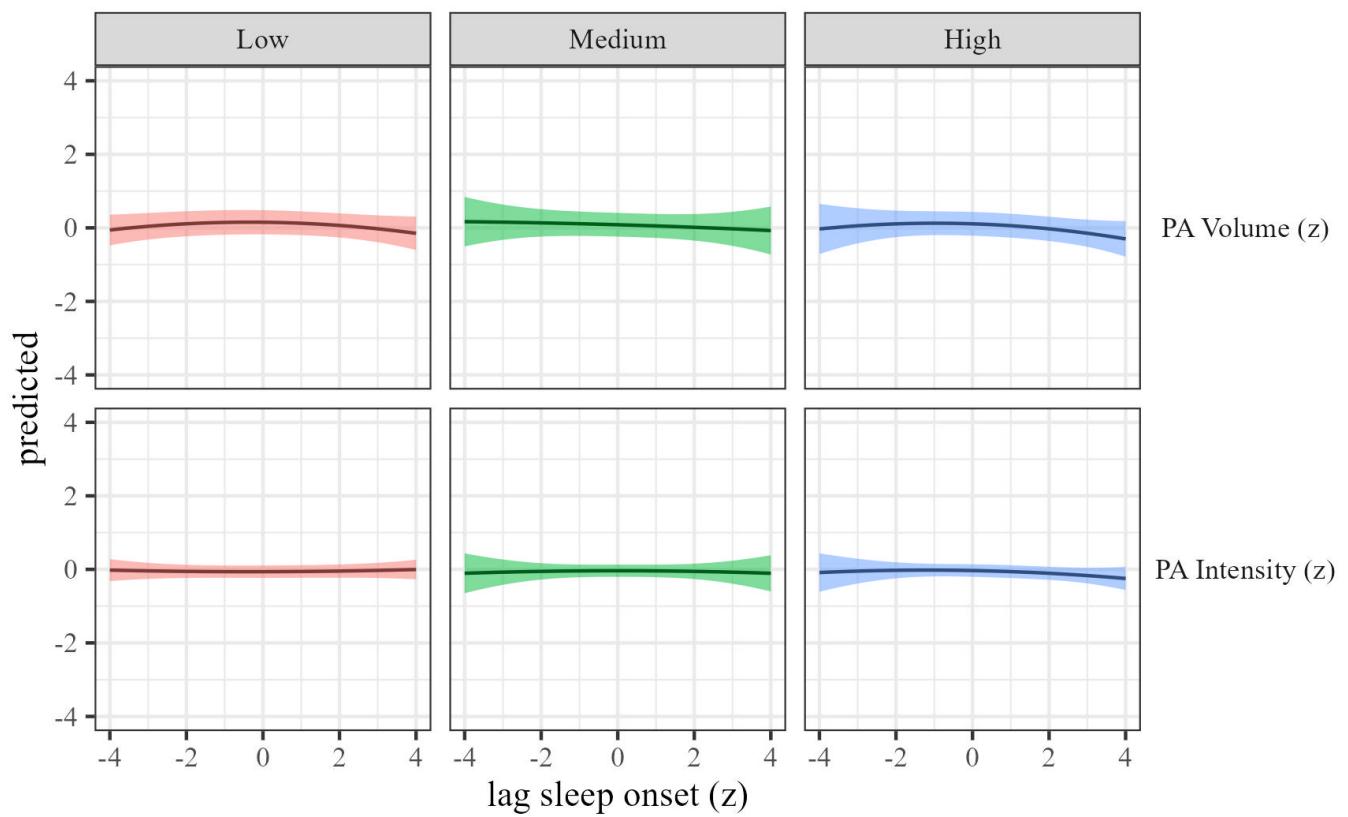


Figure 17. Physical activity by sleep onset moderated by SES

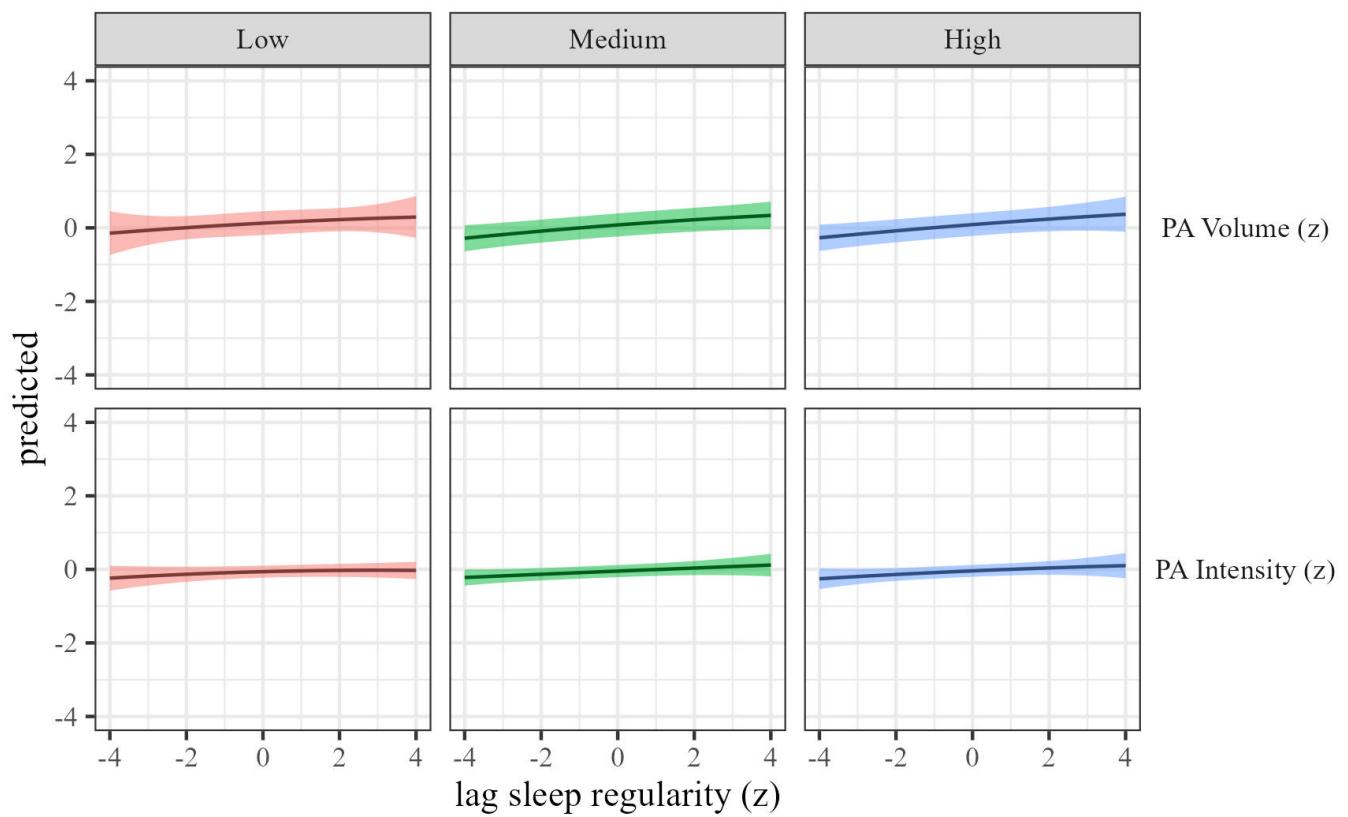


Figure 18. Physical activity by sleep regularity moderated by SES

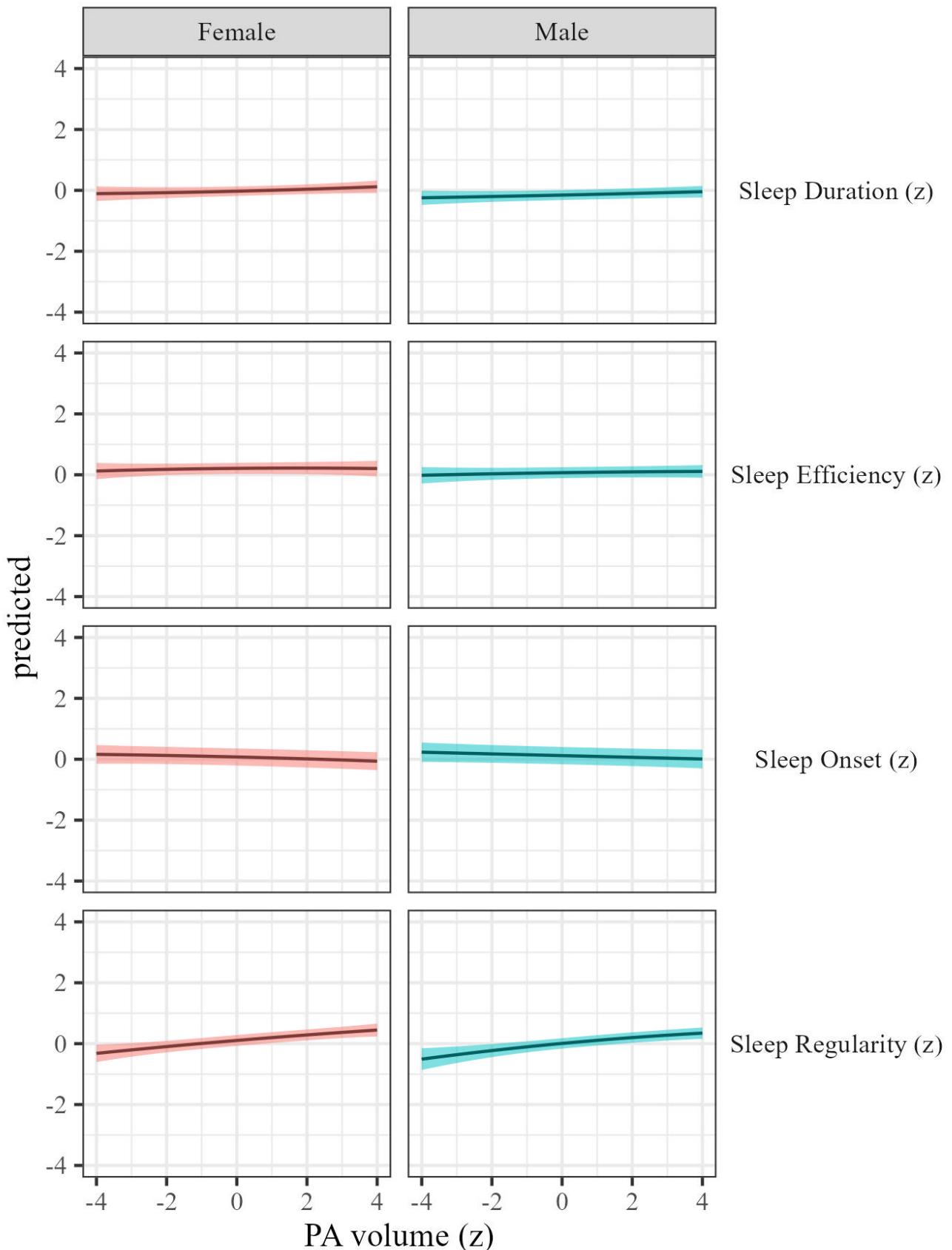


Figure 19. Sleep metrics on Physical activity volume by sex

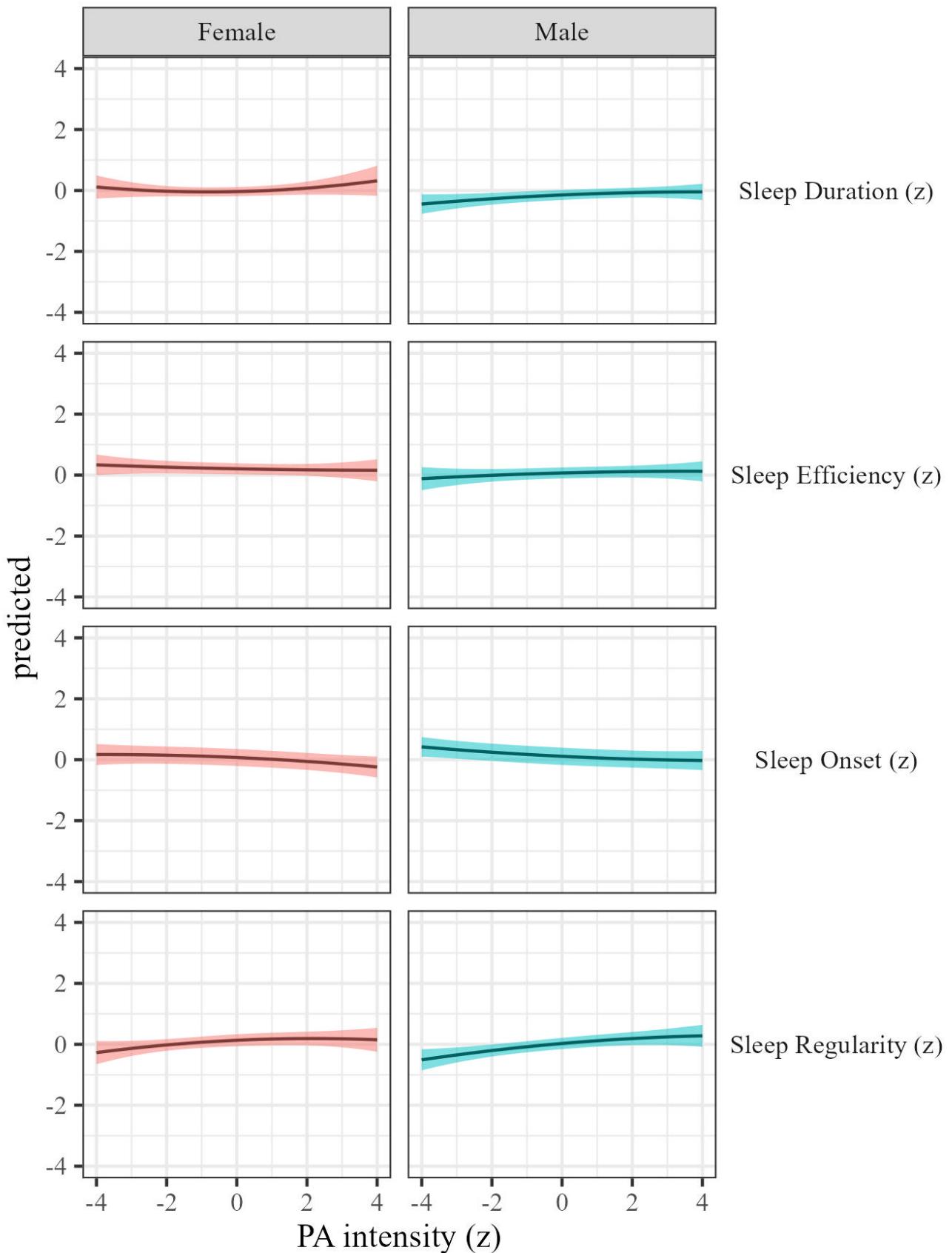


Figure 20. Sleep metrics on Physical activity intensity moderated by sex

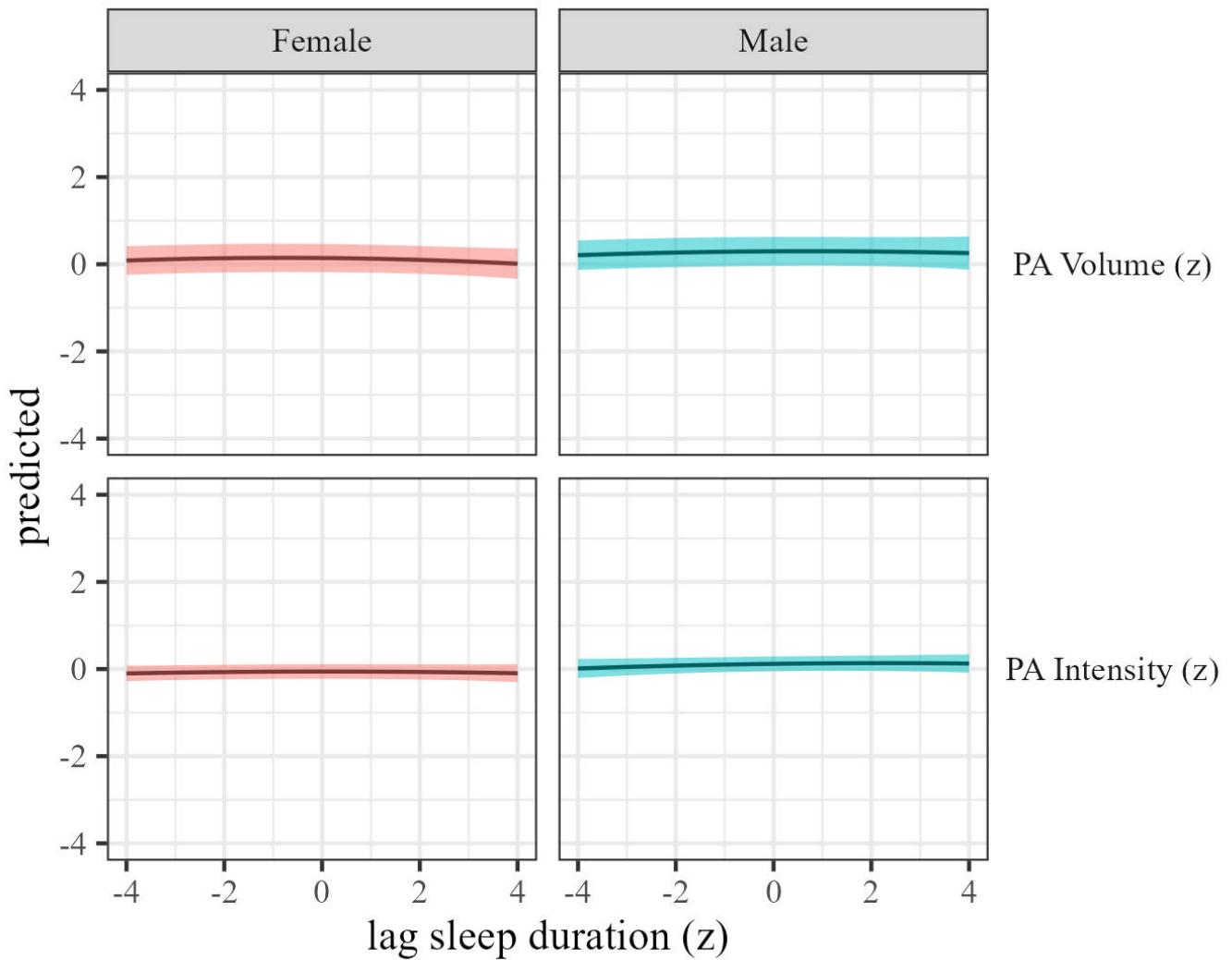


Figure 21. Physical activity by sleep duration moderated by sex

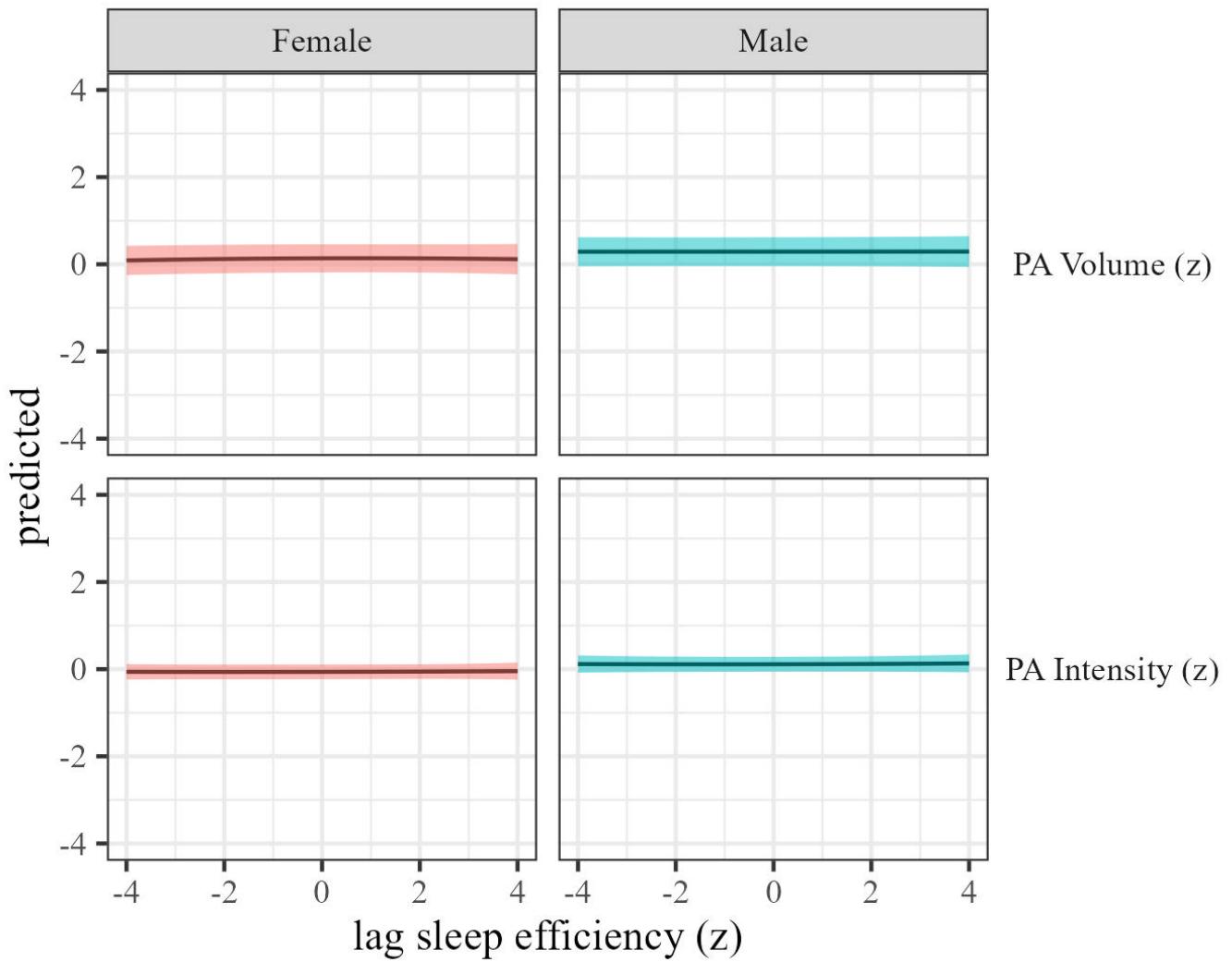


Figure 22. Physical activity by sleep efficiency moderated by sex

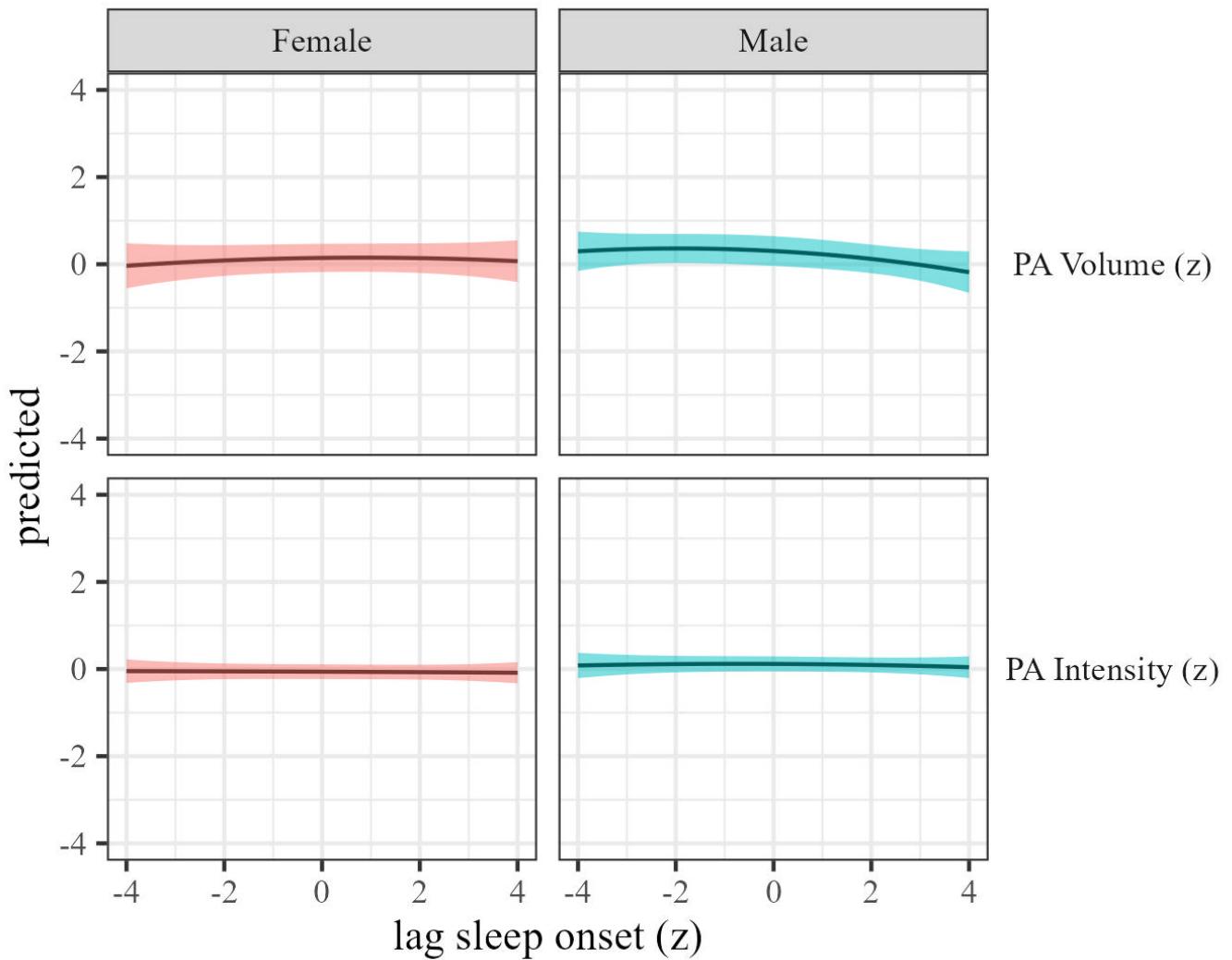


Figure 23. Physical activity by sleep onset moderated by sex

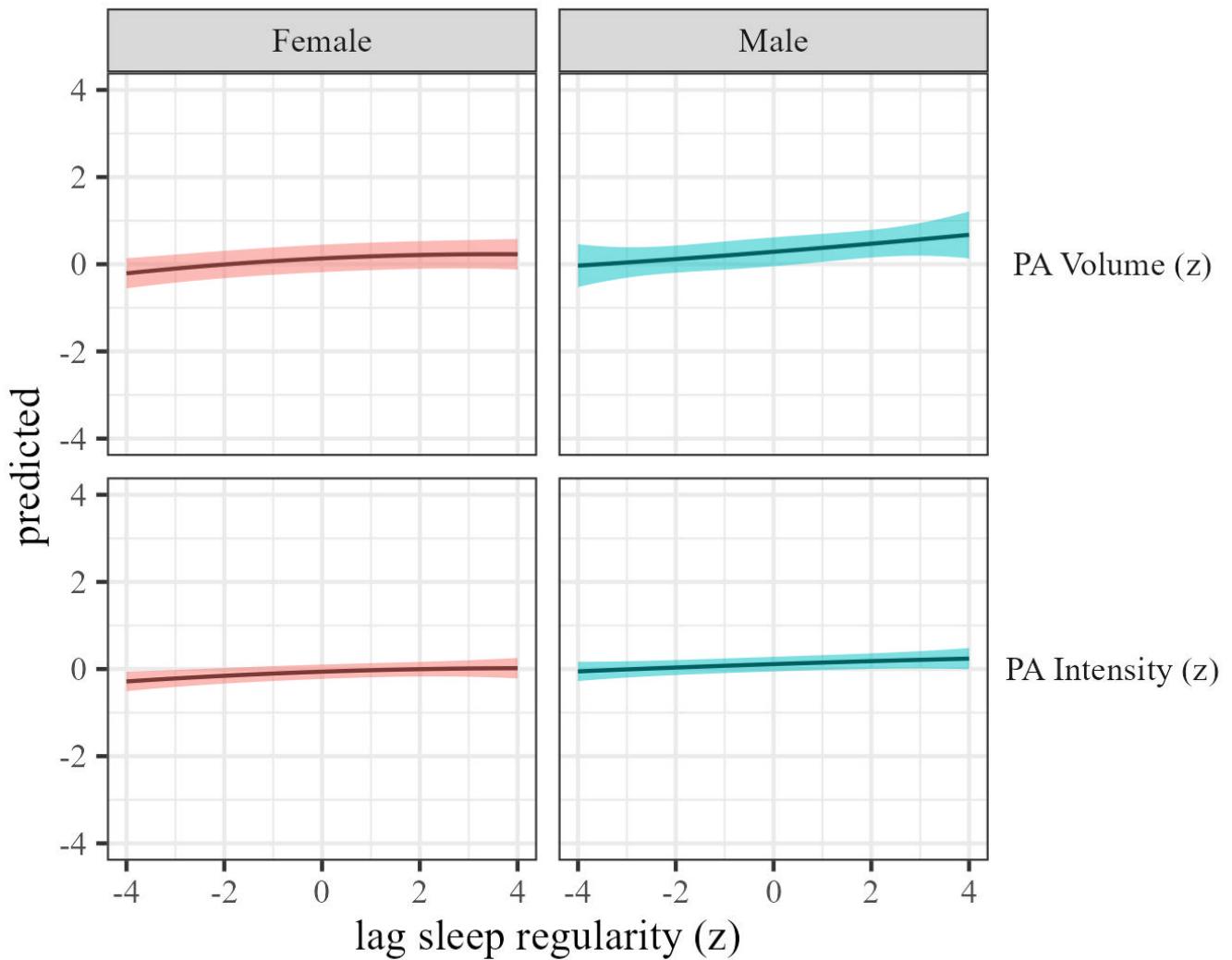


Figure 24. Physical activity by sleep regularity moderated by sex

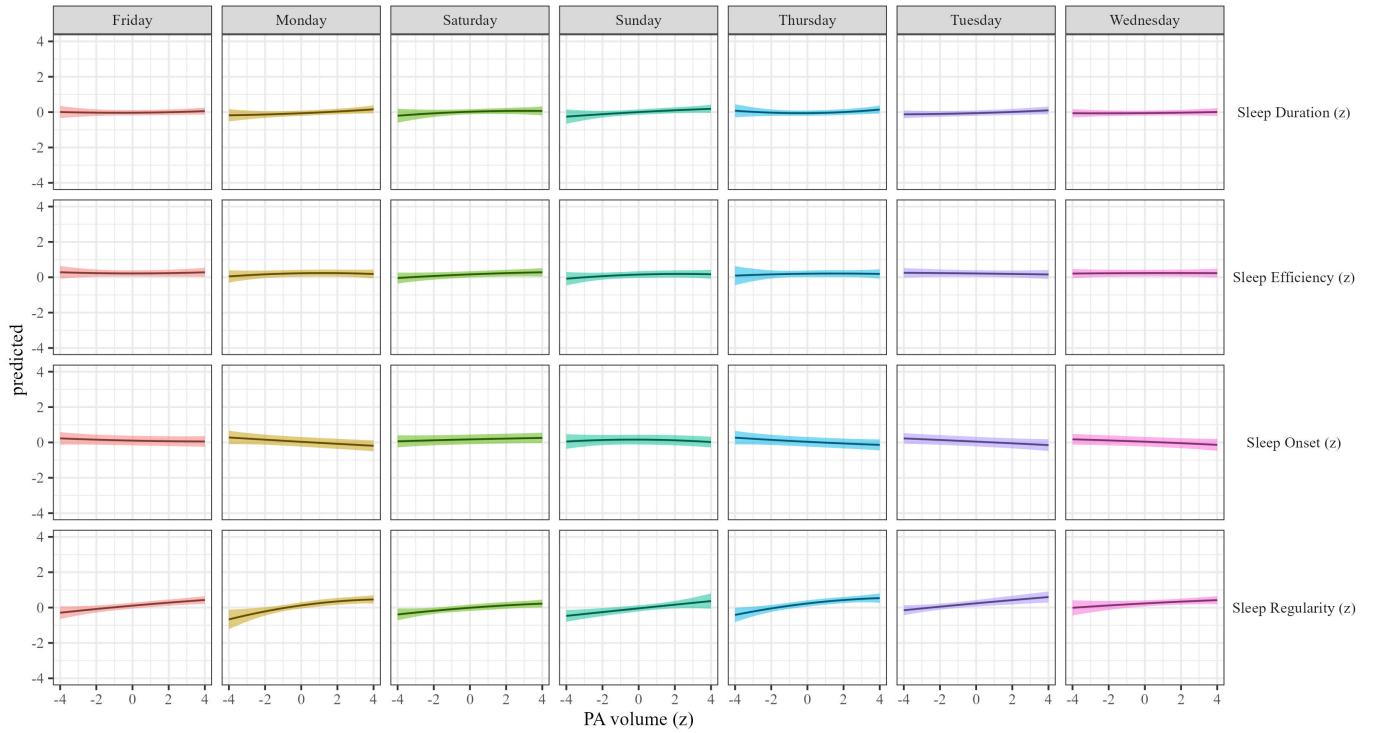


Figure 25. Sleep metrics on Physical activity volume by weekday

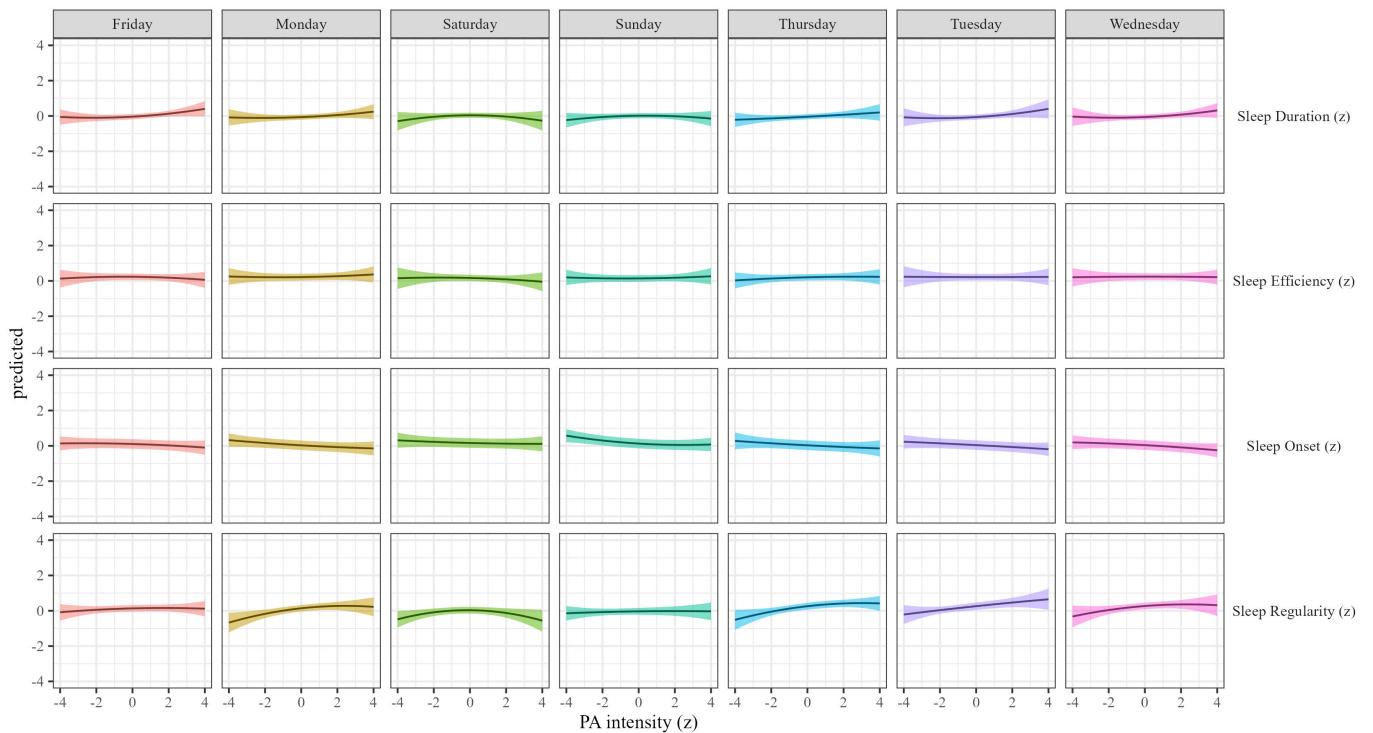


Figure 26. Sleep metrics on Physical activity intensity moderated by weekday

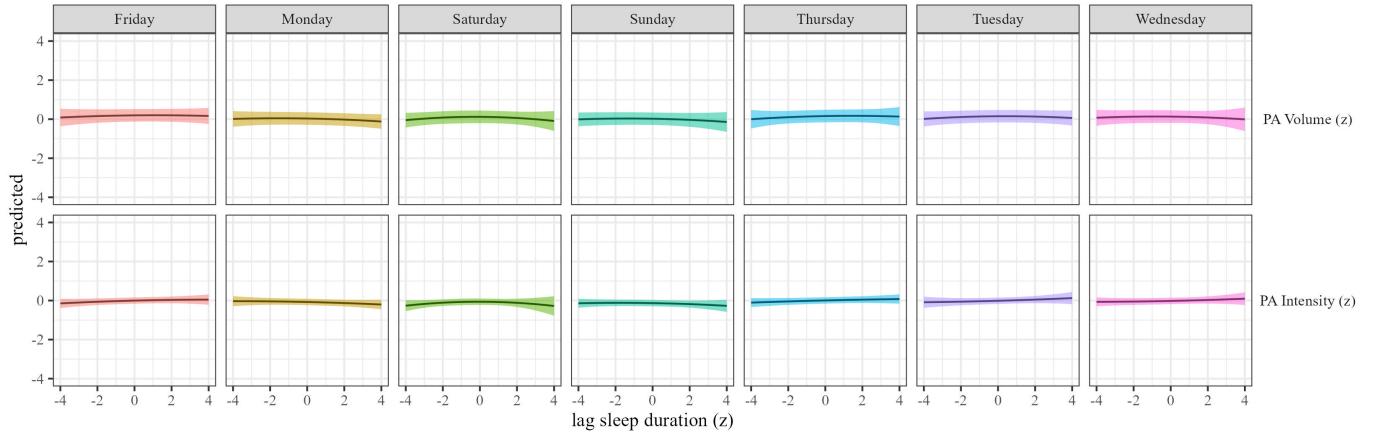


Figure 27. Physical activity by sleep duration moderated by weekday

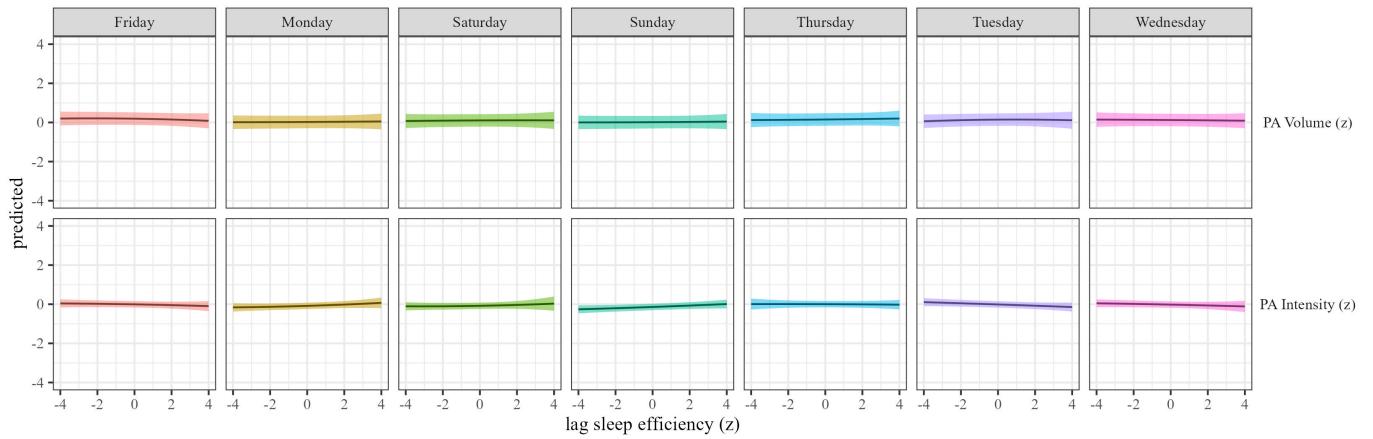


Figure 28. Physical activity by sleep efficiency moderated by weekday

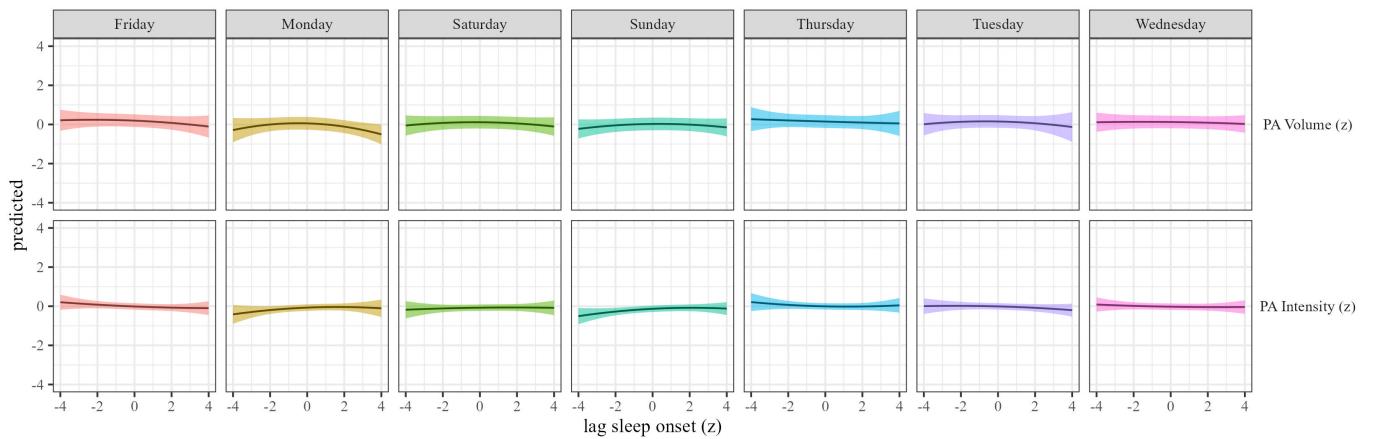


Figure 29. Physical activity by sleep onset moderated by weekday

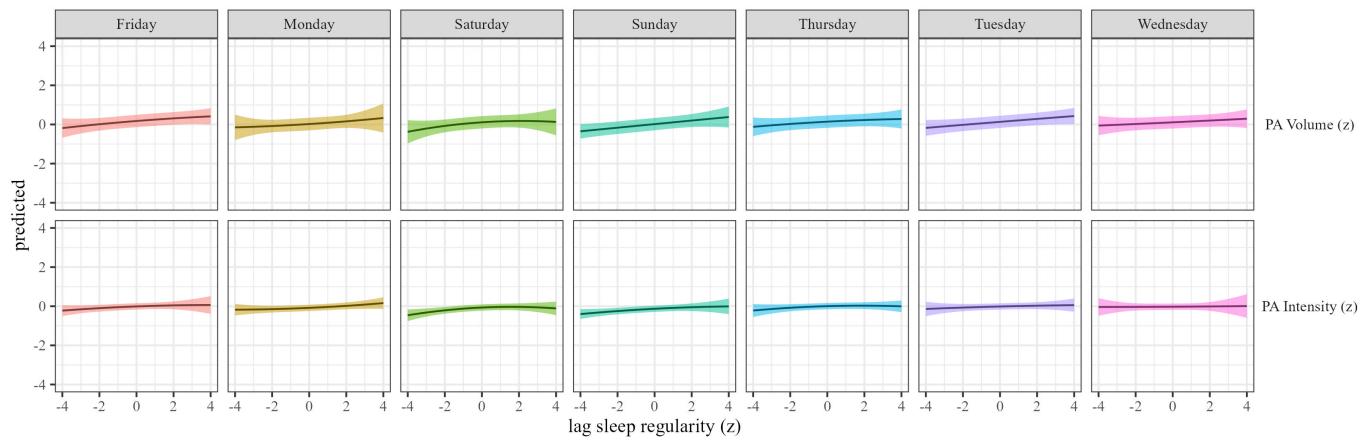


Figure 30. Physical activity by sleep regularity moderated by weekday

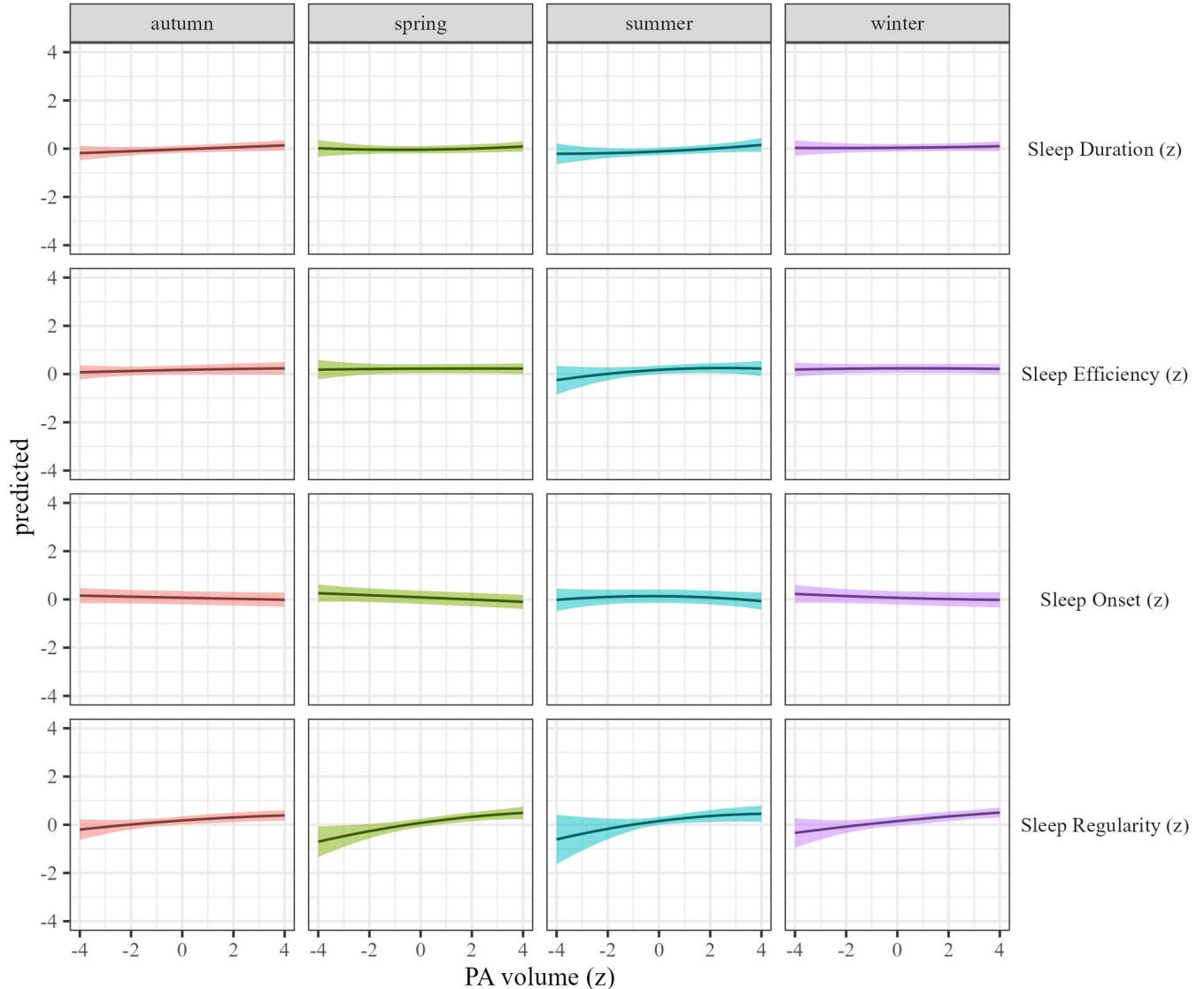


Figure 31. Sleep metrics on Physical activity volume by season

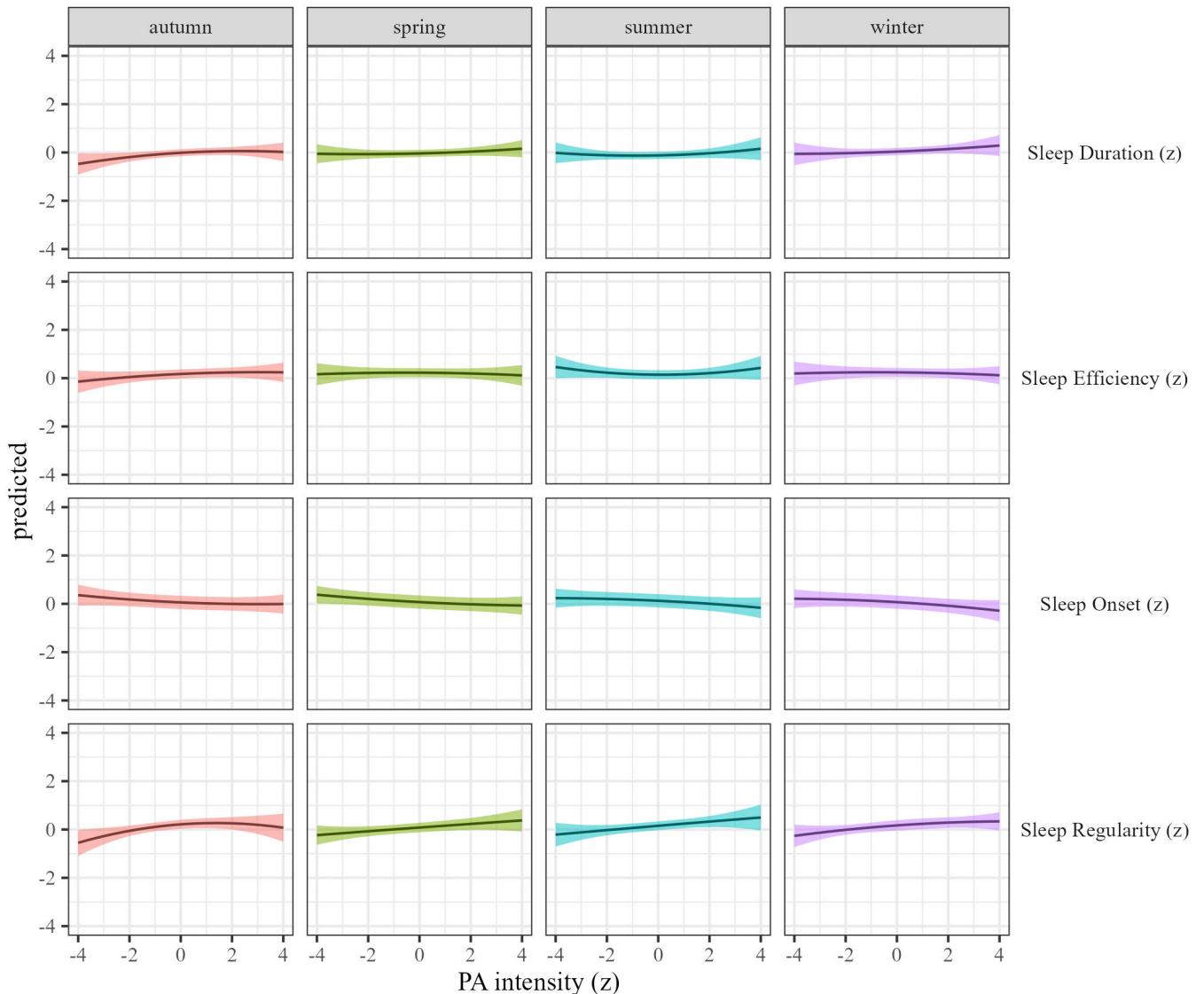


Figure 32. Sleep metrics on Physical activity intensity moderated by season

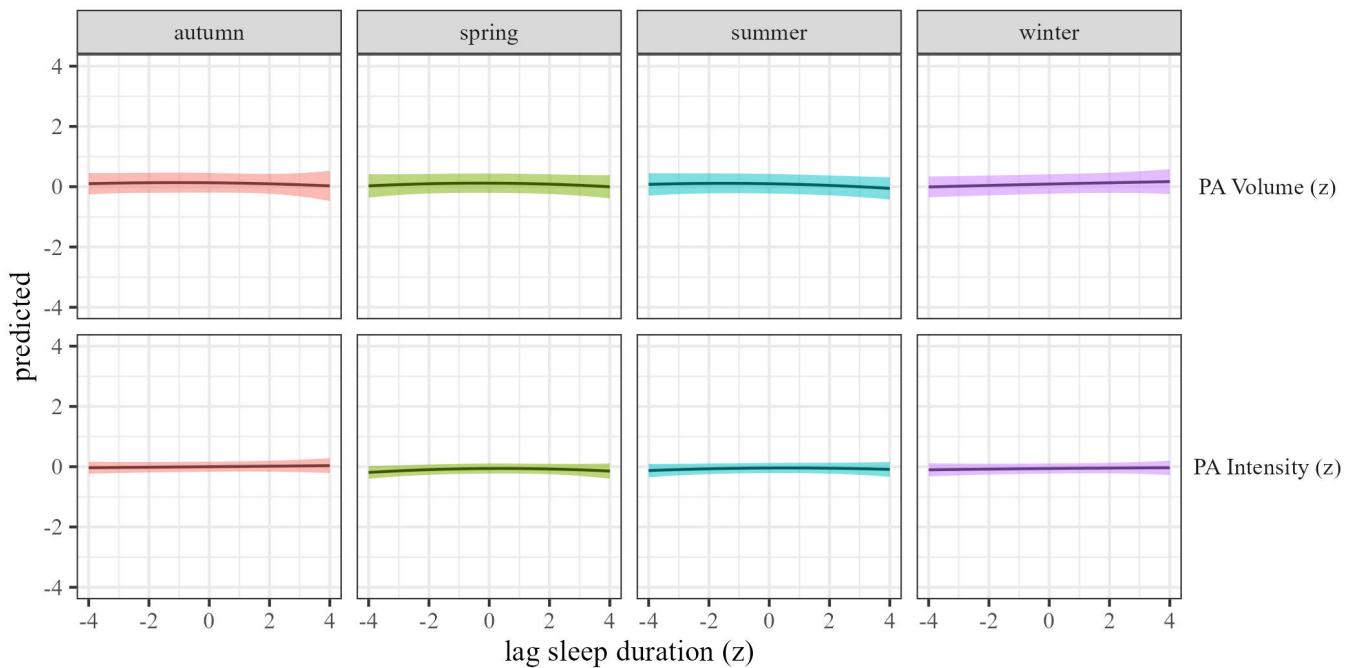


Figure 33. Physical activity by sleep duration moderated by season

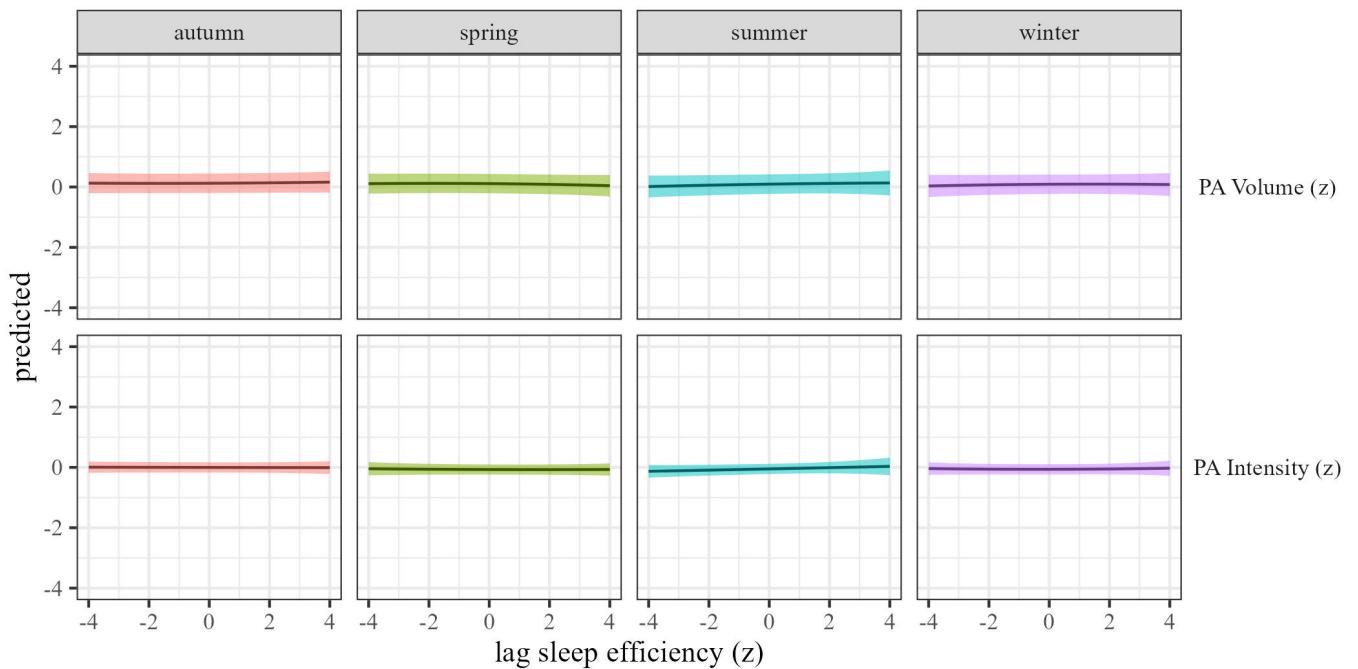


Figure 34. Physical activity by sleep efficiency moderated by season

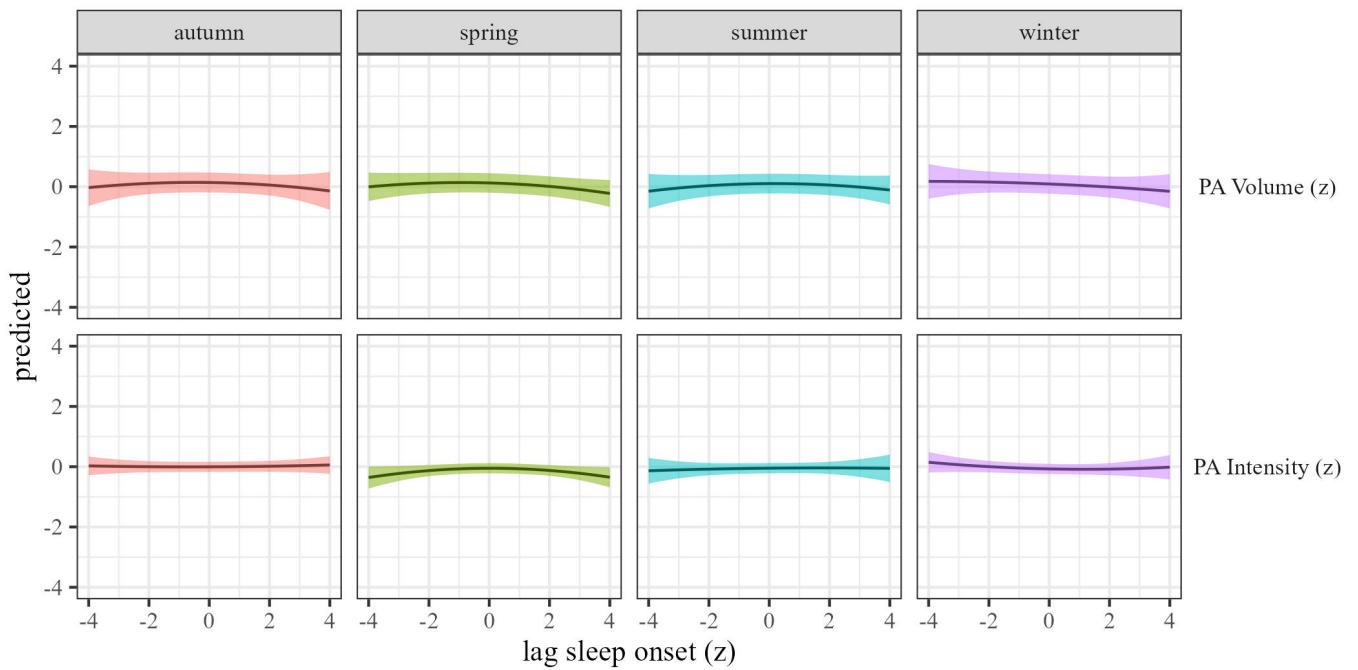


Figure 35. Physical activity by sleep onset moderated by season

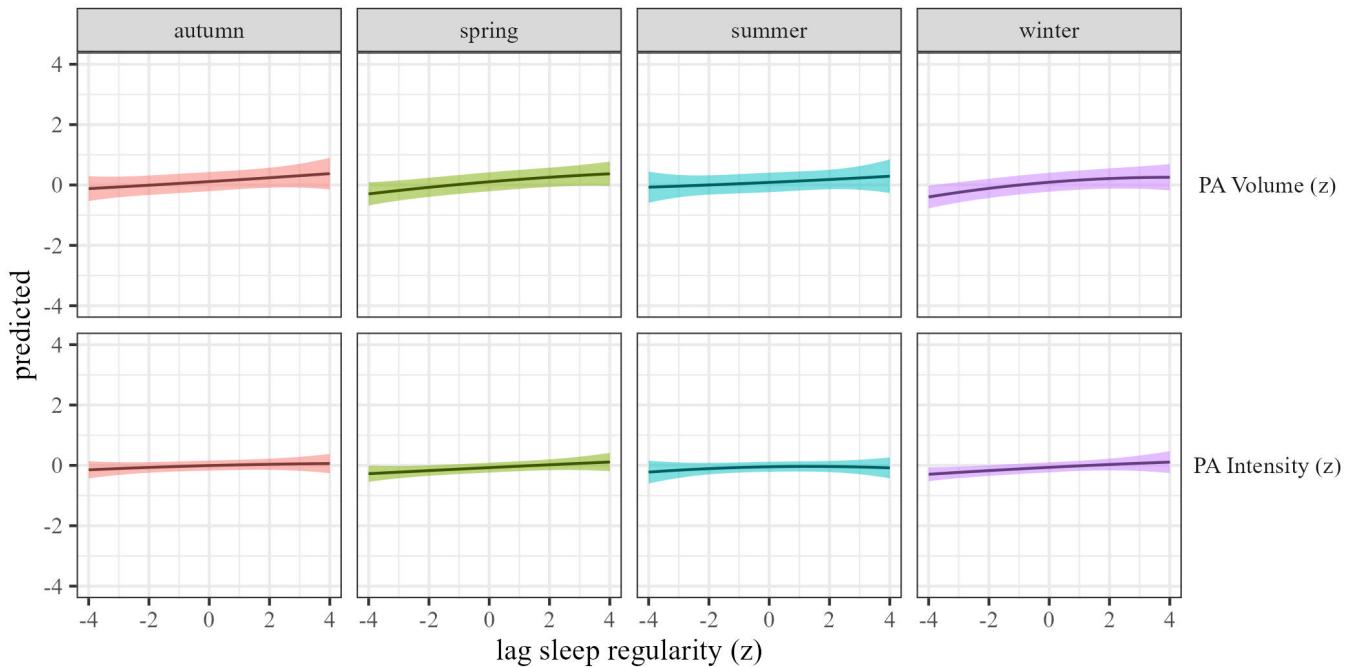


Figure 36. Physical activity by sleep regularity moderated by season

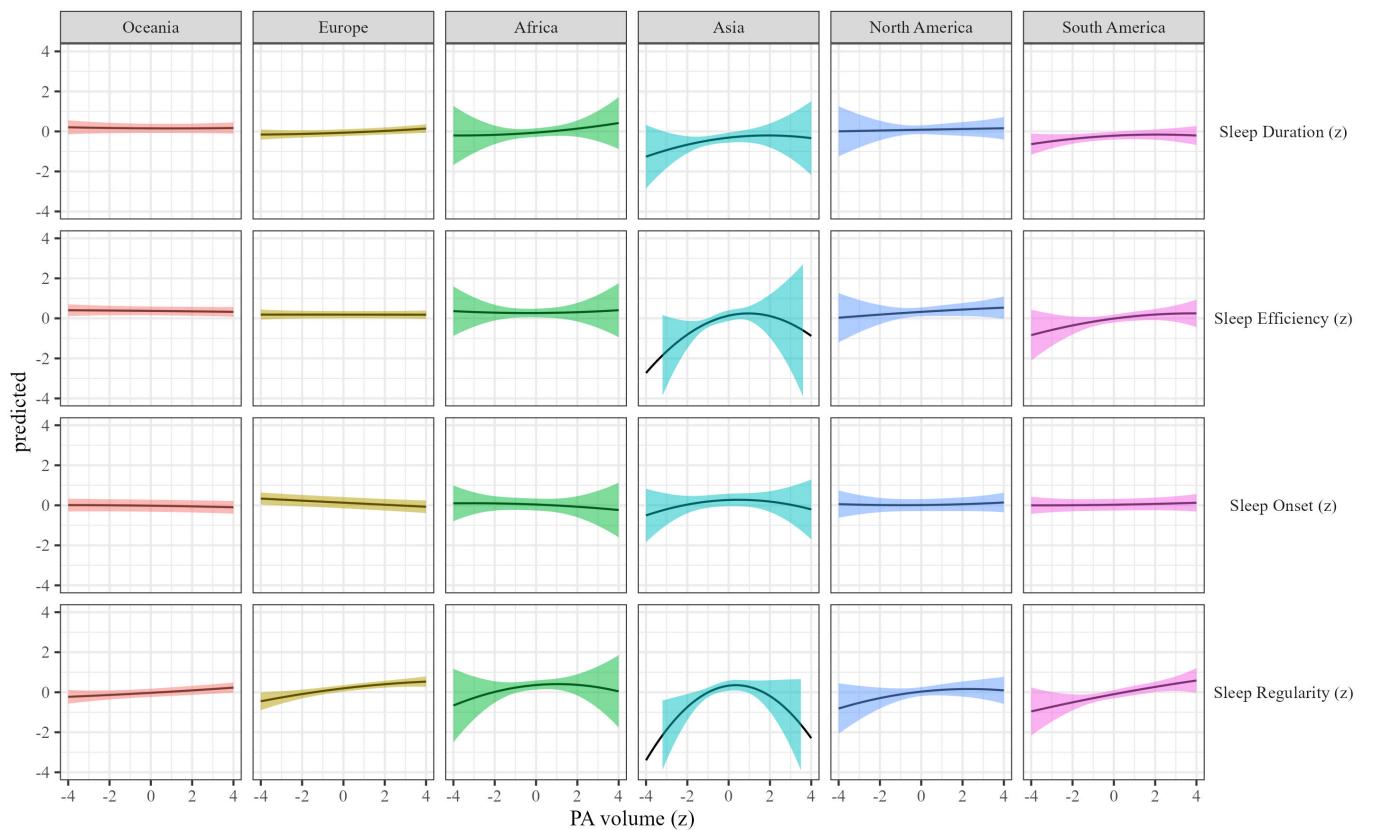


Figure 37. Sleep metrics on Physical activity volume by region

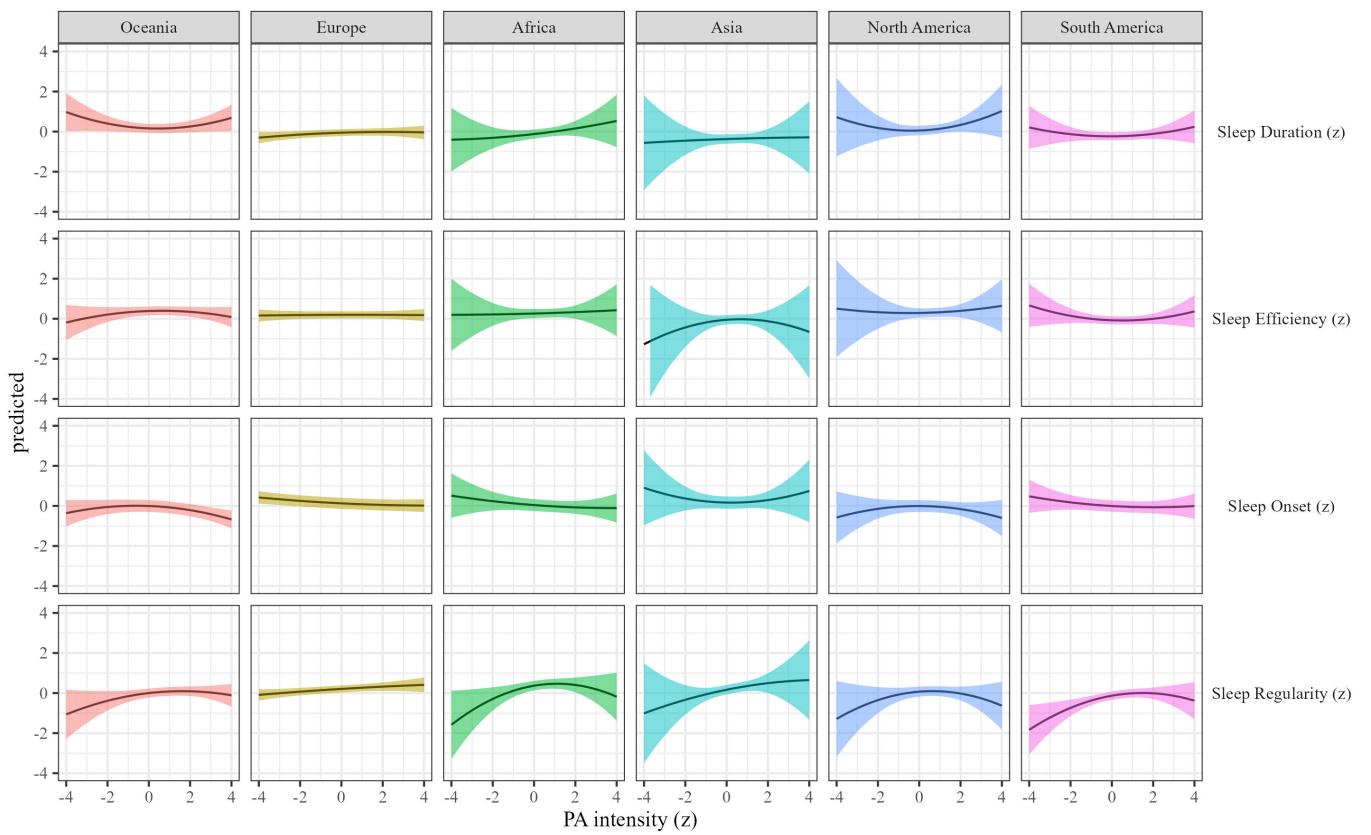


Figure 38. Sleep metrics on Physical activity intensity moderated by region

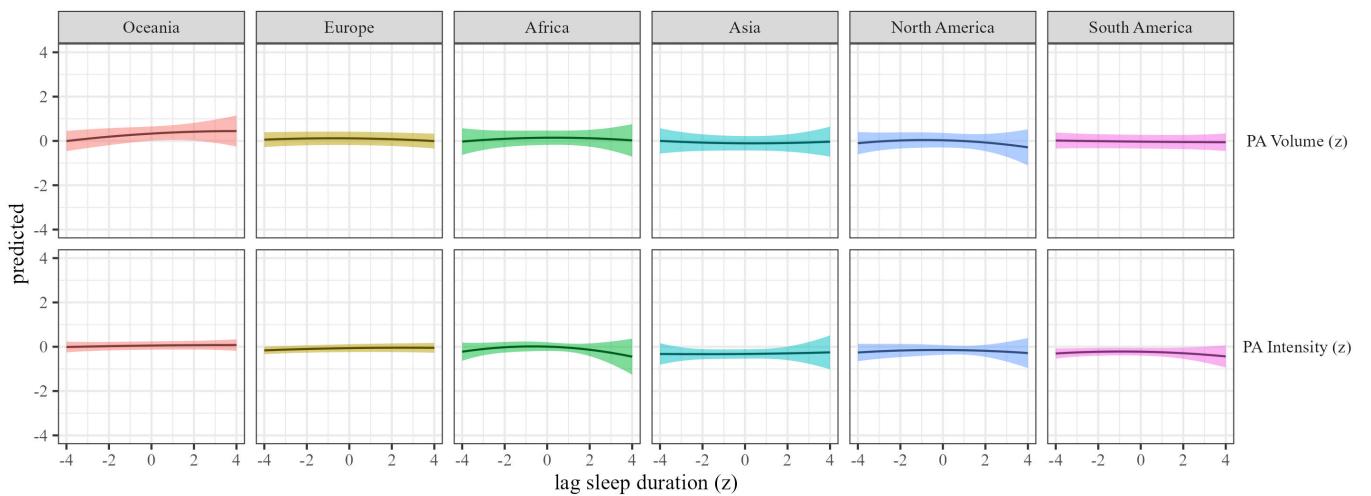
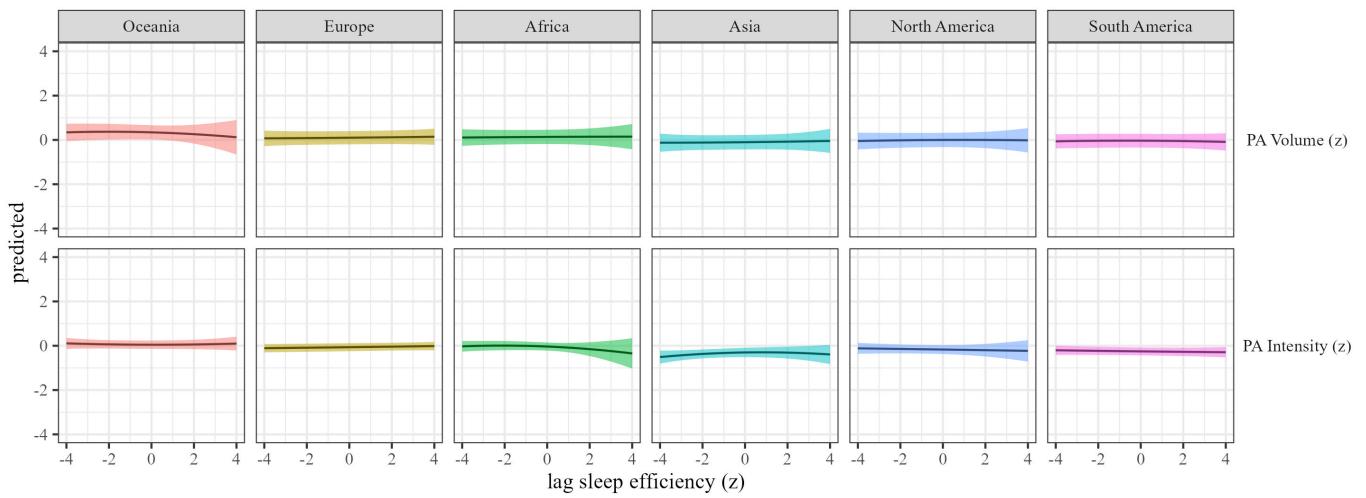
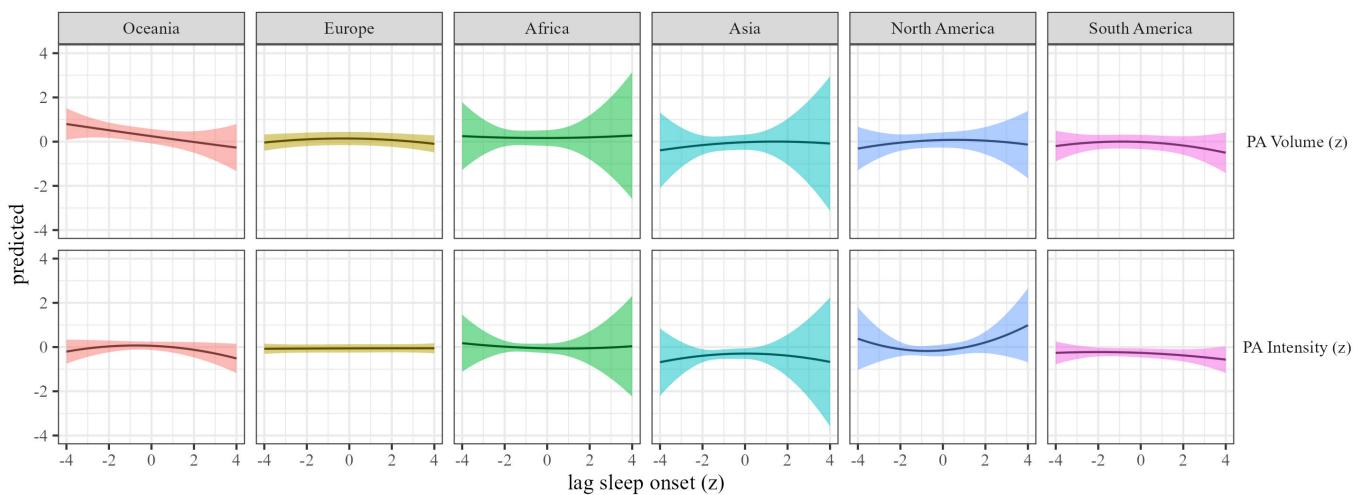


Figure 39. Physical activity by sleep duration moderated by region



*Figure 40.* Physical activity by sleep efficiency moderated by region



*Figure 41.* Physical activity by sleep onset moderated by region

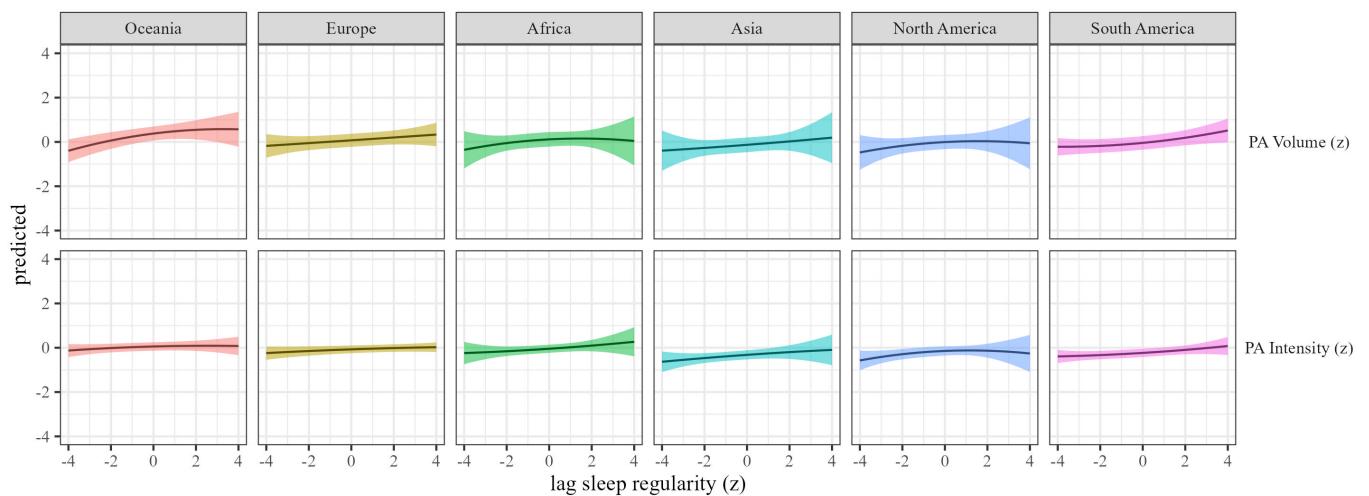


Figure 42. Physical activity by sleep regularity moderated by region

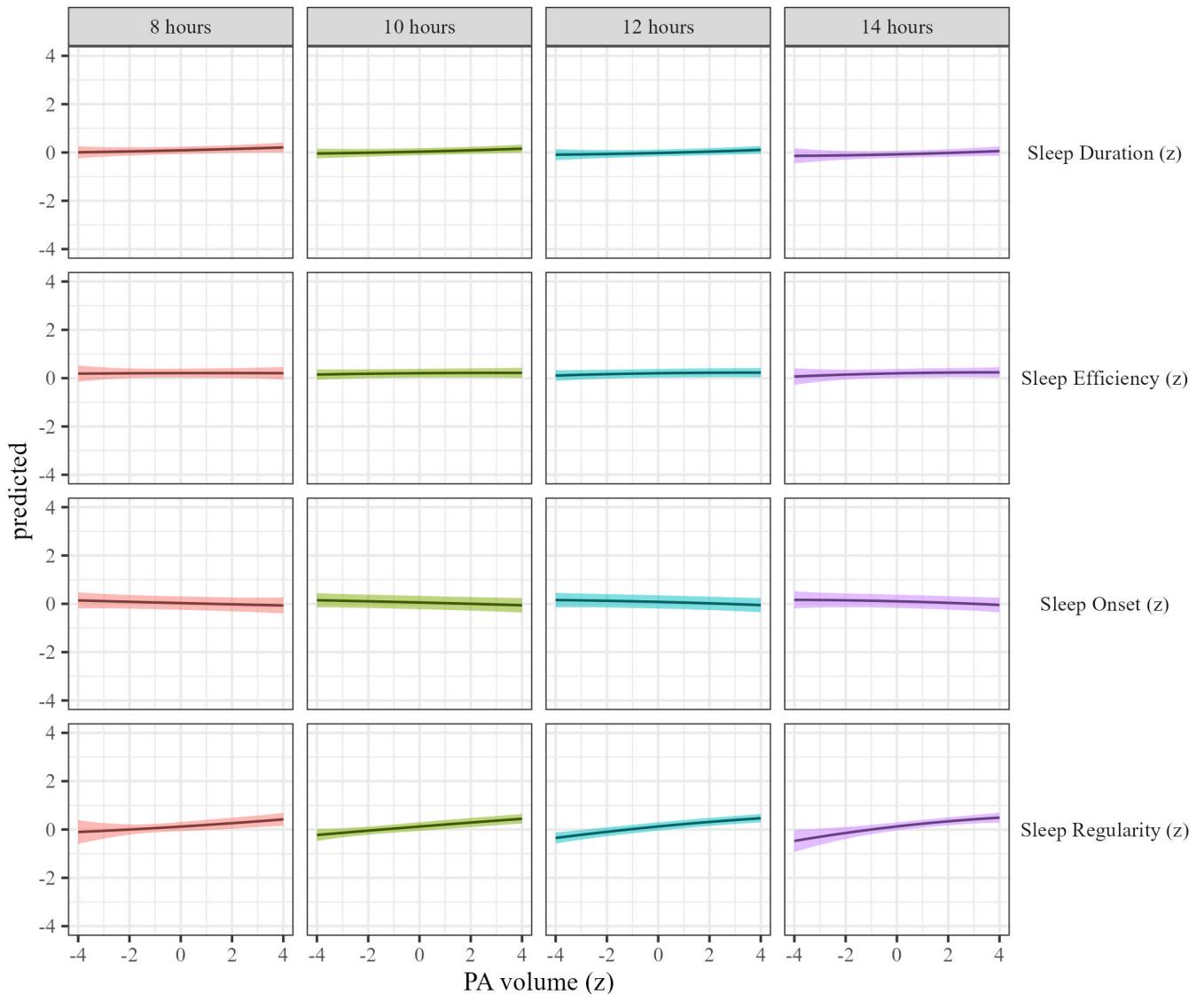


Figure 43. Sleep metrics on Physical activity volume by daylight hours

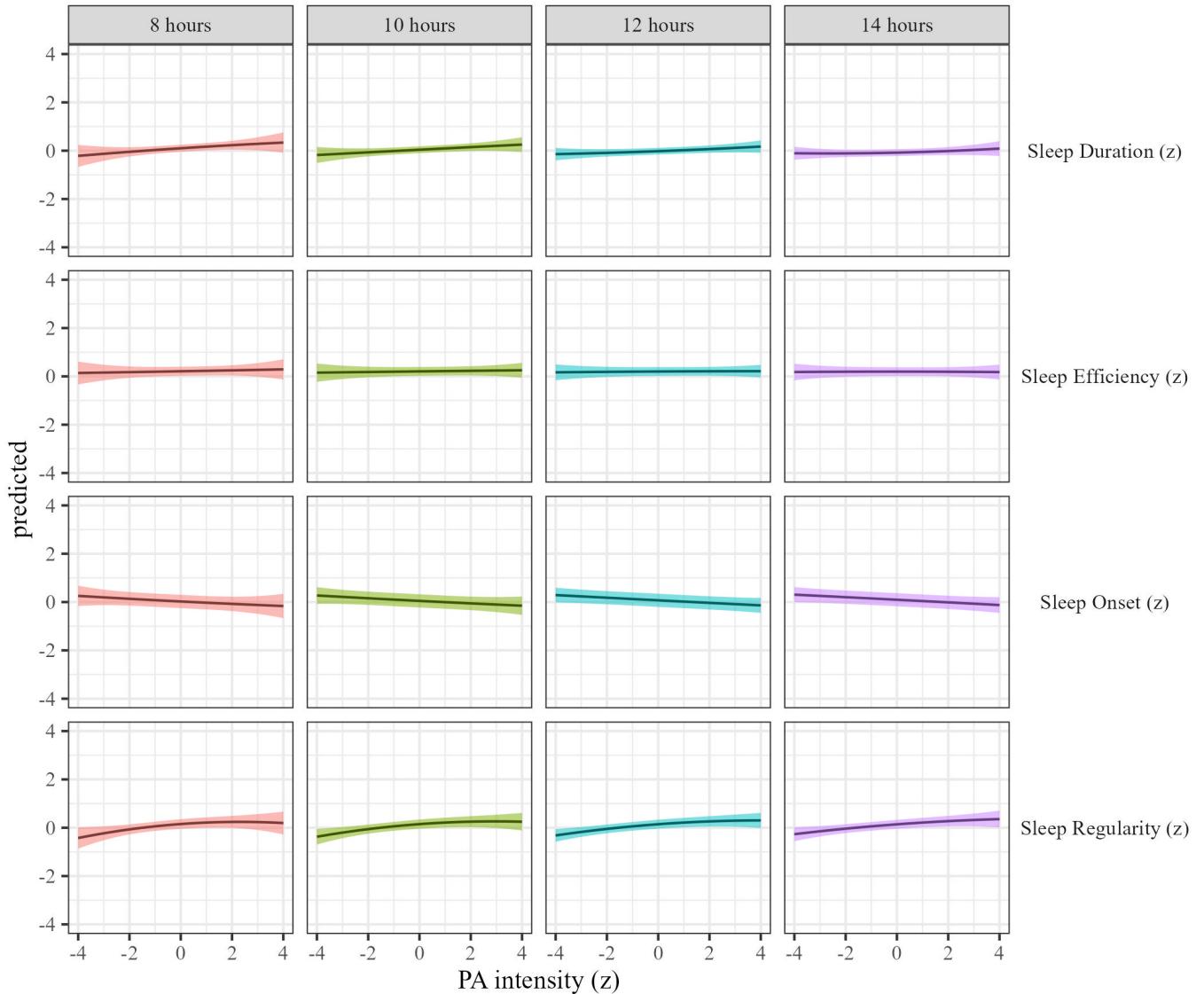


Figure 44. Sleep metrics on Physical activity intensity moderated by daylight hours

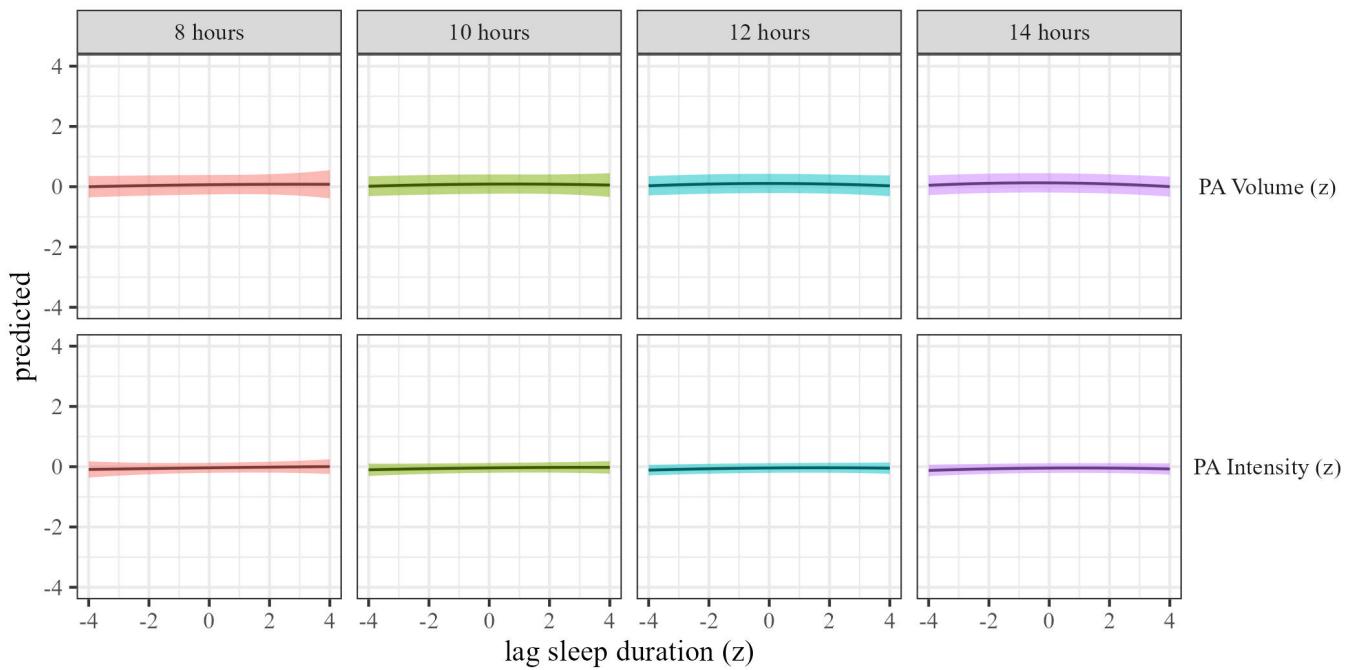


Figure 45. Physical activity by sleep duration moderated by daylight hours

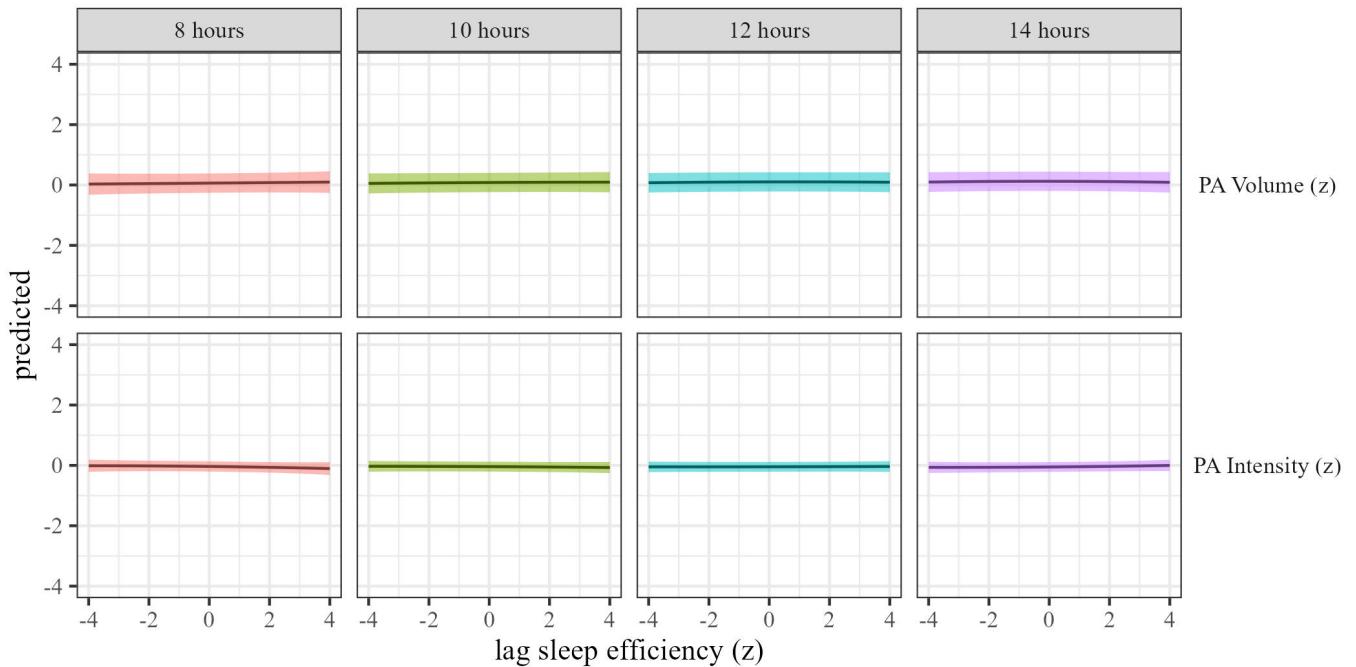


Figure 46. Physical activity by sleep efficiency moderated by daylight hours

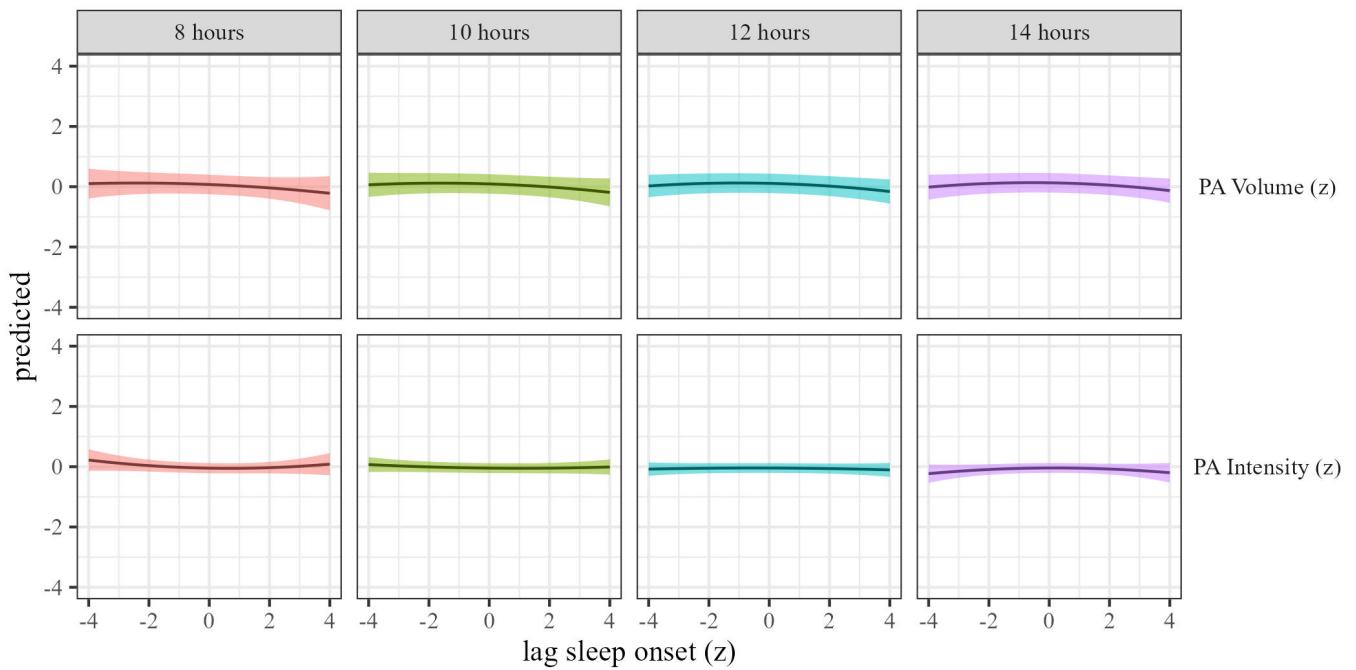


Figure 47. Physical activity by sleep onset moderated by daylight hours

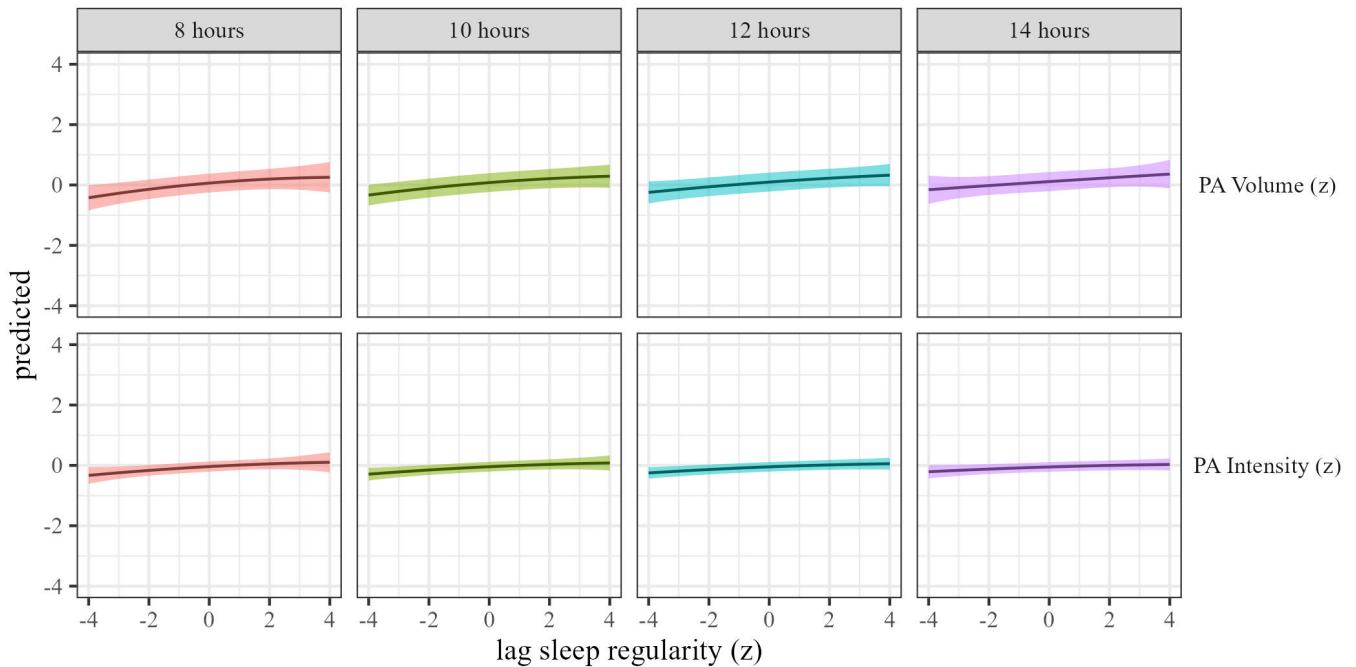


Figure 48. Physical activity by sleep regularity moderated by daylight hours

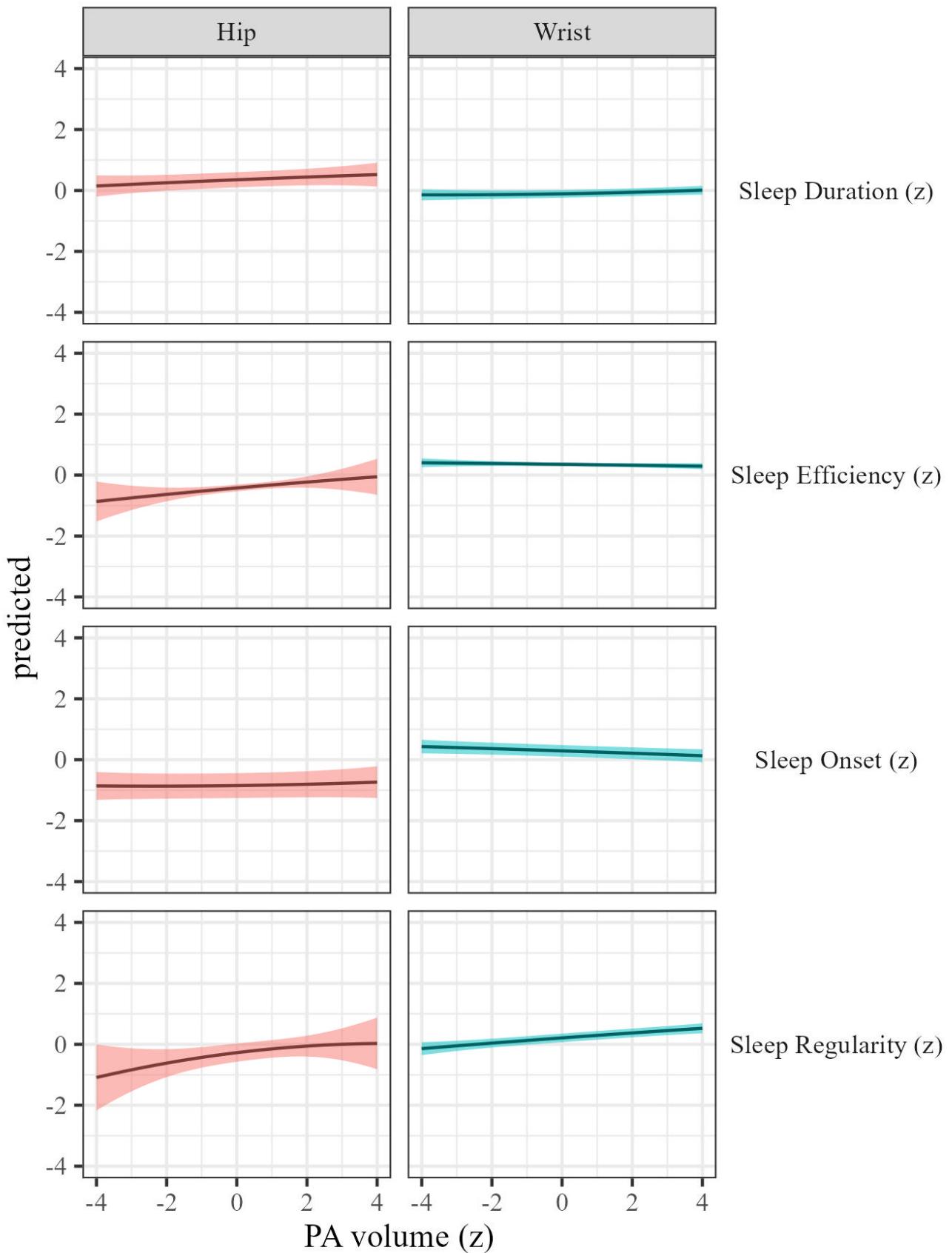


Figure 49. Sleep metrics on Physical activity volume by wear location

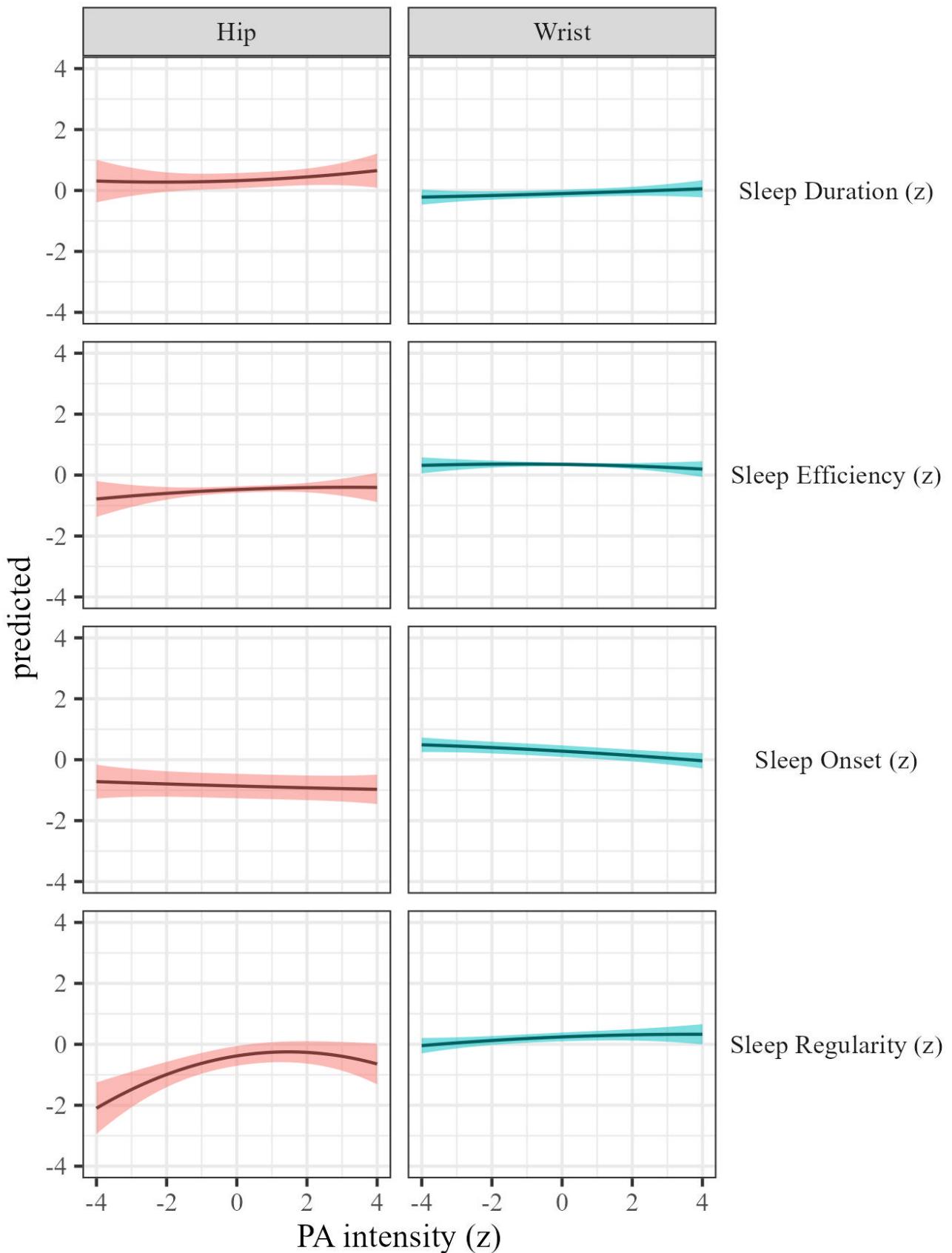


Figure 50. Sleep metrics on Physical activity intensity moderated by wear location

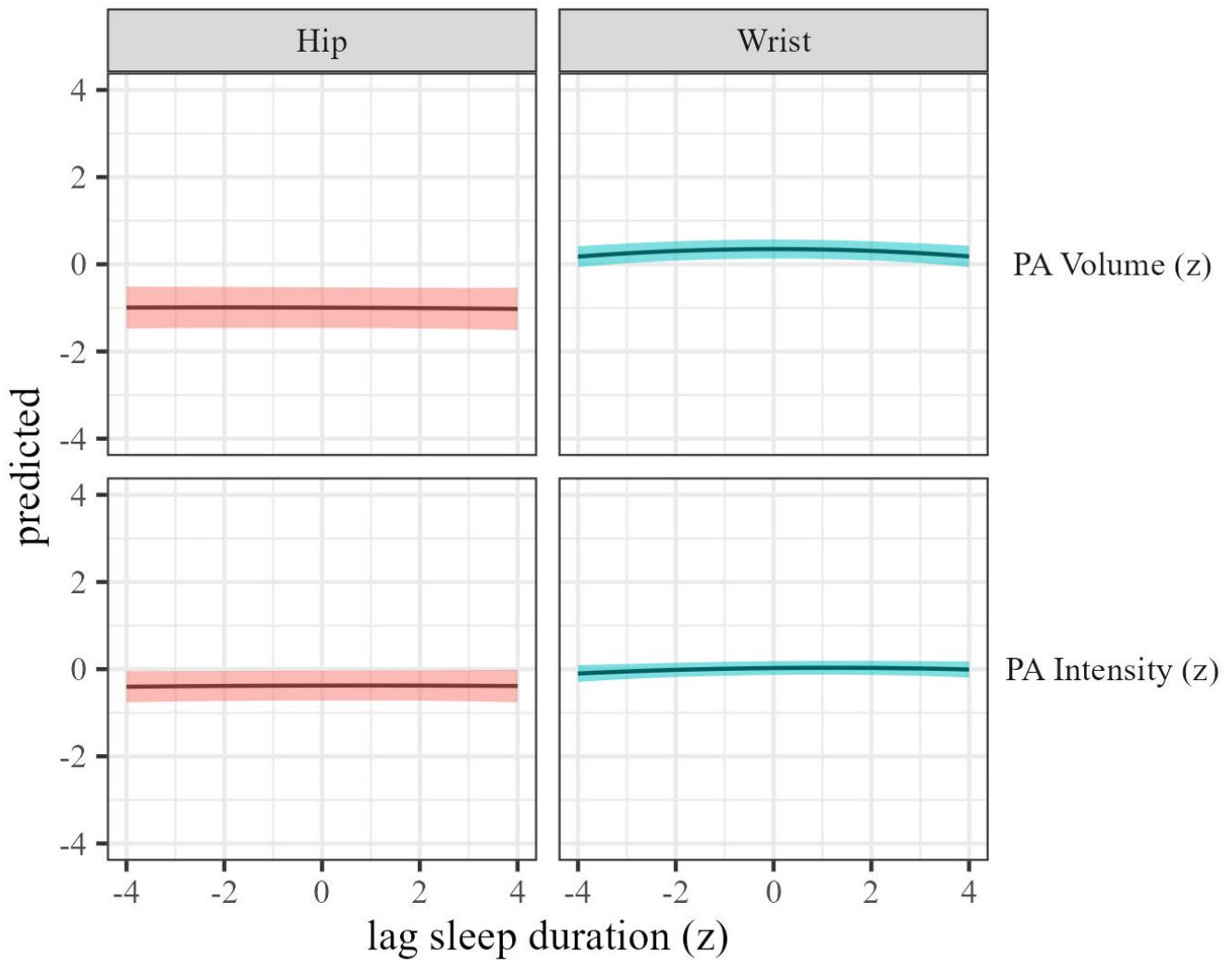


Figure 51. Physical activity by sleep duration moderated by wear location

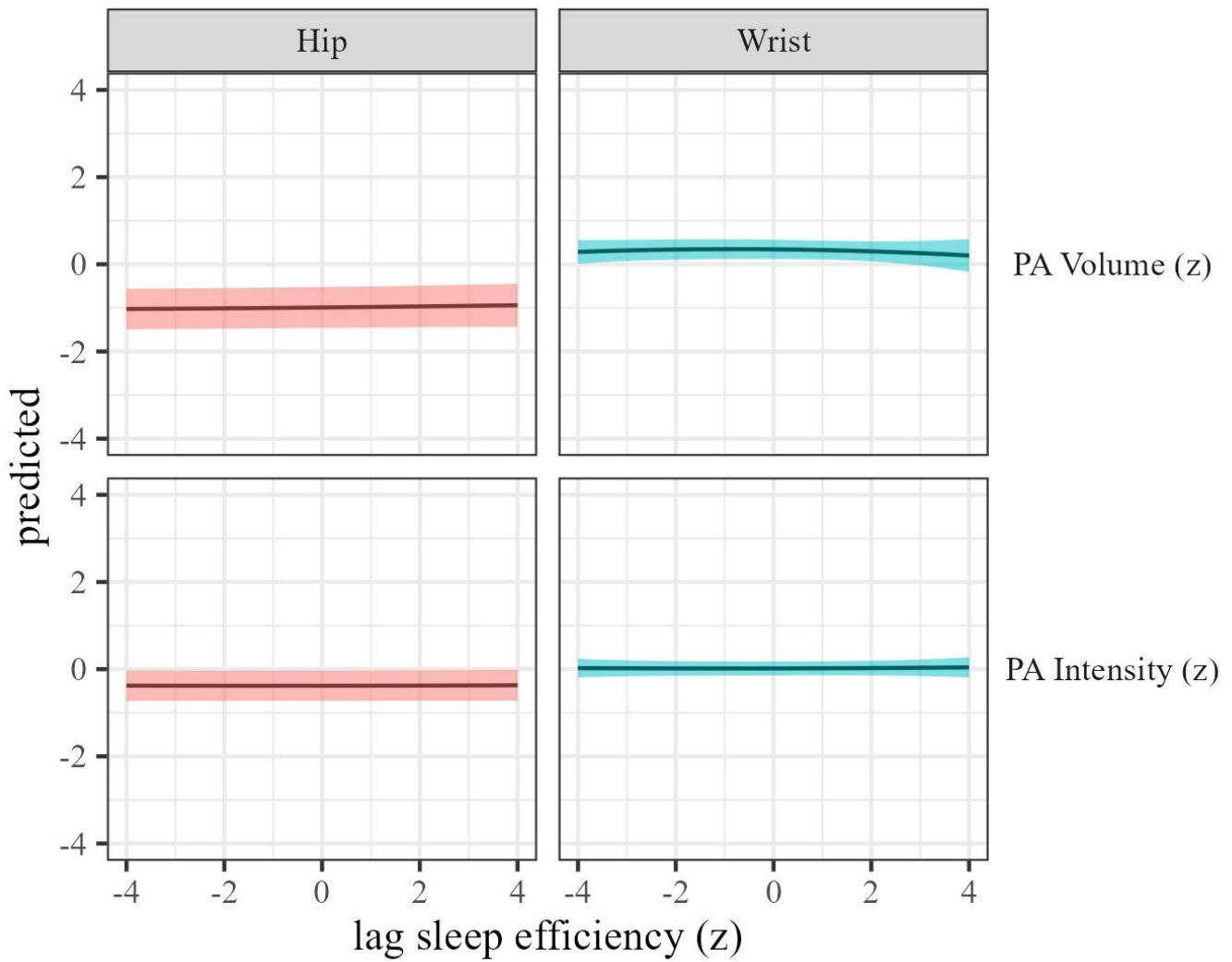


Figure 52. Physical activity by sleep efficiency moderated by wear location

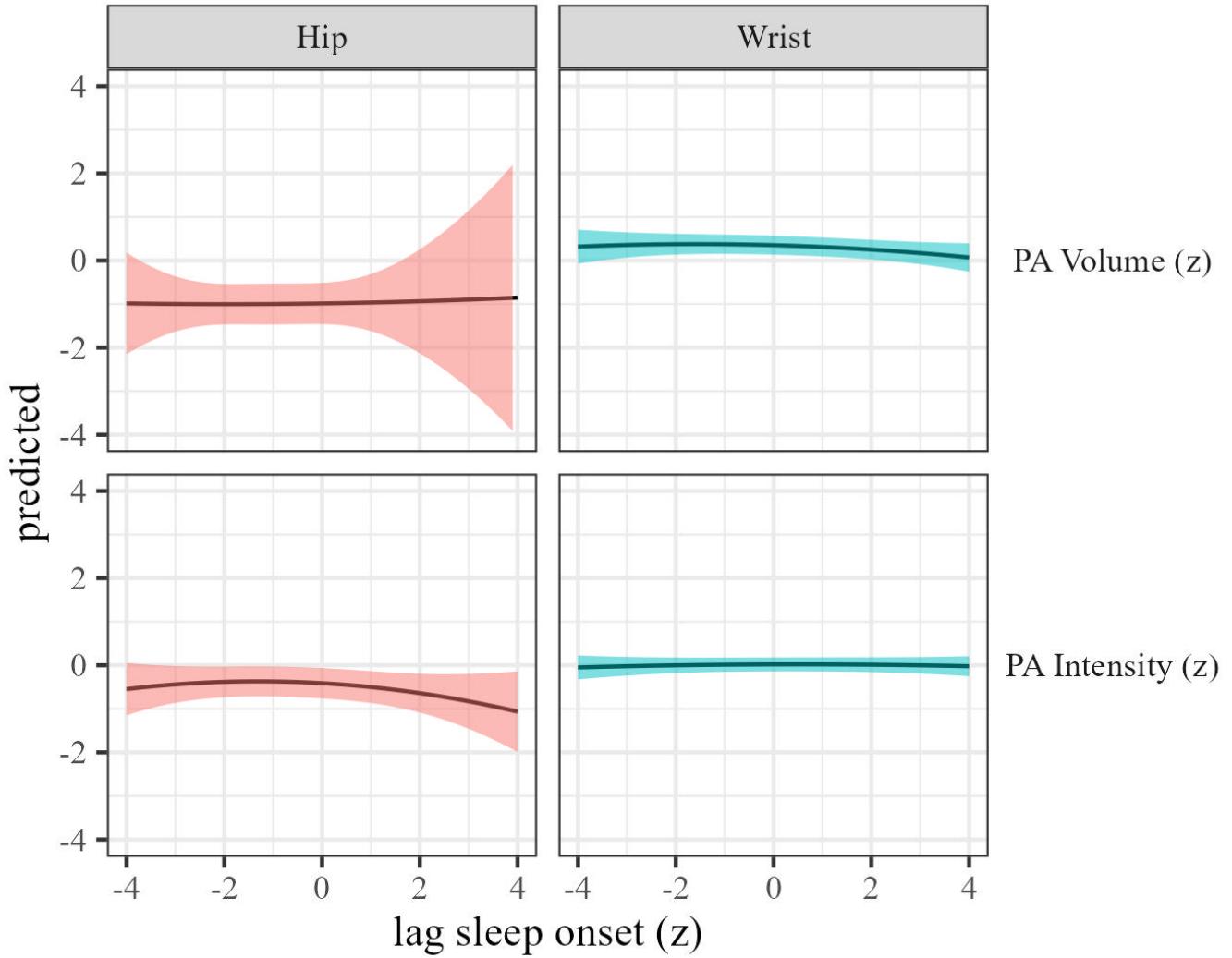


Figure 53. Physical activity by sleep onset moderated by wear location

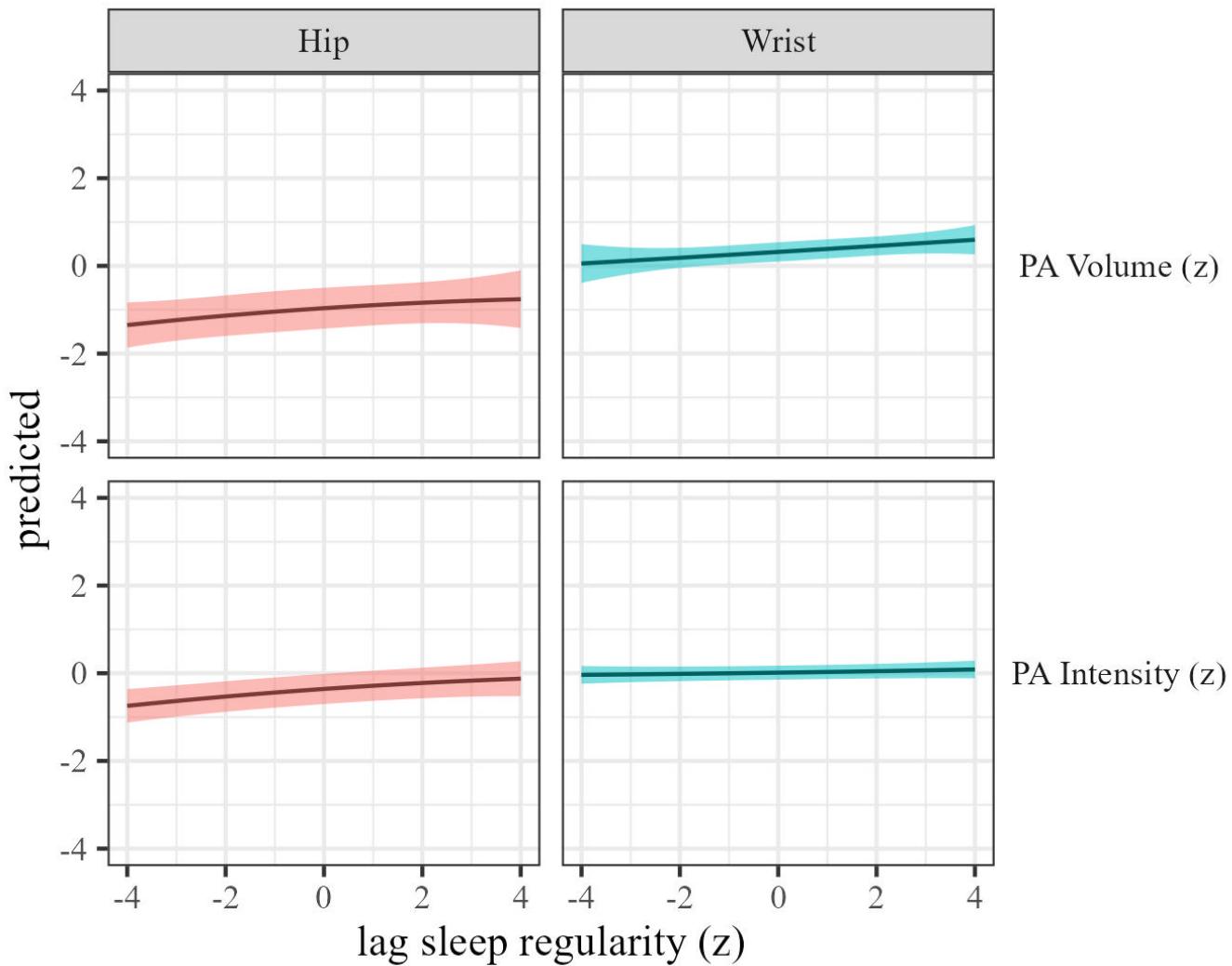


Figure 54. Physical activity by sleep regularity moderated by wear location