

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

### Model diagnostics

The model diagnostics for the main analysis, and for all models presented in this document are in Table 1

### 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 2 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 2 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 3 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 3 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 3 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 3 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 4 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 4 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 5 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 5 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 3 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 5 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 6 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 6 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 7 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 7 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 3 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 7 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 8 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 8 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 9 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 9 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 3 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 9 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 10 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 10 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 11 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 11 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 3 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 11 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 12 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 12 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 13 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 13 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 3 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 13 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 14 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 14 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 15 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 15 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 3 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 15 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 16 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 16 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 17 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 17 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 3 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 17 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 18 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 18 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 19 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 19 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 3 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 19 and Figure 54.

Table 1

*Model diagnostics*

Model name	Skewness	Kurtosis	Converged (%)
Models moderated by age			
sleep duration by PA volume	-0.01	-3.13	100.00%
sleep efficiency by PA volume	-0.57	-12.62	100.00%
sleep onset by PA volume	0.32	-11.30	100.00%
sleep regularity by PA volume	-0.37	-11.78	100.00%
sleep duration by PA intensity	-0.02	-3.11	100.00%
sleep efficiency by PA intensity	-0.57	-12.61	100.00%
sleep onset by PA intensity	0.34	-11.41	100.00%
sleep regularity by PA intensity	-0.38	-11.76	100.00%
PA volume by sleep duration(lagged)	0.56	-90.27	100.00%
PA intensity by sleep duration(lagged)	0.19	-2.37	100.00%
PA volume by sleep efficiency(lagged)	0.56	-90.13	100.00%
PA intensity by sleep efficiency(lagged)	0.19	-2.35	100.00%
PA volume by sleep onset(lagged)	0.55	-90.13	100.00%
PA intensity by sleep onset(lagged)	0.19	-2.36	100.00%
PA volume by sleep regularity(lagged)	0.56	-89.99	100.00%
PA intensity by sleep regularity(lagged)	0.21	-2.36	100.00%
Models moderated by bmi			
sleep duration by PA volume	-0.02	-3.13	100.00%
sleep efficiency by PA volume	-0.57	-12.61	100.00%
sleep onset by PA volume	0.32	-11.30	100.00%
sleep regularity by PA volume	-0.37	-11.73	100.00%
sleep duration by PA intensity	-0.02	-3.11	100.00%
sleep efficiency by PA intensity	-0.57	-12.61	100.00%
sleep onset by PA intensity	0.34	-11.40	100.00%
sleep regularity by PA intensity	-0.38	-11.70	100.00%
PA volume by sleep duration(lagged)	0.56	-90.21	100.00%
PA intensity by sleep duration(lagged)	0.19	-2.36	100.00%
PA volume by sleep efficiency(lagged)	0.56	-90.14	100.00%
PA intensity by sleep efficiency(lagged)	0.19	-2.35	100.00%
PA volume by sleep onset(lagged)	0.55	-90.07	100.00%
PA intensity by sleep onset(lagged)	0.19	-2.36	100.00%
PA volume by sleep regularity(lagged)	0.57	-90.13	100.00%
PA intensity by sleep regularity(lagged)	0.20	-2.37	100.00%

Table 1 continued

Model name		Skewness	Kurtosis	Converged (%)
Models moderated by ses				
sleep duration by PA volume	-0.02	-3.13	100.00%	
sleep efficiency by PA volume	-0.57	-12.59	100.00%	
sleep onset by PA volume	0.32	-11.28	100.00%	
sleep regularity by PA volume	-0.37	-11.78	100.00%	
sleep duration by PA intensity	-0.02	-3.11	100.00%	
sleep efficiency by PA intensity	-0.57	-12.61	100.00%	
sleep onset by PA intensity	0.34	-11.40	100.00%	
sleep regularity by PA intensity	-0.38	-11.69	100.00%	
PA volume by sleep duration(lagged)	0.56	-90.26	100.00%	
PA intensity by sleep duration(lagged)	0.19	-2.36	100.00%	
PA volume by sleep efficiency(lagged)	0.56	-90.15	100.00%	
PA intensity by sleep efficiency(lagged)	0.19	-2.36	100.00%	
PA volume by sleep onset(lagged)	0.54	-89.82	100.00%	
PA intensity by sleep onset(lagged)	0.19	-2.36	100.00%	
PA volume by sleep regularity(lagged)	0.56	-89.85	100.00%	
PA intensity by sleep regularity(lagged)	0.20	-2.36	100.00%	
Models moderated by sex				
sleep duration by PA volume	-0.02	-3.13	100.00%	
sleep efficiency by PA volume	-0.58	-12.59	100.00%	
sleep onset by PA volume	0.33	-11.35	100.00%	
sleep regularity by PA volume	-0.37	-11.77	100.00%	
sleep duration by PA intensity	-0.02	-3.12	100.00%	
sleep efficiency by PA intensity	-0.57	-12.61	100.00%	
sleep onset by PA intensity	0.33	-11.39	100.00%	
sleep regularity by PA intensity	-0.38	-11.67	100.00%	
PA volume by sleep duration(lagged)	0.56	-90.15	100.00%	
PA intensity by sleep duration(lagged)	0.19	-2.36	100.00%	
PA volume by sleep efficiency(lagged)	0.56	-90.11	100.00%	
PA intensity by sleep efficiency(lagged)	0.19	-2.35	100.00%	
PA volume by sleep onset(lagged)	0.54	-89.89	100.00%	
PA intensity by sleep onset(lagged)	0.19	-2.36	100.00%	
PA volume by sleep regularity(lagged)	0.56	-89.95	100.00%	
PA intensity by sleep regularity(lagged)	0.20	-2.37	100.00%	
Models moderated by weekday				

Table 1 continued

Model name	Skewness	Kurtosis	Converged (%)
sleep duration by PA volume	-0.04	-3.13	100.00%
sleep efficiency by PA volume	-0.57	-12.64	100.00%
sleep onset by PA volume	0.27	-11.19	100.00%
sleep regularity by PA volume	-0.38	-12.26	100.00%
sleep duration by PA intensity	-0.04	-3.10	100.00%
sleep efficiency by PA intensity	-0.56	-12.70	100.00%
sleep onset by PA intensity	0.29	-11.42	100.00%
sleep regularity by PA intensity	-0.39	-12.28	100.00%
PA volume by sleep duration(lagged)	0.57	-91.23	100.00%
PA intensity by sleep duration(lagged)	0.22	-2.45	100.00%
PA volume by sleep efficiency(lagged)	0.57	-91.30	100.00%
PA intensity by sleep efficiency(lagged)	0.22	-2.43	100.00%
PA volume by sleep onset(lagged)	0.56	-91.02	100.00%
PA intensity by sleep onset(lagged)	0.23	-2.47	100.00%
PA volume by sleep regularity(lagged)	0.56	-90.67	100.00%
PA intensity by sleep regularity(lagged)	0.23	-2.40	100.00%
Models moderated by season			
sleep duration by PA volume	-0.01	-3.13	100.00%
sleep efficiency by PA volume	-0.58	-12.56	100.00%
sleep onset by PA volume	0.33	-11.33	100.00%
sleep regularity by PA volume	-0.37	-11.79	100.00%
sleep duration by PA intensity	-0.02	-3.11	100.00%
sleep efficiency by PA intensity	-0.57	-12.61	100.00%
sleep onset by PA intensity	0.33	-11.40	100.00%
sleep regularity by PA intensity	-0.38	-11.70	100.00%
PA volume by sleep duration(lagged)	0.56	-90.15	100.00%
PA intensity by sleep duration(lagged)	0.19	-2.37	100.00%
PA volume by sleep efficiency(lagged)	0.56	-90.05	100.00%
PA intensity by sleep efficiency(lagged)	0.19	-2.36	100.00%
PA volume by sleep onset(lagged)	0.54	-89.80	100.00%
PA intensity by sleep onset(lagged)	0.19	-2.36	100.00%
PA volume by sleep regularity(lagged)	0.57	-89.86	100.00%
PA intensity by sleep regularity(lagged)	0.20	-2.36	100.00%
Models moderated by region			
sleep duration by PA volume	-0.01	-3.13	100.00%

Table 1 continued

Model name	Skewness	Kurtosis	Converged (%)
sleep efficiency by PA volume	-0.57	-12.51	100.00%
sleep onset by PA volume	0.33	-11.50	100.00%
sleep regularity by PA volume	-0.37	-11.80	100.00%
sleep duration by PA intensity	-0.02	-3.12	100.00%
sleep efficiency by PA intensity	-0.56	-12.59	100.00%
sleep onset by PA intensity	0.34	-11.40	100.00%
sleep regularity by PA intensity	-0.38	-11.72	100.00%
PA volume by sleep duration(lagged)	0.55	-90.22	100.00%
PA intensity by sleep duration(lagged)	0.19	-2.37	100.00%
PA volume by sleep efficiency(lagged)	0.55	-89.92	100.00%
PA intensity by sleep efficiency(lagged)	0.19	-2.35	100.00%
PA volume by sleep onset(lagged)	0.54	-89.74	100.00%
PA intensity by sleep onset(lagged)	0.19	-2.35	100.00%
PA volume by sleep regularity(lagged)	0.56	-88.42	100.00%
PA intensity by sleep regularity(lagged)	0.20	-2.36	100.00%
Models moderated by daylight			
sleep duration by PA volume	-0.02	-3.13	100.00%
sleep efficiency by PA volume	-0.58	-12.62	100.00%
sleep onset by PA volume	0.33	-11.36	100.00%
sleep regularity by PA volume	-0.37	-11.81	100.00%
sleep duration by PA intensity	-0.02	-3.12	100.00%
sleep efficiency by PA intensity	-0.57	-12.61	100.00%
sleep onset by PA intensity	0.33	-11.42	100.00%
sleep regularity by PA intensity	-0.38	-11.69	100.00%
PA volume by sleep duration(lagged)	0.56	-90.25	100.00%
PA intensity by sleep duration(lagged)	0.19	-2.36	100.00%
PA volume by sleep efficiency(lagged)	0.56	-90.12	100.00%
PA intensity by sleep efficiency(lagged)	0.19	-2.36	100.00%
PA volume by sleep onset(lagged)	0.55	-90.02	100.00%
PA intensity by sleep onset(lagged)	0.19	-2.36	100.00%
PA volume by sleep regularity(lagged)	0.57	-90.07	100.00%
PA intensity by sleep regularity(lagged)	0.20	-2.36	100.00%
Models moderated by wear location			
sleep duration by PA volume	-0.02	-3.13	100.00%
sleep efficiency by PA volume	-0.58	-12.50	100.00%

Table 1 continued

Model name	Skewness	Kurtosis	Converged (%)
sleep onset by PA volume	0.33	-11.46	100.00%
sleep regularity by PA volume	-0.37	-11.80	100.00%
sleep duration by PA intensity	-0.02	-3.11	100.00%
sleep efficiency by PA intensity	-0.57	-12.62	100.00%
sleep onset by PA intensity	0.34	-11.40	100.00%
sleep regularity by PA intensity	-0.38	-11.75	100.00%
PA volume by sleep duration(lagged)	0.56	-90.21	100.00%
PA intensity by sleep duration(lagged)	0.19	-2.36	100.00%
PA volume by sleep efficiency(lagged)	0.56	-90.09	100.00%
PA intensity by sleep efficiency(lagged)	0.19	-2.36	100.00%
PA volume by sleep onset(lagged)	0.54	-89.93	100.00%
PA intensity by sleep onset(lagged)	0.19	-2.36	100.00%
PA volume by sleep regularity(lagged)	0.57	-90.13	100.00%
PA intensity by sleep regularity(lagged)	0.21	-2.36	100.00%

Table 2

*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)	0.74 [0.59, 0.89]	0.08	9.67	< .001	0.71 [0.56, 0.86]	0.08	9.08	< .001
Physical activity	0.04 [0.00, 0.07]	0.02	1.92	.086	0.04 [0.00, 0.09]	0.02	1.96	.052
Age	0.00 [-0.01, 0.00]	0.00	-0.90	.371	0.00 [-0.01, 0.00]	0.00	-0.90	.373
Physical activity <sup>2</sup>	0.00 [0.00, 0.01]	0.00	0.61	.549	0.00 [-0.02, 0.03]	0.01	0.32	.753
Physical activity × age	0.00 [0.00, 0.00]	0.00	1.33	.192	0.00 [0.00, 0.00]	0.00	0.38	.702
Age × Physical activity <sup>2</sup>	0.00 [0.00, 0.00]	0.00	-1.59	.111	0.00 [0.00, 0.00]	0.00	-0.42	.676
<b>Sleep efficiency</b>								
(Intercept)	-0.34 [-0.51, -0.18]	0.08	-4.16	< .001	-0.35 [-0.52, -0.18]	0.09	-4.11	< .001
Physical activity	0.04 [0.00, 0.07]	0.02	2.22	.043	0.04 [-0.02, 0.09]	0.03	1.37	.195
Age	0.00 [-0.01, 0.01]	0.00	-0.28	.781	0.00 [-0.01, 0.00]	0.00	-0.48	.636
Physical activity <sup>2</sup>	0.00 [-0.01, 0.00]	0.00	-1.23	.227	-0.03 [-0.07, 0.02]	0.02	-1.11	.334
Physical activity × age	0.00 [0.00, 0.00]	0.00	-1.72	.088	0.00 [0.00, 0.00]	0.00	-1.53	.126
Age × Physical activity <sup>2</sup>	0.00 [0.00, 0.00]	0.00	-0.12	.904	0.00 [0.00, 0.00]	0.00	0.86	.430
<b>Sleep onset</b>								
(Intercept)	-1.08 [-1.25, -0.91]	0.09	-12.55	< .001	-1.07 [-1.23, -0.90]	0.09	-12.52	< .001
Physical activity	0.00 [-0.03, 0.03]	0.02	-0.27	.797	-0.03 [-0.06, 0.00]	0.02	-1.81	.073
Age	0.00 [0.01, 0.00]	0.00	-0.69	.490	0.00 [0.00, 0.00]	0.00	-0.63	.530
Physical activity <sup>2</sup>	-0.01 [-0.01, 0.00]	0.00	-1.04	.385	-0.02 [-0.04, 0.00]	0.01	-2.17	.031
Physical activity × age	0.00 [0.00, 0.00]	0.00	-3.83	.013	0.00 [0.00, 0.00]	0.00	-1.26	.217
Age × Physical activity <sup>2</sup>	0.00 [0.00, 0.00]	0.00	1.39	.256	0.00 [0.00, 0.00]	0.00	2.34	.019
<b>Sleep regularity</b>								

Table 2 continued

Term	Physical Activity Volume				Physical Activity Intensity			
	$\beta$ [95% CI]	SE	t	p	$\beta$ [95% CI]	SE	t	p
(Intercept)	0.20 [-0.05, 0.45]	0.13	1.55	.163	0.18 [-0.09, 0.44]	0.14	1.29	.242
Physical activity	0.08 [0.02, 0.13]	0.03	2.68	.064	0.18 [0.13, 0.23]	0.02	7.23	< .001
Age	0.00 [-0.01, 0.01]	0.00	0.08	.943	0.00 [-0.01, 0.01]	0.00	-0.41	.701
Physical activity <sup>2</sup>	0.00 [-0.01, 0.01]	0.01	0.00	.996	-0.07 [-0.10, -0.03]	0.02	-4.13	.001
Physical activity × age	0.00 [0.00, 0.00]	0.00	0.99	.329	0.00 [0.00, 0.00]	0.00	-5.27	< .001
Age × Physical activity <sup>2</sup>	0.00 [0.00, 0.00]	0.00	-2.82	.005	0.00 [0.00, 0.00]	0.00	2.06	.055

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

Table 3

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)	0.27	[0.00, 0.55]	0.14	1.93	.106	1.02	[0.80, 1.23]	0.11	9.29	.001
Sleep duration	0.00	[-0.03, 0.04]	0.02	0.06	.953	0.00	[-0.01, 0.02]	0.01	0.24	.809
Age	-0.02	[-0.03, -0.01]	0.00	-6.95	< .001	-0.02	[-0.03, -0.02]	0.00	-7.83	.001
Sleep duration <sup>2</sup>	0.00	[0.00, 0.01]	0.00	0.58	.596	0.00	[0.00, 0.00]	0.00	0.92	.369
Sleep duration × age	0.00	[0.00, 0.00]	0.00	-0.27	.798	0.00	[0.00, 0.00]	0.00	1.58	.116
Age × Sleep duration <sup>2</sup>	0.00	[0.00, 0.00]	0.00	-0.74	.517	0.00	[0.00, 0.00]	0.00	-0.68	.521
<b>Sleep efficiency</b>										
(Intercept)	0.27	[-0.01, 0.55]	0.14	1.90	.112	1.03	[0.81, 1.25]	0.11	9.25	.001
Sleep efficiency	-0.02	[-0.04, 0.01]	0.01	-1.09	.317	0.00	[-0.02, 0.02]	0.01	0.06	.952
Age	-0.02	[-0.03, -0.01]	0.00	-6.91	< .001	-0.02	[-0.03, -0.02]	0.00	-7.76	.001
Sleep efficiency <sup>2</sup>	0.00	[-0.01, 0.00]	0.00	-0.93	.374	0.00	[-0.01, 0.00]	0.00	-1.38	.178
Sleep efficiency × age	0.00	[0.00, 0.00]	0.00	1.58	.119	0.00	[0.00, 0.00]	0.00	-0.01	.995
Age × Sleep efficiency <sup>2</sup>	0.00	[0.00, 0.00]	0.00	0.01	.990	0.00	[0.00, 0.00]	0.00	1.05	.323
<b>Sleep onset</b>										
(Intercept)	0.22	[-0.03, 0.48]	0.13	1.72	.126	1.01	[0.79, 1.22]	0.11	9.11	.001
Sleep onset	-0.08	[-0.16, -0.01]	0.04	-2.10	.120	-0.03	[-0.07, 0.01]	0.02	-1.64	.112
Age	-0.02	[-0.03, -0.01]	0.00	-6.59	.001	-0.02	[-0.03, -0.02]	0.00	-7.58	.001
Sleep onset <sup>2</sup>	-0.02	[-0.05, 0.01]	0.01	-1.35	.222	-0.01	[-0.03, 0.01]	0.01	-0.58	.571
Sleep onset × age	0.00	[0.00, 0.00]	0.00	1.85	.133	0.00	[0.00, 0.00]	0.00	1.42	.192
Age × Sleep onset <sup>2</sup>	0.00	[0.00, 0.00]	0.00	0.99	.339	0.00	[0.00, 0.00]	0.00	0.07	.946
Sleep regularity										

Table 3 continued

Term	Physical Activity Volume				Physical Activity Intensity			
	$\beta$ [95% CI]	SE	t	p	$\beta$ [95% CI]	SE	t	p
(Intercept)	0.28 [-0.01, 0.56]	0.14	1.92	.111	1.02 [0.82, 1.23]	0.11	9.65	< .001
Sleep regularity	0.11 [0.08, 0.13]	0.01	7.70	< .001	0.06 [0.03, 0.08]	0.01	4.07	.004
Age	-0.02 [-0.03, -0.01]	0.00	-6.97	< .001	-0.02 [-0.03, -0.02]	0.00	-8.16	< .001
Sleep regularity <sup>2</sup>	0.00 [-0.02, 0.01]	0.01	-0.15	.882	0.00 [-0.01, 0.01]	0.01	0.52	.608
Sleep regularity × age	0.00 [0.00, 0.00]	0.00	-3.50	.004	0.00 [0.00, 0.00]	0.00	-2.82	.025
Age × Sleep regularity <sup>2</sup>	0.00 [0.00, 0.00]	0.00	-0.28	.788	0.00 [0.00, 0.00]	0.00	-0.93	.391

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

Table 4

*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)	0.26 [0.04, 0.49]	0.11	2.30	.021	0.25 [0.04, 0.47]	0.11	2.28	.022
Physical activity	0.06 [-0.03, 0.16]	0.05	1.27	.247	0.08 [-0.03, 0.18]	0.05	1.46	.203
Physical activity <sup>2</sup>	0.00 [-0.02, 0.02]	0.01	0.27	.791	0.01 [-0.03, 0.05]	0.02	0.39	.698
Age	0.00 [-0.01, 0.00]	0.00	-2.28	.027	0.00 [-0.01, 0.00]	0.00	-2.14	.037
Physical activity × bmi	0.00 [-0.01, 0.00]	0.00	-0.37	.719	0.00 [-0.01, 0.00]	0.00	-0.54	.610
<b>Sleep efficiency</b>								
(Intercept)	0.21 [-0.03, 0.46]	0.13	1.69	.097	0.24 [-0.02, 0.50]	0.13	1.83	.076
Physical activity	0.05 [-0.03, 0.12]	0.04	1.21	.228	0.00 [-0.06, 0.07]	0.03	0.07	.941
Physical activity <sup>2</sup>	-0.01 [-0.03, 0.02]	0.01	-0.42	.686	-0.01 [-0.05, 0.03]	0.02	-0.42	.677
Age	0.00 [0.00, 0.01]	0.00	0.91	.372	0.00 [0.00, 0.01]	0.00	0.74	.474
Physical activity × bmi	0.00 [0.00, 0.00]	0.00	-0.51	.618	0.00 [0.00, 0.00]	0.00	0.03	.976
<b>Sleep onset</b>								
(Intercept)	-0.06 [-0.39, 0.28]	0.17	-0.32	.746	-0.07 [-0.41, 0.28]	0.18	-0.37	.713
Physical activity	0.01 [-0.04, 0.06]	0.03	0.35	.731	-0.07 [-0.16, 0.02]	0.04	-1.56	.201
Physical activity <sup>2</sup>	-0.01 [-0.02, 0.00]	0.01	-1.42	.162	-0.01 [-0.05, 0.03]	0.02	-0.37	.724
Age	0.00 [0.00, 0.00]	0.00	0.41	.678	0.00 [0.00, 0.00]	0.00	0.20	.839
Physical activity × bmi	0.00 [-0.01, 0.00]	0.00	-2.01	.051	0.00 [0.00, 0.00]	0.00	0.48	.654
<b>Sleep regularity</b>								
(Intercept)	0.55 [0.33, 0.77]	0.11	4.89	<.001	0.72 [0.44, 1.00]	0.14	5.04	< .001
Physical activity	-0.06 [-0.46, 0.34]	0.20	-0.30	.790	0.10 [-0.04, 0.24]	0.07	1.41	.242
Physical activity <sup>2</sup>	0.02 [-0.07, 0.10]	0.04	0.40	.723	-0.05 [-0.11, 0.00]	0.03	-1.92	.088

Term	Physical Activity Volume			Physical Activity Intensity				
	$\beta$ [95% CI]	SE	t	p	$\beta$ [95% CI]	SE	t	p
Age	0.00 [-0.01, 0.01]	0.00	0.24	.817	0.00 [-0.01, 0.01]	0.00	0.19	.856
Physical activity $\times$ bmi	0.01 [-0.01, 0.03]	0.01	0.86	.474	0.00 [-0.01, 0.00]	0.00	-0.58	.587

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

Table 5

*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
<b>Sleep duration</b>								
(Intercept)	1.57 [1.11, 2.03]	0.23	6.75	< .001	1.36 [1.08, 1.64]	0.14	9.54	< .001
Sleep duration	0.01 [-0.03, 0.05]	0.02	0.44	.662	0.01 [-0.04, 0.07]	0.03	0.51	.636
Sleep duration <sup>2</sup>	0.00 [-0.01, 0.02]	0.01	0.47	.660	0.00 [-0.02, 0.02]	0.01	-0.07	.947
Age	-0.02 [-0.03, -0.02]	0.00	-7.26	< .001	-0.02 [-0.03, -0.02]	0.00	-9.87	< .001
Sleep duration × bmi	0.00 [0.00, 0.00]	0.00	-0.53	.599	0.00 [0.00, 0.00]	0.00	-0.07	.950
<b>Sleep efficiency</b>								
(Intercept)	1.58 [1.12, 2.04]	0.24	6.71	< .001	1.37 [1.09, 1.64]	0.14	9.65	< .001
Sleep efficiency	-0.01 [-0.05, 0.03]	0.02	-0.47	.642	0.01 [-0.04, 0.07]	0.03	0.51	.626
Sleep efficiency <sup>2</sup>	0.00 [-0.02, 0.01]	0.01	-0.56	.586	0.00 [-0.01, 0.01]	0.01	-0.58	.566
Age	-0.02 [-0.03, -0.02]	0.00	-7.16	< .001	-0.02 [-0.03, -0.02]	0.00	-10.07	< .001
Sleep efficiency × bmi	0.00 [0.00, 0.00]	0.00	0.35	.726	0.00 [0.00, 0.00]	0.00	-0.50	.631
<b>Sleep onset</b>								
(Intercept)	1.58 [1.11, 2.05]	0.24	6.62	< .001	1.37 [1.09, 1.66]	0.14	9.45	< .001
Sleep onset	-0.04 [-0.10, 0.01]	0.03	-1.51	.131	-0.03 [-0.09, 0.03]	0.03	-0.98	.347
Sleep onset <sup>2</sup>	-0.01 [-0.04, 0.02]	0.02	-0.60	.549	-0.01 [-0.04, 0.02]	0.01	-0.67	.503
Age	-0.02 [-0.03, -0.01]	0.00	-7.20	< .001	-0.02 [-0.03, -0.02]	0.00	-9.94	< .001
Sleep onset × bmi	0.00 [0.00, 0.00]	0.00	0.46	.646	0.00 [0.00, 0.00]	0.00	0.73	.495
<b>Sleep regularity</b>								
(Intercept)	1.52 [1.06, 1.98]	0.24	6.47	< .001	1.34 [1.06, 1.61]	0.14	9.54	< .001
Sleep regularity	0.07 [-0.09, 0.22]	0.08	0.87	.465	0.05 [-0.01, 0.12]	0.03	1.56	.199
Sleep regularity <sup>2</sup>	-0.01 [-0.04, 0.02]	0.02	-0.38	.713	0.00 [-0.02, 0.02]	0.01	0.29	.777

Table 5 continued

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	-7.26	< .001	-0.02	[-0.03, -0.02]	0.00	-10.14	< .001
Sleep regularity $\times$ bmi	0.00	[-0.01, 0.01]	0.00	0.14	.902	0.00	[0.00, 0.00]	0.00	-0.87	.416

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

Table 6

*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
(Intercept)	0.60 [0.34, 0.86]	0.13	4.55	< .001	0.69 [0.40, 0.98]	0.15	4.61	< .001
Physical activity	0.10 [0.00, 0.20]	0.05	2.01	.145	0.05 [0.01, 0.09]	0.02	2.56	.012
Physical activity <sup>2</sup>	0.00 [-0.03, 0.03]	0.01	-0.23	.835	-0.02 [-0.04, 0.01]	0.01	-1.46	.151
Age	0.00 [-0.01, 0.01]	0.00	0.28	.794	0.00 [-0.01, 0.01]	0.00	0.17	.874
Physical activity × sesmedium	0.00 [-0.08, 0.07]	0.04	-0.09	.930	0.00 [-0.06, 0.05]	0.03	-0.17	.864
Physical activity × seshigh	0.00 [-0.10, 0.11]	0.05	0.05	.962	0.02 [-0.03, 0.08]	0.03	0.96	.343

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

Table 7

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

Term	Physical Activity Volume			Physical Activity Intensity				
	$\beta$ [95% CI]	SE	t	p	$\beta$ [95% CI]	SE	t	p
<b>Sleep duration</b>								
(Intercept)	1.57 [1.11, 2.03]	0.23	6.75	< .001	1.36 [1.09, 1.63]	0.14	9.76	< .001
Sleep duration	0.00 [-0.03, 0.02]	0.01	-0.11	.913	0.02 [-0.01, 0.04]	0.01	1.41	.170
Sleep duration <sup>2</sup>	0.00 [-0.01, 0.01]	0.00	-0.16	.871	0.00 [-0.02, 0.01]	0.01	-0.66	.544
Age	-0.02 [-0.03, -0.02]	0.00	-7.25	< .001	-0.02 [-0.03, -0.02]	0.00	-10.04	< .001
Sleep duration × sesmedium	0.00 [-0.04, 0.03]	0.02	-0.14	.889	-0.01 [-0.04, 0.02]	0.01	-0.84	.408
Sleep duration × seshigh	0.01 [-0.05, 0.07]	0.03	0.36	.738	0.00 [-0.04, 0.04]	0.02	-0.22	.832
<b>Sleep efficiency</b>								
(Intercept)	1.57 [1.11, 2.03]	0.23	6.74	< .001	1.36 [1.09, 1.63]	0.14	9.81	< .001
Sleep efficiency	0.00 [-0.03, 0.03]	0.01	0.07	.946	0.00 [-0.02, 0.02]	0.01	0.10	.918
Sleep efficiency <sup>2</sup>	0.00 [-0.01, 0.01]	0.01	0.17	.875	0.00 [0.00, 0.01]	0.00	0.84	.416
Age	-0.02 [-0.03, -0.02]	0.00	-7.17	< .001	-0.02 [-0.03, -0.02]	0.00	-10.02	< .001
Sleep efficiency × sesmedium	0.00 [-0.04, 0.03]	0.02	-0.17	.868	0.00 [-0.03, 0.03]	0.02	0.26	.797
Sleep efficiency × seshigh	0.00 [-0.04, 0.03]	0.02	-0.25	.802	0.00 [-0.03, 0.03]	0.02	0.17	.865
<b>Sleep onset</b>								
(Intercept)	1.58 [1.12, 2.05]	0.24	6.63	< .001	1.36 [1.08, 1.64]	0.14	9.57	< .001
Sleep onset	-0.01 [-0.05, 0.03]	0.02	-0.50	.629	-0.01 [-0.04, 0.02]	0.02	-0.89	.383
Sleep onset <sup>2</sup>	-0.01 [-0.03, 0.02]	0.01	-0.64	.548	-0.01 [-0.03, 0.02]	0.01	-0.50	.635
Age	-0.02 [-0.03, -0.02]	0.00	-7.15	< .001	-0.02 [-0.03, -0.02]	0.00	-9.96	< .001
Sleep onset × sesmedium	-0.02 [-0.11, 0.06]	0.04	-0.59	.593	0.01 [-0.03, 0.05]	0.02	0.58	.567
Sleep onset × seshigh	-0.03 [-0.10, 0.04]	0.04	-0.78	.480	0.01 [-0.02, 0.05]	0.02	0.81	.420
Sleep regularity								

Term	Physical Activity Volume				Physical Activity Intensity			
	$\beta$ [95% CI]	SE	t	p	$\beta$ [95% CI]	SE	t	p
(Intercept)	1.53 [1.08, 1.98]	0.23	6.70	< .001	1.34 [1.08, 1.61]	0.14	9.92	< .001
Sleep regularity	0.05 [0.03, 0.08]	0.01	3.97	< .001	0.02 [-0.01, 0.06]	0.02	1.16	.304
Sleep regularity <sup>2</sup>	-0.01 [-0.02, 0.01]	0.01	-1.09	.294	0.00 [-0.01, 0.01]	0.01	-0.59	.556
Age	-0.02 [-0.03, -0.02]	0.00	-7.28	< .001	-0.02 [-0.03, -0.02]	0.00	-10.20	< .001
Sleep regularity × sesmedium	0.02 [-0.02, 0.05]	0.02	0.96	.341	0.00 [-0.06, 0.06]	0.03	0.01	.990
Sleep regularity × seshigh	0.03 [0.01, 0.07]	0.02	1.33	.210	0.02 [-0.03, 0.06]	0.02	0.80	.461

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

Table 8

*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)	0.26 [0.04, 0.48]	0.11	2.35	.019	0.27 [0.06, 0.49]	0.11	2.48	.013
Physical activity	0.05 [0.02, 0.09]	0.02	2.92	.006	0.05 [0.02, 0.08]	0.01	3.29	.001
Physical activity <sup>2</sup>	0.00 [-0.02, 0.01]	0.01	-0.33	.751	-0.01 [-0.03, 0.00]	0.01	-1.54	.125
Age	0.00 [-0.01, 0.00]	0.00	-2.28	.027	0.00 [-0.01, 0.00]	0.00	-2.14	.037
Physical activity × sexmale	-0.01 [-0.06, 0.04]	0.03	-0.30	.770	0.01 [-0.02, 0.05]	0.02	0.70	.481
<b>Sleep efficiency</b>								
(Intercept)	0.21 [-0.04, 0.45]	0.13	1.65	.107	0.22 [-0.05, 0.50]	0.14	1.62	.122
Physical activity	0.04 [0.00, 0.08]	0.02	2.17	.035	-0.02 [-0.05, 0.01]	0.02	-1.14	.257
Physical activity <sup>2</sup>	-0.01 [-0.02, 0.01]	0.01	-0.96	.338	0.00 [-0.02, 0.03]	0.01	0.34	.739
Age	0.00 [0.00, 0.01]	0.00	0.94	.358	0.00 [0.00, 0.01]	0.00	0.71	.487
Physical activity × sexmale	-0.02 [-0.06, 0.01]	0.02	-1.23	.218	0.04 [0.00, 0.08]	0.02	2.02	.046
<b>Sleep onset</b>								
(Intercept)	-0.07 [-0.41, 0.26]	0.17	-0.43	.671	-0.08 [-0.41, 0.25]	0.17	-0.47	.642
Physical activity	-0.05 [-0.07, -0.02]	0.01	-3.64	.001	-0.05 [-0.07, -0.03]	0.01	-4.47	< .001
Physical activity <sup>2</sup>	0.00 [-0.01, 0.01]	0.01	-0.28	.786	0.01 [-0.01, 0.02]	0.01	1.04	.301
Age	0.00 [0.00, 0.00]	0.00	0.44	.657	0.00 [0.00, 0.00]	0.00	0.25	.802
Physical activity × sexmale	0.00 [-0.03, 0.03]	0.02	0.22	.827	-0.01 [-0.04, 0.03]	0.02	-0.50	.629
<b>Sleep regularity</b>								
(Intercept)	0.62 [0.36, 0.89]	0.14	4.55	< .001	0.69 [0.41, 0.98]	0.14	4.83	< .001
Physical activity	0.14 [0.09, 0.20]	0.03	4.99	.005	0.04 [0.01, 0.08]	0.02	2.46	.020
Physical activity <sup>2</sup>	-0.02 [-0.04, 0.00]	0.01	-1.64	.194	-0.03 [-0.05, -0.01]	0.01	-2.88	.004

Term	Physical Activity Volume				Physical Activity Intensity			
	$\beta$ [95% CI]	SE	t	p	$\beta$ [95% CI]	SE	t	p
Age	0.00 [-0.01, 0.01]	0.00	.26	.804	0.00 [-0.01, 0.01]	0.00	0.18	.865
Physical activity $\times$ sexmale	-0.07 [-0.11, -0.03]	0.02	-3.42	.001	0.02 [-0.02, 0.07]	0.02	1.01	.322

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

*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)	1.57 [1.12, 2.02]	0.23	6.81	< .001	1.36 [1.08, 1.63]	0.14	9.79	< .001
Sleep duration	0.00 [-0.02, 0.01]	0.01	-0.24	.812	0.01 [-0.01, 0.04]	0.01	1.05	.364
Sleep duration <sup>2</sup>	0.00 [0.00, 0.00]	0.00	-0.54	.602	0.00 [0.00, 0.00]	0.00	0.80	.445
Age	-0.02 [-0.03, -0.02]	0.00	-7.33	< .001	-0.02 [-0.03, -0.02]	0.00	-10.12	< .001
Sleep duration × sexmale	0.00 [-0.02, 0.03]	0.01	0.21	.833	0.00 [-0.06, 0.05]	0.03	-0.17	.880
Sleep efficiency								
(Intercept)	1.58 [1.12, 2.03]	0.23	6.75	< .001	1.36 [1.09, 1.64]	0.14	9.72	< .001
Sleep efficiency	0.01 [-0.01, 0.03]	0.01	0.91	.371	0.00 [-0.01, 0.02]	0.01	0.63	.526
Sleep efficiency <sup>2</sup>	0.00 [-0.01, 0.00]	0.00	-1.21	.234	0.00 [0.00, 0.00]	0.00	-0.76	.450
Age	-0.02 [-0.03, -0.02]	0.00	-7.17	< .001	-0.02 [-0.03, -0.02]	0.00	-10.01	< .001
Sleep efficiency × sexmale	-0.02 [-0.05, 0.00]	0.01	-1.84	.067	0.00 [-0.03, 0.02]	0.01	-0.37	.711
Sleep onset								
(Intercept)	1.58 [1.11, 2.04]	0.24	6.67	< .001	1.36 [1.08, 1.64]	0.14	9.59	< .001
Sleep onset	0.00 [-0.03, 0.03]	0.02	0.06	.955	-0.01 [-0.04, 0.02]	0.02	-0.45	.663
Sleep onset <sup>2</sup>	0.00 [-0.03, 0.02]	0.01	-0.22	.832	0.00 [-0.01, 0.02]	0.01	0.07	.943
Age	-0.02 [-0.03, -0.02]	0.00	-7.08	< .001	-0.02 [-0.03, -0.02]	0.00	-9.94	< .001
Sleep onset × sexmale	-0.06 [-0.13, 0.01]	0.04	-1.55	.210	0.00 [-0.03, 0.04]	0.02	0.22	.830
Sleep regularity								
(Intercept)	1.53 [1.08, 1.98]	0.23	6.63	< .001	1.34 [1.07, 1.61]	0.14	9.74	< .001
Sleep regularity	0.06 [0.04, 0.09]	0.01	5.04	.001	0.03 [0.01, 0.05]	0.01	3.41	.001
Sleep regularity <sup>2</sup>	-0.01 [-0.02, 0.00]	0.01	-1.20	.250	0.00 [-0.02, 0.01]	0.01	-0.35	.742

Table 9 continued

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	-7.25	< .001	-0.02	[-0.03, -0.02]	0.00	-10.07	< .001
Sleep regularity $\times$ sexmale	0.01	[0.03, 0.05]	0.02	0.64	.546	-0.01	[-0.04, 0.03]	0.02	-0.38	.715

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

Table 10

*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
<b>Sleep duration</b>								
(Intercept)	0.26 [0.04, 0.48]	0.11	2.28	.023	0.25 [0.03, 0.47]	0.11	2.24	.025
Physical activity	0.07 [0.01, 0.14]	0.03	2.22	.073	0.09 [0.05, 0.13]	0.02	4.47	< .001
Weekday xmonday	-0.04 [-0.10, 0.01]	0.03	-1.63	.117	-0.02 [-0.08, 0.04]	0.03	-0.79	.433
Weekday xsaturday	0.05 [-0.01, 0.10]	0.03	1.73	.103	0.06 [0.00, 0.12]	0.03	1.88	.070
Weekday xsunday	0.02 [-0.04, 0.07]	0.03	0.64	.530	0.02 [-0.04, 0.08]	0.03	0.73	.474
Weekday xthursday	-0.03 [-0.08, 0.01]	0.02	-1.44	.152	-0.04 [-0.10, 0.02]	0.03	-1.33	.188
Weekday xtuesday	-0.07 [-0.13, -0.01]	0.03	-2.29	.052	-0.06 [-0.13, 0.01]	0.04	-1.56	.152
Weekday xwednesday	-0.06 [-0.11, 0.00]	0.03	-2.10	.049	-0.06 [-0.13, 0.01]	0.03	-1.80	.095
Physical activity <sup>2</sup>	0.00 [-0.02, 0.02]	0.01	-0.18	.865	0.01 [-0.02, 0.03]	0.01	0.63	.532
Age	0.00 [-0.01, 0.00]	0.00	-2.16	.037	0.00 [-0.01, 0.00]	0.00	-2.07	.043
Physical activity × weekday xmonday	-0.01 [-0.08, 0.05]	0.03	-0.43	.673	-0.03 [-0.07, 0.02]	0.02	-1.17	.245
Physical activity × weekday xsaturday	-0.03 [-0.11, 0.04]	0.04	-0.83	.431	-0.08 [-0.13, -0.03]	0.02	-3.11	.005
Physical activity × weekday xsunday	0.01 [-0.05, 0.08]	0.03	0.44	.665	-0.07 [-0.12, -0.02]	0.02	-2.95	.007
Physical activity × weekday xtuesday	-0.02 [-0.09, 0.04]	0.03	-0.74	.470	-0.01 [-0.07, 0.05]	0.03	-0.34	.748
Physical activity × weekday xtuesday	-0.05 [-0.12, 0.02]	0.04	-1.31	.220	-0.01 [-0.06, 0.04]	0.02	-0.51	.616
Physical activity × weekday xwednesday	-0.04 [-0.11, 0.02]	0.03	-1.26	.234	-0.03 [-0.07, 0.02]	0.02	-1.17	.245
Weekday xmonday × Physical activity <sup>2</sup>	0.00 [-0.02, 0.01]	0.01	-0.35	.727	-0.03 [-0.06, 0.00]	0.02	-1.73	.085
Weekday xsaturday × Physical activity <sup>2</sup>	0.00 [-0.02, 0.02]	0.01	0.01	.994	-0.01 [-0.05, 0.02]	0.02	-0.76	.453
Weekday xsunday × Physical activity <sup>2</sup>	-0.01 [-0.03, 0.01]	0.01	-0.85	.414	-0.02 [-0.06, 0.01]	0.02	-1.22	.226
Weekday xthursday × Physical activity <sup>2</sup>	0.00 [-0.02, 0.03]	0.01	0.31	.768	0.01 [-0.03, 0.05]	0.02	0.29	.772
Weekday xtuesday × Physical activity <sup>2</sup>	0.00 [-0.02, 0.02]	0.01	0.08	.941	-0.02 [-0.05, 0.02]	0.02	-0.87	.385

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 $\times$ Physical activity <sup>2</sup>	0.01 [-0.01, 0.02]	0.01	0.57	.576	0.01 [-0.03, 0.04]	0.02	0.38	.708
Sleep efficency								
(Intercept)	0.21 [-0.02, 0.44]	0.12	1.81	.072	0.24 [0.00, 0.49]	0.13	1.94	.058
Physical activity	0.02 [-0.02, 0.06]	0.02	0.99	.325	0.01 [-0.03, 0.05]	0.02	0.49	.625
Weekday xmunday	-0.02 [-0.07, 0.04]	0.03	-0.59	.561	-0.01 [-0.07, 0.05]	0.03	-0.29	.770
Weekday xsaturday	-0.03 [-0.08, 0.02]	0.03	-1.28	.207	-0.04 [-0.10, 0.01]	0.03	-1.45	.147
Weekday xsunday	-0.07 [-0.13, -0.01]	0.03	-2.29	.038	-0.09 [-0.15, -0.04]	0.03	-3.21	.001
Weekday xthursday	0.03 [-0.01, 0.08]	0.02	1.35	.176	0.02 [-0.05, 0.08]	0.03	0.50	.620
Weekday xtuesday	0.00 [-0.05, 0.05]	0.02	-0.05	.961	0.03 [-0.03, 0.09]	0.03	1.08	.281
Weekday xwednesday	0.00 [-0.05, 0.05]	0.03	0.04	.968	0.00 [-0.06, 0.07]	0.03	0.07	.943
Physical activity <sup>2</sup>	0.00 [-0.02, 0.01]	0.01	-0.50	.619	0.00 [-0.04, 0.03]	0.02	-0.20	.846
Age	0.00 [0.00, 0.01]	0.00	0.90	.381	0.00 [0.00, 0.01]	0.00	0.69	.504
Physical activity $\times$ weekday xmonday	0.00 [-0.07, 0.06]	0.03	-0.12	.901	-0.02 [-0.08, 0.04]	0.03	-0.56	.587
Physical activity $\times$ weekday xsaturday	0.05 [-0.01, 0.10]	0.03	1.60	.109	-0.02 [-0.07, 0.03]	0.03	-0.77	.450
Physical activity $\times$ weekday xsunday	0.02 [-0.06, 0.10]	0.04	0.53	.612	-0.03 [-0.08, 0.02]	0.03	-1.29	.212
Physical activity $\times$ weekday xtursday	-0.01 [-0.07, 0.05]	0.03	-0.32	.746	0.00 [-0.04, 0.05]	0.02	0.06	.956
Physical activity $\times$ weekday xtuesday	-0.02 [-0.08, 0.04]	0.03	-0.58	.560	-0.01 [-0.06, 0.04]	0.02	-0.28	.782
Physical activity $\times$ weekday xwednesday	-0.02 [-0.09, 0.04]	0.03	-0.76	.455	0.00 [-0.05, 0.04]	0.02	-0.08	.938
Weekday xmunday $\times$ Physical activity <sup>2</sup>	0.00 [-0.02, 0.01]	0.01	-0.30	.767	-0.01 [-0.06, 0.03]	0.02	-0.59	.563
Weekday xsaturday $\times$ Physical activity <sup>2</sup>	-0.01 [-0.02, 0.01]	0.01	-0.70	.487	0.00 [-0.03, 0.04]	0.02	0.04	.967
Weekday xsunday $\times$ Physical activity <sup>2</sup>	0.00 [-0.03, 0.03]	0.01	-0.03	.976	0.02 [-0.03, 0.06]	0.02	0.65	.537
Weekday xthursday $\times$ Physical activity <sup>2</sup>	0.00 [-0.02, 0.02]	0.01	-0.07	.945	0.01 [-0.03, 0.06]	0.02	0.59	.569
Weekday xtuesday $\times$ Physical activity <sup>2</sup>	0.00 [-0.02, 0.02]	0.01	-0.15	.884	-0.04 [-0.08, 0.01]	0.02	-1.65	.117

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 $\times$ Physical activity <sup>2</sup>	0.00 [-0.02, 0.02]	0.01	-0.06	.957	0.00 [-0.04, 0.04]	0.02	-0.12	.906
Sleep onset								
(Intercept)	-0.01 [-0.35, 0.33]	0.17	-0.08	.939	-0.01 [-0.35, 0.32]	0.17	-0.08	.939
Physical activity	-0.04 [-0.07, 0.00]	0.02	-2.20	.037	-0.03 [-0.05, 0.00]	0.01	-2.02	.055
Weekday xmunday	-0.06 [-0.09, -0.03]	0.02	-3.93	< .001	-0.06 [-0.10, -0.02]	0.02	-3.17	.002
Weekday xsaturday	0.07 [0.04, 0.11]	0.02	3.94	.001	0.06 [0.02, 0.10]	0.02	2.74	.012
Weekday xsunday	0.06 [0.03, 0.10]	0.02	3.54	.002	0.05 [0.01, 0.09]	0.02	2.46	.019
Weekday xthursday	-0.05 [-0.08, -0.02]	0.02	-3.43	.001	-0.06 [-0.10, -0.01]	0.02	-2.53	.027
Weekday xtuesday	-0.05 [-0.08, -0.02]	0.02	-3.27	.001	-0.05 [-0.09, -0.02]	0.02	-2.79	.007
Weekday xwednesday	-0.05 [-0.08, -0.02]	0.02	-3.10	.002	-0.05 [-0.08, -0.01]	0.02	-2.30	.025
Physical activity <sup>2</sup>	0.00 [-0.01, 0.01]	0.00	-0.07	.947	0.00 [-0.02, 0.01]	0.01	-0.47	.639
Age	0.00 [0.00, 0.00]	0.00	0.32	.747	0.00 [0.00, 0.00]	0.00	0.19	.849
Physical activity $\times$ weekday xmonday	-0.05 [-0.09, 0.00]	0.02	-2.18	.037	-0.04 [-0.07, -0.01]	0.01	-2.54	.012
Physical activity $\times$ weekday xsaturday	0.06 [0.01, 0.10]	0.02	2.30	.043	0.00 [-0.03, 0.03]	0.01	-0.12	.905
Physical activity $\times$ weekday xsunday	0.00 [-0.05, 0.04]	0.02	-0.18	.858	-0.05 [-0.08, -0.02]	0.01	-3.57	< .001
Physical activity $\times$ weekday xtuesday	-0.03 [-0.09, 0.03]	0.03	-1.08	.328	-0.03 [-0.05, 0.00]	0.01	-1.75	.082
Physical activity $\times$ weekday xtuesday	-0.01 [-0.07, 0.04]	0.03	-0.47	.658	-0.02 [-0.05, 0.00]	0.01	-1.72	.086
Physical activity $\times$ weekday xwednesday	-0.02 [-0.07, 0.02]	0.02	-1.08	.299	-0.02 [-0.04, 0.01]	0.01	-1.08	.280
Weekday xmunday $\times$ Physical activity <sup>2</sup>	0.00 [-0.01, 0.01]	0.01	0.43	.673	0.01 [-0.02, 0.04]	0.01	0.68	.504
Weekday xsaturday $\times$ Physical activity <sup>2</sup>	0.00 [-0.02, 0.01]	0.01	-0.60	.552	0.01 [-0.01, 0.03]	0.01	0.92	.360
Weekday xsunday $\times$ Physical activity <sup>2</sup>	0.00 [-0.02, 0.01]	0.01	-0.56	.592	0.00 [-0.02, 0.03]	0.01	0.39	.701
Weekday xthursday $\times$ Physical activity <sup>2</sup>	0.00 [-0.01, 0.02]	0.01	0.27	.798	0.01 [-0.02, 0.04]	0.02	0.51	.628
Weekday xtuesday $\times$ Physical activity <sup>2</sup>	0.00 [-0.01, 0.02]	0.01	0.23	.827	0.01 [-0.02, 0.03]	0.01	0.61	.547

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 $\times$ Physical activity <sup>2</sup>	0.00 [-0.02, 0.01]	0.01	-0.54	.600	0.00 [-0.03, 0.03]	0.02	-0.22	.833
Sleep regularity								
(Intercept)	0.61 [0.34, 0.87]	0.13	4.55	< .001	0.68 [0.41, 0.94]	0.13	5.05	< .001
Physical activity	0.08 [0.04, 0.13]	0.02	3.66	< .001	0.00 [-0.03, 0.04]	0.02	0.08	.933
Weekday xmunday	0.04 [-0.02, 0.10]	0.03	1.18	.266	0.07 [0.01, 0.12]	0.03	2.21	.029
Weekday xsaturday	-0.09 [-0.14, -0.04]	0.02	-3.84	< .001	-0.09 [-0.15, -0.04]	0.03	-3.11	.003
Weekday xsunday	-0.12 [-0.17, -0.06]	0.03	-4.25	< .001	-0.12 [-0.18, -0.06]	0.03	-3.64	.001
Weekday xthursday	0.15 [0.10, 0.21]	0.03	5.73	< .001	0.18 [0.12, 0.24]	0.03	6.02	< .001
Weekday xtuesday	0.18 [0.12, 0.23]	0.03	6.41	< .001	0.21 [0.14, 0.27]	0.03	6.09	< .001
Weekday xwednesday	0.14 [0.09, 0.20]	0.03	5.03	< .001	0.16 [0.10, 0.22]	0.03	5.57	< .001
Physical activity <sup>2</sup>	-0.01 [-0.03, 0.01]	0.01	-0.85	.423	0.00 [-0.03, 0.03]	0.01	0.17	.868
Age	0.00 [-0.01, 0.01]	0.00	0.20	.847	0.00 [-0.01, 0.01]	0.00	0.02	.986
Physical activity $\times$ weekday xmonday	0.05 [-0.02, 0.13]	0.04	1.50	.158	0.08 [0.04, 0.12]	0.02	3.51	< .001
Physical activity $\times$ weekday xsaturday	0.02 [-0.04, 0.08]	0.03	0.68	.499	-0.02 [-0.08, 0.03]	0.03	-0.81	.431
Physical activity $\times$ weekday xsunday	0.04 [-0.06, 0.15]	0.05	0.84	.452	-0.03 [-0.08, 0.02]	0.02	-1.16	.252
Physical activity $\times$ weekday xtuesday	0.03 [-0.03, 0.09]	0.03	0.98	.330	0.08 [0.04, 0.12]	0.02	3.61	< .001
Physical activity $\times$ weekday xtuesday	-0.02 [-0.12, 0.08]	0.05	-0.32	.768	0.10 [0.04, 0.16]	0.03	3.26	.011
Physical activity $\times$ weekday xwednesday	-0.01 [-0.08, 0.06]	0.04	-0.28	.784	0.07 [0.02, 0.11]	0.02	3.05	.002
Weekday xmunday $\times$ Physical activity <sup>2</sup>	-0.01 [-0.04, 0.02]	0.02	-0.62	.575	-0.05 [-0.09, -0.02]	0.02	-3.05	.002
Weekday xsaturday $\times$ Physical activity <sup>2</sup>	-0.01 [-0.03, 0.01]	0.01	-0.96	.341	-0.01 [-0.05, 0.03]	0.02	-0.57	.567
Weekday xsunday $\times$ Physical activity <sup>2</sup>	-0.01 [-0.05, 0.03]	0.02	-0.54	.624	-0.02 [-0.06, 0.02]	0.02	-1.19	.244
Weekday xthursday $\times$ Physical activity <sup>2</sup>	0.00 [-0.03, 0.02]	0.01	-0.33	.746	-0.03 [-0.07, 0.01]	0.02	-1.47	.162
Weekday xtuesday $\times$ Physical activity <sup>2</sup>	0.01 [-0.02, 0.03]	0.01	0.36	.735	-0.03 [-0.08, 0.01]	0.02	-1.33	.213

Term	Physical Activity Volume			Physical Activity Intensity				
	$\beta$ [95% CI]	SE	t	p	$\beta$ [95% CI]	SE	t	p
Weekday x wednesday $\times$ Physical activity <sup>2</sup>	0.01 [-0.03, 0.04]	0.02	0.30	.785	-0.01 [-0.05, 0.02]	0.02	-0.83	.406

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

Table 11

*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
Sleep duration								
(Intercept)	1.59 [1.13, 2.04]	0.23	6.78	< .001	1.39 [1.11, 1.68]	0.15	9.59	< .001
Sleep duration	0.04 [0.00, 0.07]	0.02	1.96	.070	0.05 [0.00, 0.11]	0.03	2.00	.130
Weekday xmonday	-0.12 [-0.17, -0.08]	0.02	-5.24	< .001	-0.04 [-0.08, -0.01]	0.02	-2.72	.007
Weekday xsaturday	-0.05 [-0.10, 0.00]	0.03	-1.88	.085	-0.05 [-0.08, -0.01]	0.02	-2.44	.019
Weekday xsunday	-0.16 [-0.21, -0.11]	0.03	-6.21	< .001	-0.14 [-0.18, -0.11]	0.02	-8.31	< .001
Weekday xthursday	-0.02 [-0.09, 0.04]	0.03	-0.70	.519	0.01 [-0.03, 0.05]	0.02	0.55	.585
Weekday xtuesday	-0.06 [-0.13, 0.01]	0.04	-1.72	.159	-0.02 [-0.05, 0.01]	0.02	-1.14	.256
Weekday xwednesday	-0.04 [-0.09, 0.02]	0.03	-1.41	.198	0.02 [-0.02, 0.06]	0.02	0.99	.337
Sleep duration <sup>2</sup>	0.00 [-0.01, 0.01]	0.01	-0.16	.876	0.00 [-0.01, 0.01]	0.00	-0.25	.803
Age	-0.02 [-0.03, -0.01]	0.00	-7.38	< .001	-0.02 [-0.03, -0.02]	0.00	-9.91	< .001
Sleep duration × weekday xmonday	-0.03 [-0.07, 0.01]	0.02	-1.35	.184	-0.05 [-0.09, -0.01]	0.02	-2.36	.038
Sleep duration × weekday xsaturday	-0.07 [-0.14, -0.01]	0.03	-2.22	.066	-0.06 [-0.11, -0.01]	0.03	-2.40	.042
Sleep duration × weekday xsunday	-0.07 [-0.11, -0.02]	0.02	-2.77	.010	-0.09 [-0.15, -0.03]	0.03	-2.94	.039
Sleep duration × weekday xtuesday	-0.02 [-0.08, 0.04]	0.03	-0.69	.506	0.00 [-0.04, 0.04]	0.02	-0.01	.988
Sleep duration × weekday xtuesday	-0.03 [-0.07, 0.02]	0.02	-1.17	.241	-0.03 [-0.08, 0.01]	0.02	-1.37	.197
Sleep duration × weekday xwednesday	-0.04 [-0.08, 0.00]	0.02	-1.82	.069	0.00 [-0.05, 0.04]	0.02	-0.14	.889
Weekday xmonday × Sleep duration <sup>2</sup>	0.00 [-0.02, 0.01]	0.01	-0.30	.774	0.00 [-0.01, 0.01]	0.01	-0.16	.878
Weekday xsaturday × Sleep duration <sup>2</sup>	-0.01 [-0.04, 0.01]	0.01	-1.07	.332	-0.01 [-0.03, 0.01]	0.01	-1.02	.341
Weekday xsunday × Sleep duration <sup>2</sup>	0.00 [-0.02, 0.01]	0.01	-0.17	.863	0.00 [-0.02, 0.02]	0.01	-0.28	.791
Weekday xtuesday × Sleep duration <sup>2</sup>	0.00 [-0.02, 0.02]	0.01	0.12	.908	0.01 [-0.02, 0.03]	0.01	0.49	.648
Weekday xtuesday × Sleep duration <sup>2</sup>	0.00 [-0.02, 0.02]	0.01	-0.04	.967	0.00 [-0.01, 0.01]	0.01	0.11	.909

Table 11 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 [-0.03, 0.03]	0.01	-0.14	.892	0.00 [-0.02, 0.02]	0.01	-0.16	.873
Sleep efficiency (Intercept)	1.59 [1.12, 2.05]	0.24	6.71	< .001	1.40 [1.13, 1.67]	0.14	10.03	< .001
Sleep efficiency	0.01 [-0.05, 0.06]	0.03	0.26	.804	-0.02 [-0.05, 0.00]	0.01	-1.85	.065
Weekday xmunday	-0.12 [-0.19, -0.06]	0.03	-4.00	.009	-0.05 [-0.08, -0.02]	0.02	-3.03	.003
Weekday xsaturday	-0.06 [-0.12, 0.01]	0.03	-1.71	.155	-0.05 [-0.09, -0.02]	0.02	-3.12	.002
Weekday xsunday	-0.16 [-0.21, -0.11]	0.03	-6.35	< .001	-0.15 [-0.19, -0.12]	0.02	-8.84	< .001
Weekday xthursday	-0.02 [-0.07, 0.03]	0.03	-0.80	.443	0.01 [-0.03, 0.05]	0.02	0.44	.670
Weekday xtuesday	-0.06 [-0.13, 0.01]	0.04	-1.75	.155	-0.02 [-0.05, 0.01]	0.02	-1.30	.192
Weekday xwednesday	-0.04 [-0.10, 0.02]	0.03	-1.21	.285	0.02 [-0.02, 0.05]	0.02	0.90	.371
Sleep efficiency <sup>2</sup>	0.00 [-0.01, 0.01]	0.01	-0.28	.792	0.00 [-0.01, 0.01]	0.00	-0.46	.659
Age	-0.02 [-0.03, -0.01]	0.00	-7.23	< .001	-0.02 [-0.03, -0.02]	0.00	-9.92	< .001
Sleep efficiency $\times$ weekday xmonday	0.00 [-0.06, 0.05]	0.03	-0.17	.871	0.04 [0.01, 0.08]	0.02	2.34	.020
Sleep efficiency $\times$ weekday xsaturday	-0.04 [-0.11, 0.03]	0.04	-1.09	.325	0.02 [-0.02, 0.06]	0.02	0.92	.358
Sleep efficiency $\times$ weekday xsunday	0.00 [-0.05, 0.05]	0.03	-0.02	.987	0.05 [0.01, 0.10]	0.02	2.39	.041
Sleep efficiency $\times$ weekday xthursday	-0.01 [-0.09, 0.07]	0.04	-0.24	.823	0.02 [-0.01, 0.06]	0.02	1.35	.177
Sleep efficiency $\times$ weekday xtuesday	-0.01 [-0.05, 0.04]	0.02	-0.29	.774	0.01 [-0.03, 0.04]	0.02	0.49	.623
Sleep efficiency $\times$ weekday xwednesday	-0.03 [-0.07, 0.02]	0.02	-1.25	.213	0.01 [-0.03, 0.05]	0.02	0.56	.580
Weekday xmunday $\times$ Sleep efficiency <sup>2</sup>	0.00 [-0.02, 0.02]	0.01	0.07	.951	0.00 [-0.01, 0.01]	0.01	0.28	.785
Weekday xsaturday $\times$ Sleep efficiency <sup>2</sup>	0.00 [-0.02, 0.01]	0.01	-0.42	.694	0.00 [-0.01, 0.01]	0.00	-0.65	.518
Weekday xsunday $\times$ Sleep efficiency <sup>2</sup>	0.00 [-0.01, 0.01]	0.00	-0.04	.969	0.00 [-0.01, 0.01]	0.00	0.50	.637
Weekday xthursday $\times$ Sleep efficiency <sup>2</sup>	0.00 [-0.02, 0.01]	0.01	-0.13	.902	0.00 [-0.01, 0.01]	0.00	0.57	.568
Weekday xtuesday $\times$ Sleep efficiency <sup>2</sup>	0.00 [-0.01, 0.01]	0.00	0.14	.886	0.00 [-0.01, 0.01]	0.01	-0.01	.995

Table 11 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, 0.01]	0.01	-0.30	.767	0.00 [-0.01, 0.01]	0.00	0.25	.808
Sleep onset								
(Intercept)	1.59 [1.13, 2.05]	0.23	6.84	< .001	1.39 [1.12, 1.65]	0.14	10.26	< .001
Sleep onset	-0.05 [-0.09, -0.01]	0.02	-2.22	.053	-0.04 [-0.07, -0.02]	0.01	-3.04	.003
Weekday xmunday	-0.13 [-0.19, -0.08]	0.03	-5.16	< .001	-0.03 [-0.07, 0.01]	0.02	-1.29	.202
Weekday xsaturday	-0.06 [-0.12, -0.01]	0.03	-2.51	.016	-0.05 [-0.10, 0.01]	0.03	-1.68	.140
Weekday xsunday	-0.15 [-0.20, -0.11]	0.02	-6.28	< .001	-0.13 [-0.18, -0.09]	0.02	-5.38	< .001
Weekday xthursday	-0.04 [-0.10, 0.03]	0.03	-1.07	.315	0.01 [-0.05, 0.07]	0.03	0.32	.759
Weekday xtuesday	-0.08 [-0.14, -0.01]	0.03	-2.25	.057	-0.03 [-0.07, 0.02]	0.02	-1.11	.275
Weekday xwednesday	-0.05 [-0.10, 0.00]	0.03	-1.81	.084	0.02 [-0.02, 0.07]	0.02	1.02	.319
Sleep onset <sup>2</sup>	-0.01 [-0.03, 0.01]	0.01	-0.80	.425	0.00 [-0.02, 0.03]	0.01	0.29	.780
Age	-0.02 [-0.03, -0.01]	0.00	-7.35	< .001	-0.02 [-0.03, -0.02]	0.00	-9.83	< .001
Sleep onset $\times$ weekday xmonday	0.02 [-0.02, 0.06]	0.02	0.86	.396	0.08 [0.05, 0.12]	0.02	4.51	< .001
Sleep onset $\times$ weekday xsaturday	0.04 [-0.01, 0.08]	0.02	1.71	.094	0.06 [0.02, 0.09]	0.02	3.12	.004
Sleep onset $\times$ weekday xsunday	0.07 [0.03, 0.11]	0.02	3.29	.001	0.11 [0.07, 0.14]	0.02	6.07	< .001
Sleep onset $\times$ weekday xthursday	0.01 [-0.04, 0.05]	0.02	0.24	.808	0.00 [-0.04, 0.04]	0.02	-0.14	.890
Sleep onset $\times$ weekday xtuesday	0.03 [-0.02, 0.07]	0.02	1.19	.243	0.03 [-0.01, 0.08]	0.02	1.41	.198
Sleep onset $\times$ weekday xwednesday	0.02 [-0.03, 0.07]	0.03	0.91	.383	0.02 [-0.02, 0.05]	0.02	0.90	.369
Weekday xmunday $\times$ Sleep onset <sup>2</sup>	0.01 [-0.02, 0.04]	0.01	0.90	.371	-0.02 [-0.05, 0.01]	0.01	-1.24	.238
Weekday xsaturday $\times$ Sleep onset <sup>2</sup>	0.00 [-0.03, 0.04]	0.02	0.19	.849	-0.01 [-0.05, 0.03]	0.02	-0.40	.712
Weekday xsunday $\times$ Sleep onset <sup>2</sup>	-0.01 [-0.04, 0.03]	0.02	-0.38	.709	-0.02 [-0.05, 0.02]	0.02	-0.93	.382
Weekday xthursday $\times$ Sleep onset <sup>2</sup>	0.01 [-0.02, 0.04]	0.02	0.87	.386	0.00 [-0.03, 0.03]	0.02	0.21	.840
Weekday xtuesday $\times$ Sleep onset <sup>2</sup>	0.02 [-0.01, 0.05]	0.02	1.03	.301	0.01 [-0.03, 0.04]	0.02	0.30	.777

Table 11 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, 0.05]	0.02	0.40	.700	-0.01 [-0.05, 0.03]	0.02	-0.33	.759
Sleep regularity								
(Intercept)	1.53 [1.08, 1.98]	0.23	6.67	< .001	1.38 [1.11, 1.66]	0.14	9.97	< .001
Sleep regularity	0.07 [0.04, 0.10]	0.02	4.56	< .001	-0.01 [-0.04, 0.02]	0.02	-0.46	.658
Weekday xmunday	-0.11 [-0.16, -0.06]	0.03	-4.05	.001	-0.04 [-0.09, 0.00]	0.02	-2.17	.035
Weekday xsaturday	-0.05 [-0.10, 0.01]	0.03	-1.75	.092	-0.05 [-0.10, 0.00]	0.02	-2.09	.063
Weekday xsunday	-0.13 [-0.18, -0.08]	0.03	-4.93	< .001	-0.14 [-0.18, -0.11]	0.02	-7.60	< .001
Weekday xthursday	-0.01 [-0.06, 0.04]	0.03	-0.56	.576	0.01 [-0.06, 0.07]	0.03	0.22	.834
Weekday xtuesday	-0.05 [-0.14, 0.03]	0.04	-1.29	.271	-0.02 [-0.06, 0.02]	0.02	-1.03	.305
Weekday xwednesday	-0.04 [-0.10, 0.03]	0.03	-1.16	.288	0.02 [-0.02, 0.06]	0.02	1.14	.259
Sleep regularity <sup>2</sup>	0.00 [-0.02, 0.02]	0.01	0.08	.936	0.00 [-0.02, 0.02]	0.01	-0.13	.895
Age	-0.02 [-0.03, -0.01]	0.00	-7.35	< .001	-0.02 [-0.03, -0.02]	0.00	-10.09	< .001
Sleep regularity $\times$ weekday xmonday	-0.03 [-0.08, 0.02]	0.02	-1.26	.220	0.02 [-0.02, 0.05]	0.02	1.01	.317
Sleep regularity $\times$ weekday xsaturday	0.00 [-0.04, 0.04]	0.02	0.12	.904	0.05 [0.00, 0.09]	0.02	2.11	.062
Sleep regularity $\times$ weekday xsunday	-0.01 [-0.05, 0.03]	0.02	-0.31	.756	0.03 [-0.02, 0.08]	0.02	1.20	.269
Sleep regularity $\times$ weekday xthursday	-0.02 [-0.07, 0.04]	0.03	-0.55	.600	0.03 [-0.02, 0.07]	0.02	1.08	.317
Sleep regularity $\times$ weekday xtuesday	-0.01 [-0.08, 0.05]	0.03	-0.41	.698	0.02 [-0.02, 0.05]	0.02	1.03	.309
Sleep regularity $\times$ weekday xwednesday	0.00 [-0.04, 0.04]	0.02	-0.10	.920	0.04 [0.00, 0.09]	0.02	1.83	.114
Weekday xmunday $\times$ Sleep regularity <sup>2</sup>	0.00 [-0.03, 0.02]	0.01	-0.32	.749	0.00 [-0.03, 0.02]	0.01	-0.10	.921
Weekday xsaturday $\times$ Sleep regularity <sup>2</sup>	-0.01 [-0.04, 0.02]	0.02	-0.48	.636	0.00 [-0.04, 0.03]	0.02	-0.20	.853
Weekday xsunday $\times$ Sleep regularity <sup>2</sup>	-0.02 [-0.05, 0.01]	0.02	-1.10	.295	0.00 [-0.03, 0.02]	0.01	-0.28	.783
Weekday xthursday $\times$ Sleep regularity <sup>2</sup>	-0.01 [-0.04, 0.02]	0.01	-0.46	.646	0.00 [-0.03, 0.04]	0.02	0.24	.821
Weekday xtuesday $\times$ Sleep regularity <sup>2</sup>	0.00 [-0.03, 0.03]	0.02	-0.03	.978	0.00 [-0.02, 0.02]	0.01	-0.05	.960

Table 11 continued

Term	Physical Activity Volume			Physical Activity Intensity						
	$\beta$	[95% CI]	SE	t	p	$\beta$	[95% CI]	SE	t	p
Weekday x wednesday × Sleep regularity <sup>2</sup>	-0.01	[-0.03, 0.02]	0.01	-0.39	.694	-0.01	[-0.03, 0.01]	0.01	-1.07	.286

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

Table 12

*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)	0.26 [0.04, 0.48]	0.11	2.29	.022	0.25 [0.04, 0.47]	0.11	2.30	.022
Physical activity	0.06 [0.02, 0.10]	0.02	2.73	.019	0.06 [0.02, 0.10]	0.02	3.07	.005
Seasonspring	-0.03 [-0.10, 0.04]	0.04	-0.85	.395	-0.02 [-0.09, 0.06]	0.04	-0.43	.664
Seasonsummer	-0.07 [-0.15, 0.01]	0.04	-1.72	.088	-0.07 [-0.17, 0.03]	0.05	-1.42	.174
Seasonwinter	0.03 [-0.04, 0.09]	0.03	0.83	.409	0.03 [-0.04, 0.10]	0.04	0.73	.469
Physical activity <sup>2</sup>	0.00 [-0.01, 0.01]	0.00	-0.56	.594	0.00 [-0.02, 0.02]	0.01	0.04	.966
Age	0.00 [-0.01, 0.00]	0.00	-2.11	.041	0.00 [-0.01, 0.00]	0.00	-2.03	.048
Physical activity × seasonspring	-0.01 [-0.08, 0.06]	0.04	-0.15	.887	-0.01 [-0.06, 0.04]	0.03	-0.55	.587
Physical activity × seasonsummer	-0.01 [-0.08, 0.05]	0.03	-0.45	.652	-0.01 [-0.08, 0.05]	0.03	-0.45	.655
Physical activity × seasonwinter	-0.01 [-0.07, 0.05]	0.03	-0.43	.674	0.00 [-0.05, 0.04]	0.02	-0.12	.906
Seasonspring × Physical activity <sup>2</sup>	0.00 [-0.02, 0.02]	0.01	-0.04	.970	-0.01 [-0.05, 0.02]	0.02	-0.60	.553
Seasonsummer × Physical activity <sup>2</sup>	-0.01 [-0.03, 0.01]	0.01	-0.98	.327	-0.01 [-0.06, 0.05]	0.03	-0.22	.836
Seasonwinter × Physical activity <sup>2</sup>	0.00 [-0.01, 0.02]	0.01	0.63	.553	0.01 [-0.03, 0.04]	0.02	0.38	.706
<b>Sleep efficiency</b>								
(Intercept)	0.18 [-0.04, 0.40]	0.11	1.57	.117	0.19 [-0.05, 0.43]	0.12	1.57	.120
Physical activity	0.03 [-0.01, 0.06]	0.02	1.47	.142	0.00 [-0.05, 0.05]	0.02	-0.01	.994
Seasonspring	0.00 [-0.07, 0.07]	0.04	0.05	.964	0.00 [-0.07, 0.08]	0.04	0.12	.902
Seasonsummer	0.06 [-0.03, 0.15]	0.05	1.28	.215	0.08 [0.00, 0.17]	0.04	1.86	.064
Seasonwinter	0.03 [-0.05, 0.11]	0.04	0.79	.437	0.07 [-0.01, 0.14]	0.04	1.71	.090
Physical activity <sup>2</sup>	-0.01 [-0.01, 0.00]	0.00	-1.50	.141	0.01 [-0.02, 0.04]	0.01	0.58	.570
Age	0.00 [0.00, 0.01]	0.00	0.96	.347	0.00 [0.00, 0.01]	0.00	0.76	.456

Table 12 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	0.01 [-0.05, 0.06]	0.03	0.25	.805	0.00 [-0.06, 0.06]	0.03	-0.05	.961
Physical activity $\times$ seasonsummer	0.02 [-0.08, 0.11]	0.05	0.30	.776	0.02 [-0.06, 0.09]	0.04	0.51	.621
Physical activity $\times$ seasonwinter	-0.02 [-0.07, 0.04]	0.03	-0.53	.602	0.00 [-0.06, 0.06]	0.03	0.06	.952
Seasonspring $\times$ Physical activity <sup>2</sup>	0.00 [-0.02, 0.01]	0.01	-0.63	.532	-0.01 [-0.04, 0.03]	0.02	-0.43	.668
Seasonsummer $\times$ Physical activity <sup>2</sup>	0.00 [-0.02, 0.03]	0.01	0.17	.869	-0.01 [-0.05, 0.02]	0.02	-0.73	.470
Seasonwinter $\times$ Physical activity <sup>2</sup>	0.01 [0.00, 0.01]	0.00	1.03	.302	-0.03 [-0.06, 0.00]	0.02	-1.75	.083
Sleep onset								
(Intercept)	-0.03 [-0.38, 0.32]	0.18	-0.17	.862	-0.02 [-0.36, 0.31]	0.17	-0.14	.888
Physical activity	-0.05 [-0.08, -0.01]	0.02	-2.44	.059	-0.07 [-0.10, -0.05]	0.01	-5.28	< .001
Seasonspring	0.03 [-0.02, 0.09]	0.03	1.19	.239	0.03 [-0.03, 0.08]	0.03	0.87	.384
Seasonsummer	0.05 [-0.02, 0.13]	0.04	1.48	.161	0.03 [-0.04, 0.10]	0.04	0.90	.378
Seasonwinter	-0.01 [-0.06, 0.04]	0.03	-0.42	.676	-0.01 [-0.07, 0.05]	0.03	-0.29	.775
Physical activity <sup>2</sup>	0.00 [-0.01, 0.01]	0.00	0.08	.939	0.00 [-0.02, 0.02]	0.01	-0.11	.915
Age	0.00 [0.00, 0.00]	0.00	0.16	.874	0.00 [0.00, 0.00]	0.00	-0.03	.973
Physical activity $\times$ seasonspring	0.00 [-0.07, 0.07]	0.04	0.06	.959	0.03 [-0.01, 0.06]	0.02	1.50	.140
Physical activity $\times$ seasonsummer	0.01 [-0.07, 0.10]	0.04	0.35	.745	0.04 [0.01, 0.08]	0.02	2.28	.023
Physical activity $\times$ seasonwinter	0.00 [-0.04, 0.03]	0.02	-0.25	.800	0.02 [-0.02, 0.05]	0.02	1.00	.317
Seasonspring $\times$ Physical activity <sup>2</sup>	0.00 [-0.02, 0.01]	0.01	-0.13	.903	0.00 [-0.02, 0.02]	0.01	0.39	.700
Seasonsummer $\times$ Physical activity <sup>2</sup>	-0.01 [-0.03, 0.01]	0.01	-0.61	.574	0.01 [-0.01, 0.04]	0.01	0.93	.363
Seasonwinter $\times$ Physical activity <sup>2</sup>	0.00 [-0.01, 0.01]	0.00	-0.14	.886	0.00 [-0.03, 0.02]	0.01	-0.37	.713
Sleep regularity								
(Intercept)	0.63 [0.37, 0.90]	0.14	4.69	< .001	0.70 [0.44, 0.97]	0.14	5.17	< .001
Physical activity	0.10 [0.06, 0.15]	0.02	4.99	< .001	0.09 [0.05, 0.13]	0.02	4.79	< .001

Table 12 continued

Term	Physical Activity Volume				Physical Activity Intensity			
	$\beta$ [95% CI]	SE	t	p	$\beta$ [95% CI]	SE	t	p
Seasonspring	-0.03 [-0.12, 0.07]	0.05	-0.55	.594	-0.03 [-0.12, 0.07]	0.05	-0.57	.573
Seasonsummer	0.03 [-0.07, 0.13]	0.05	0.62	.538	0.01 [-0.09, 0.10]	0.05	0.14	.886
Seasonwinter	0.01 [-0.07, 0.08]	0.04	0.14	.886	0.01 [-0.07, 0.09]	0.04	0.23	.821
Physical activity <sup>2</sup>	-0.01 [-0.02, 0.00]	0.01	-1.73	.137	-0.03 [-0.06, 0.00]	0.02	-1.68	.121
Age	0.00 [-0.01, 0.01]	0.00	0.26	.806	0.00 [-0.01, 0.01]	0.00	0.18	.862
Physical activity $\times$ seasonspring	0.01 [-0.10, 0.11]	0.05	0.10	.924	-0.05 [-0.10, -0.01]	0.02	-2.19	.028
Physical activity $\times$ seasonsummer	-0.03 [-0.10, 0.03]	0.03	-1.02	.307	-0.08 [-0.14, -0.02]	0.03	-2.62	.009
Physical activity $\times$ seasonwinter	-0.01 [-0.06, 0.04]	0.02	-0.53	.596	-0.02 [-0.08, 0.03]	0.03	-0.82	.418
Seasonspring $\times$ Physical activity <sup>2</sup>	0.00 [-0.03, 0.03]	0.02	-0.13	.908	0.01 [-0.04, 0.05]	0.02	0.23	.824
Seasonsummer $\times$ Physical activity <sup>2</sup>	0.01 [-0.01, 0.03]	0.01	1.03	.305	0.03 [-0.01, 0.08]	0.02	1.61	.113
Seasonwinter $\times$ Physical activity <sup>2</sup>	0.00 [-0.02, 0.02]	0.01	0.23	.828	0.00 [-0.04, 0.04]	0.02	0.01	.993

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

Table 13

*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)	1.53 [1.10, 1.97]	0.22	6.90	< .001	1.38 [1.12, 1.65]	0.13	10.29	< .001		
Sleep duration	0.00 [-0.04, 0.05]	0.02	0.03	.981	0.01 [-0.02, 0.04]	0.02	0.40	.702		
Seasonspring	0.00 [-0.09, 0.08]	0.04	-0.10	.921	-0.04 [-0.10, 0.02]	0.03	-1.28	.211		
Seasonsummer	0.01 [-0.06, 0.08]	0.03	0.22	.828	-0.06 [-0.14, 0.02]	0.04	-1.39	.195		
Seasonwinter	-0.04 [-0.11, 0.02]	0.03	-1.28	.212	-0.03 [-0.09, 0.03]	0.03	-1.09	.284		
Sleep duration <sup>2</sup>	-0.01 [-0.02, 0.01]	0.01	-0.69	.528	0.00 [-0.02, 0.01]	0.01	-0.56	.597		
Age	-0.02 [-0.03, -0.01]	0.00	-7.26	< .001	-0.02 [-0.03, -0.02]	0.00	-9.78	< .001		
Sleep duration × seasonspring	0.00 [-0.03, 0.04]	0.02	0.25	.804	0.01 [-0.03, 0.06]	0.02	0.60	.572		
Sleep duration × seasonsummer	-0.04 [-0.12, 0.04]	0.04	-0.88	.433	-0.01 [-0.06, 0.04]	0.03	-0.36	.731		
Sleep duration × seasonwinter	0.01 [-0.05, 0.07]	0.03	0.17	.876	0.01 [-0.02, 0.05]	0.02	0.62	.544		
Seasonspring × Sleep duration <sup>2</sup>	0.00 [-0.02, 0.03]	0.01	0.27	.805	0.00 [-0.01, 0.02]	0.01	0.64	.536		
Seasonsummer × Sleep duration <sup>2</sup>	0.00 [-0.01, 0.02]	0.01	0.39	.695	0.00 [-0.02, 0.01]	0.01	-0.56	.579		
Seasonwinter × Sleep duration <sup>2</sup>	0.00 [-0.01, 0.02]	0.01	0.24	.817	0.00 [-0.01, 0.02]	0.01	0.14	.891		
Sleep efficiency										
(Intercept)	1.53 [1.09, 1.97]	0.22	6.86	< .001	1.39 [1.12, 1.66]	0.14	10.13	< .001		
Sleep efficiency	0.00 [-0.02, 0.02]	0.01	-0.04	.970	0.01 [-0.01, 0.03]	0.01	1.10	.270		
Seasonspring	0.00 [-0.09, 0.08]	0.04	-0.06	.954	-0.04 [-0.10, 0.02]	0.03	-1.32	.193		
Seasonsummer	0.01 [-0.06, 0.08]	0.04	0.33	.745	-0.06 [-0.13, 0.01]	0.04	-1.67	.110		
Seasonwinter	-0.04 [-0.11, 0.02]	0.03	-1.28	.205	-0.03 [-0.08, 0.03]	0.03	-0.91	.367		
Sleep efficiency <sup>2</sup>	0.00 [-0.01, 0.01]	0.00	-0.56	.599	0.00 [-0.01, 0.01]	0.00	-0.06	.952		
Age	-0.02 [-0.03, -0.01]	0.00	-7.03	< .001	-0.02 [-0.03, -0.02]	0.00	-9.81	< .001		

Table 13 continued

Term	Physical Activity Volume				Physical Activity Intensity			
	$\beta$ [95% CI]	SE	t	p	$\beta$ [95% CI]	SE	t	p
Sleep efficiency $\times$ seasonspring	0.00 [-0.04, 0.04]	0.02	0.15	.879	-0.01 [-0.04, 0.02]	0.02	-0.61	.548
Sleep efficiency $\times$ seasonsummer	-0.01 [-0.05, 0.03]	0.02	-0.44	.667	-0.01 [-0.04, 0.02]	0.02	-0.58	.559
Sleep efficiency $\times$ seasonwinter	-0.01 [-0.04, 0.03]	0.02	-0.25	.802	-0.02 [-0.05, 0.01]	0.02	-1.39	.167
Seasonspring $\times$ Sleep efficiency <sup>2</sup>	0.00 [-0.01, 0.01]	0.01	-0.01	.990	0.00 [-0.01, 0.01]	0.01	0.15	.891
Seasonsummer $\times$ Sleep efficiency <sup>2</sup>	0.00 [-0.01, 0.02]	0.01	0.53	.622	0.00 [-0.01, 0.01]	0.01	0.06	.955
Seasonwinter $\times$ Sleep efficiency <sup>2</sup>	0.00 [-0.01, 0.01]	0.01	-0.13	.901	0.00 [-0.01, 0.00]	0.00	-1.07	.288
Sleep onset								
(Intercept)	1.53 [1.09, 1.96]	0.22	6.84	< .001	1.39 [1.12, 1.65]	0.14	10.25	< .001
Sleep onset	-0.03 [-0.06, 0.01]	0.02	-1.47	.141	-0.01 [-0.04, 0.02]	0.02	-0.42	.673
Seasonspring	0.01 [-0.09, 0.10]	0.05	0.12	.910	-0.04 [-0.11, 0.03]	0.04	-1.01	.323
Seasonsummer	0.02 [-0.05, 0.09]	0.04	0.60	.545	-0.06 [-0.15, 0.02]	0.04	-1.55	.148
Seasonwinter	-0.05 [-0.11, 0.02]	0.03	-1.34	.181	-0.03 [-0.09, 0.04]	0.03	-0.88	.386
Sleep onset <sup>2</sup>	0.00 [-0.02, 0.02]	0.01	0.03	.974	0.00 [-0.02, 0.02]	0.01	-0.12	.907
Age	-0.02 [-0.03, -0.01]	0.00	-7.09	< .001	-0.02 [-0.03, -0.02]	0.00	-9.79	< .001
Sleep onset $\times$ seasonspring	0.01 [-0.04, 0.05]	0.02	0.25	.801	0.01 [-0.04, 0.05]	0.02	0.38	.710
Sleep onset $\times$ seasonsummer	0.01 [-0.04, 0.06]	0.03	0.37	.711	0.03 [-0.02, 0.08]	0.02	1.23	.219
Sleep onset $\times$ seasonwinter	-0.02 [-0.08, 0.03]	0.03	-0.82	.429	-0.02 [-0.05, 0.02]	0.02	-0.88	.382
Seasonspring $\times$ Sleep onset <sup>2</sup>	-0.01 [-0.03, 0.02]	0.01	-0.66	.511	0.00 [-0.03, 0.02]	0.01	-0.17	.871
Seasonsummer $\times$ Sleep onset <sup>2</sup>	-0.01 [-0.04, 0.02]	0.02	-0.50	.616	0.00 [-0.03, 0.04]	0.02	0.07	.942
Seasonwinter $\times$ Sleep onset <sup>2</sup>	0.00 [-0.03, 0.03]	0.02	0.03	.975	0.00 [-0.03, 0.02]	0.01	-0.25	.807
Sleep regularity								
(Intercept)	1.47 [1.04, 1.91]	0.22	6.65	< .001	1.37 [1.10, 1.63]	0.13	10.12	< .001
Sleep regularity	0.06 [0.03, 0.08]	0.01	3.94	< .001	0.03 [-0.01, 0.07]	0.02	1.69	.165

Table 13 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, 0.10]	0.04	0.29	.776	-0.03 [-0.10, 0.03]	0.03	-0.97	.347
Seasonsummer	0.02 [-0.05, 0.09]	0.04	0.52	.607	-0.05 [-0.14, 0.04]	0.05	-1.13	.298
Seasonwinter	-0.04 [-0.11, 0.03]	0.04	-1.12	.273	-0.03 [-0.09, 0.04]	0.03	-0.80	.434
Sleep regularity <sup>2</sup>	0.00 [-0.03, 0.03]	0.01	-0.09	.932	0.00 [-0.02, 0.02]	0.01	-0.14	.893
Age	-0.02 [-0.03, -0.01]	0.00	-7.02	< .001	-0.02 [-0.03, -0.02]	0.00	-9.73	< .001
Sleep regularity $\times$ seasonspring	0.03 [-0.01, 0.06]	0.02	1.46	.145	-0.02 [-0.07, 0.03]	0.03	-0.67	.535
Sleep regularity $\times$ seasonsummer	-0.02 [-0.07, 0.03]	0.03	-0.62	.543	-0.03 [-0.08, 0.03]	0.03	-1.06	.335
Sleep regularity $\times$ seasonwinter	0.03 [-0.01, 0.07]	0.02	1.29	.202	0.01 [-0.05, 0.07]	0.03	0.36	.740
Seasonspring $\times$ Sleep regularity <sup>2</sup>	-0.01 [-0.04, 0.02]	0.01	-0.77	.474	0.00 [-0.03, 0.02]	0.01	-0.19	.855
Seasonsummer $\times$ Sleep regularity <sup>2</sup>	0.00 [-0.04, 0.04]	0.02	0.01	.989	0.00 [-0.04, 0.03]	0.02	-0.28	.795
Seasonwinter $\times$ Sleep regularity <sup>2</sup>	0.00 [-0.04, 0.04]	0.02	0.09	.931	0.00 [-0.03, 0.02]	0.01	-0.10	.921

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

Table 14

*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)	0.32 [0.07, 0.58]	0.13	2.47	.015	0.34 [0.10, 0.57]	0.12	2.78	.005
Physical activity	0.04 [-0.01, 0.09]	0.03	1.61	.163	0.04 [-0.09, 0.17]	0.07	0.63	.558
Regioneurope	-0.18 [-0.36, 0.01]	0.09	-1.87	.062	-0.19 [-0.38, 0.00]	0.10	-1.97	.049
Regionafrica	-0.25 [-0.47, -0.03]	0.11	-2.26	.026	-0.22 [-0.44, 0.00]	0.11	-1.94	.056
Regionasia	-0.55 [-0.81, -0.28]	0.14	-4.02	< .001	-0.51 [-0.74, -0.28]	0.12	-4.29	< .001
Regionnorth america	-0.06 [-0.28, 0.17]	0.11	-0.49	.626	-0.04 [-0.26, 0.17]	0.11	-0.41	.683
Regionsouth america	-0.45 [-0.64, -0.25]	0.10	-4.46	< .001	-0.45 [-0.65, -0.25]	0.10	-4.48	< .001
Physical activity <sup>2</sup>								
Age	0.00 [-0.01, 0.01]	0.00	0.15	.885	0.00 [-0.04, 0.05]	0.02	0.14	.887
Physical activity × regioneurope	0.02 [-0.03, 0.07]	0.03	0.89	.387	0.02 [-0.11, 0.15]	0.07	0.33	.755
Physical activity × regionafrica	-0.06 [-0.16, 0.04]	0.05	-1.12	.264	-0.08 [-0.33, 0.16]	0.13	-0.66	.544
Physical activity × regionasia	-0.07 [-0.32, 0.17]	0.13	-0.58	.567	-0.02 [-0.21, 0.17]	0.10	-0.22	.832
Physical activity × regionnorth america	0.05 [-0.09, 0.18]	0.07	0.66	.517	0.04 [-0.11, 0.20]	0.08	0.54	.593
Physical activity × regionsouth america	-0.02 [-0.15, 0.12]	0.07	-0.23	.833	0.03 [-0.11, 0.17]	0.07	0.48	.643
Regioneurope × Physical activity <sup>2</sup>	-0.01 [-0.02, 0.00]	0.01	-1.11	.278	0.00 [-0.05, 0.05]	0.02	-0.04	.967
Regionafrica × Physical activity <sup>2</sup>	-0.02 [-0.13, 0.10]	0.06	-0.28	.788	0.04 [-0.07, 0.15]	0.06	0.70	.501
Regionasia × Physical activity <sup>2</sup>	-0.07 [-0.27, 0.13]	0.10	-0.70	.506	-0.04 [-0.15, 0.06]	0.05	-0.83	.408
Regionnorth america × Physical activity <sup>2</sup>	-0.01 [-0.05, 0.03]	0.02	-0.55	.584	-0.08 [-0.16, 0.01]	0.04	-1.79	.076
Regionsouth america × Physical activity <sup>2</sup>	-0.01 [-0.04, 0.02]	0.02	-0.84	.401	-0.01 [-0.08, 0.06]	0.03	-0.27	.788
Sleep efficiency								
(Intercept)	0.24 [0.01, 0.48]	0.12	2.01	.047	0.31 [0.05, 0.57]	0.13	2.37	.023

Table 14 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 [-0.04, 0.05]	0.02	0.31	.763	0.07 [-0.08, 0.23]	0.08	0.90	.424
Regioneurope	-0.10 [-0.28, 0.09]	0.09	-1.03	.302	-0.15 [-0.34, 0.04]	0.10	-1.59	.112
Regionafrica	-0.01 [-0.22, 0.20]	0.11	-0.07	.943	0.04 [-0.19, 0.26]	0.12	0.32	.750
Regionasia	-0.17 [-0.48, 0.15]	0.16	-1.04	.314	-0.29 [-0.54, -0.05]	0.12	-2.37	.018
Regionnorth america	0.01 [-0.22, 0.25]	0.12	0.11	.913	-0.09 [-0.31, 0.14]	0.11	-0.75	.456
Regionsouth america	-0.28 [-0.48, -0.08]	0.10	-2.70	.007	-0.39 [-0.61, -0.17]	0.11	-3.47	.001
Physical activity <sup>2</sup>	0.00 [-0.01, 0.00]	0.00	-0.46	.648	-0.08 [-0.16, 0.00]	0.04	-1.96	.129
Age	0.00 [0.00, 0.01]	0.00	0.74	.468	0.00 [0.00, 0.01]	0.00	0.47	.650
Physical activity × regioneurope	0.01 [-0.05, 0.07]	0.03	0.43	.677	-0.07 [-0.22, 0.08]	0.08	-0.92	.406
Physical activity × regionafrica	-0.01 [-0.12, 0.09]	0.05	-0.22	.827	-0.16 [-0.39, 0.07]	0.12	-1.39	.219
Physical activity × regionasia	-0.01 [-0.62, 0.59]	0.31	-0.05	.967	-0.05 [-0.24, 0.15]	0.10	-0.47	.650
Physical activity × regionnorth america	0.11 [-0.02, 0.23]	0.06	1.66	.098	0.04 [-0.14, 0.21]	0.09	0.41	.689
Physical activity × regionsouth america	0.11 [-0.01, 0.23]	0.06	1.83	.127	0.01 [-0.17, 0.18]	0.09	0.06	.956
Regioneurope × Physical activity <sup>2</sup>	-0.01 [-0.02, 0.00]	0.00	-1.56	.122	0.09 [0.01, 0.17]	0.04	2.11	.101
Regionafrica × Physical activity <sup>2</sup>	0.01 [-0.06, 0.08]	0.04	0.35	.729	0.06 [-0.06, 0.18]	0.06	1.03	.329
Regionasia × Physical activity <sup>2</sup>	-0.18 [-0.60, 0.23]	0.21	-0.86	.464	0.05 [-0.06, 0.16]	0.06	0.86	.394
Regionnorth america × Physical activity <sup>2</sup>	-0.03 [-0.07, 0.01]	0.02	-1.32	.190	0.01 [-0.09, 0.11]	0.05	0.20	.843
Regionsouth america × Physical activity <sup>2</sup>	0.00 [-0.05, 0.06]	0.03	0.12	.909	0.08 [0.00, 0.15]	0.04	2.03	.054
Sleep onset								
(Intercept)	-0.08 [-0.40, 0.24]	0.17	-0.49	.623	-0.08 [-0.39, 0.23]	0.16	-0.49	.627
Physical activity	-0.02 [-0.05, 0.01]	0.02	-1.17	.290	-0.02 [-0.08, 0.05]	0.03	-0.52	.608
Regioneurope	0.13 [-0.04, 0.30]	0.09	1.52	.129	0.14 [-0.02, 0.31]	0.09	1.68	.094
Regionafrica	0.15 [-0.03, 0.33]	0.09	1.63	.104	0.15 [-0.03, 0.32]	0.09	1.62	.106

Table 14 continued

TITLE

Term	Physical Activity Volume			Physical Activity Intensity				
	$\beta$ [95% CI]	SE	t	p	$\beta$ [95% CI]	SE	t	p
Regionasia	0.29 [0.08, 0.50]	0.11	2.76	.006	0.23 [0.03, 0.42]	0.10	2.25	.025
Regionnorth america	0.07 [-0.13, 0.26]	0.10	0.65	.516	0.00 [-0.18, 0.18]	0.09	-0.04	.972
Regionsouth america	0.09 [-0.09, 0.27]	0.09	0.95	.343	0.07 [-0.10, 0.24]	0.09	0.76	.446
Physical activity <sup>2</sup>	0.00 [-0.01, 0.01]	0.00	-0.62	.577	-0.04 [-0.07, 0.00]	0.02	-2.22	.036
Age	0.00 [0.00, 0.00]	0.00	0.31	.760	0.00 [0.00, 0.00]	0.00	0.24	.810
Physical activity × regioneurope	-0.06 [-0.10, -0.02]	0.02	-2.87	.019	-0.05 [-0.12, 0.02]	0.03	-1.43	.167
Physical activity × regionafrica	0.02 [-0.04, 0.09]	0.03	0.69	.494	-0.02 [-0.14, 0.10]	0.06	-0.30	.767
Physical activity × regionasia	0.02 [-0.23, 0.27]	0.13	0.15	.886	0.02 [-0.11, 0.15]	0.06	0.34	.741
Physical activity × regionnorth america	0.06 [-0.07, 0.18]	0.06	0.86	.427	0.01 [-0.14, 0.16]	0.08	0.12	.907
Physical activity × regionsouth america	-0.02 [-0.07, 0.04]	0.03	-0.60	.555	-0.01 [-0.10, 0.09]	0.05	-0.18	.860
Regioneurope × Physical activity <sup>2</sup>	0.01 [0.00, 0.01]	0.00	1.50	.152	0.04 [0.01, 0.07]	0.02	2.44	.016
Regionafrica × Physical activity <sup>2</sup>	0.01 [-0.04, 0.07]	0.03	0.54	.588	0.01 [-0.04, 0.07]	0.03	0.49	.626
Regionasia × Physical activity <sup>2</sup>	-0.03 [-0.21, 0.14]	0.09	-0.39	.718	0.03 [-0.05, 0.11]	0.04	0.78	.441
Regionnorth america × Physical activity <sup>2</sup>	0.01 [-0.02, 0.05]	0.02	0.82	.424	0.06 [0.00, 0.11]	0.03	1.90	.059
Regionsouth america × Physical activity <sup>2</sup>	0.00 [-0.03, 0.03]	0.02	0.03	.979	0.04 [-0.05, 0.12]	0.04	0.80	.479
Sleep regularity								
(Intercept)	0.15 [-0.10, 0.41]	0.13	1.18	.249	0.23 [-0.02, 0.49]	0.13	1.79	.079
Physical activity	0.06 [-0.02, 0.14]	0.04	1.48	.237	0.11 [0.03, 0.20]	0.04	2.72	.007
Regioneurope	0.06 [-0.13, 0.25]	0.10	0.62	.536	0.02 [-0.18, 0.22]	0.10	0.21	.834
Regionafrica	0.38 [0.10, 0.67]	0.14	2.65	.023	0.35 [0.11, 0.59]	0.12	2.86	.005
Regionasia	0.40 [0.11, 0.69]	0.15	2.73	.008	0.42 [0.17, 0.68]	0.13	3.24	.001
Regionnorth america	-0.02 [-0.24, 0.20]	0.11	-0.17	.867	-0.10 [-0.33, 0.13]	0.12	-0.85	.398
Regionsouth america	-0.12 [-0.35, 0.11]	0.12	-1.04	.308	-0.21 [-0.43, 0.01]	0.11	-1.84	.067

Table 14 continued

Term	Physical Activity Volume			Physical Activity Intensity				
	$\beta$ [95% CI]	SE	t	p	$\beta$ [95% CI]	SE	t	p
Physical activity <sup>2</sup>	0.00 [-0.01, 0.01]	0.01	-0.15	.891	-0.06 [-0.11, -0.01]	0.02	-2.57	.013
Age	0.00 [-0.01, 0.00]	0.00	-0.48	.653	0.00 [-0.01, 0.00]	0.00	-0.70	.509
Physical activity × regioneurope	0.07 [0.02, 0.12]	0.03	2.61	.013	-0.07 [-0.16, 0.02]	0.05	-1.48	.139
Physical activity × regionafrica	0.01 [-0.14, 0.16]	0.07	0.14	.895	0.10 [-0.07, 0.26]	0.08	1.15	.257
Physical activity × regionasia	-0.04 [-0.36, 0.27]	0.16	-0.27	.793	-0.06 [-0.28, 0.16]	0.11	-0.54	.607
Physical activity × regionnorth america	0.14 [-0.05, 0.33]	0.10	1.48	.190	0.06 [-0.10, 0.23]	0.08	0.77	.444
Physical activity × regionsouth america	0.10 [0.01, 0.18]	0.04	2.25	.031	0.08 [-0.04, 0.20]	0.06	1.29	.198
Regioneurope × Physical activity <sup>2</sup>	-0.02 [-0.02, -0.01]	0.00	-3.11	.002	0.06 [0.01, 0.11]	0.03	2.28	.028
Regionafrica × Physical activity <sup>2</sup>	-0.10 [-0.32, 0.12]	0.11	-0.88	.454	-0.11 [-0.24, 0.03]	0.07	-1.55	.170
Regionasia × Physical activity <sup>2</sup>	-0.04 [-0.23, 0.16]	0.10	-0.39	.705	0.00 [-0.11, 0.12]	0.06	0.08	.938
Regionnorth america × Physical activity <sup>2</sup>	-0.04 [-0.09, 0.01]	0.02	-1.58	.129	-0.04 [-0.13, 0.05]	0.05	-0.85	.401
Regionsouth america × Physical activity <sup>2</sup>	-0.03 [-0.10, 0.05]	0.04	-0.67	.552	-0.01 [-0.08, 0.07]	0.04	-0.19	.848

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

Table 15

*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)	1.29 [0.88, 1.70]	0.21	6.15	< .001	1.09 [0.87, 1.31]	0.11	9.65	< .001
Sleep duration	0.03 [-0.04, 0.10]	0.03	0.91	.411	0.01 [-0.04, 0.05]	0.02	0.37	.722
Regioneurope	-0.25 [-0.44, -0.06]	0.10	-2.61	.009	-0.16 [-0.32, 0.00]	0.08	-2.01	.044
Regionafrica	-0.19 [-0.39, 0.02]	0.10	-1.79	.074	-0.06 [-0.23, 0.11]	0.09	-0.74	.456
Regionasia	-0.48 [-0.70, -0.26]	0.11	-4.24	< .001	-0.45 [-0.64, -0.26]	0.10	-4.67	< .001
Regionnorth america	-0.36 [-0.57, -0.14]	0.11	-3.22	.001	-0.19 [-0.38, 0.00]	0.10	-1.98	.050
Regionsouth america	-0.31 [-0.51, -0.11]	0.10	-3.06	.002	-0.23 [-0.39, -0.07]	0.08	-2.78	.005
Sleep duration <sup>2</sup>	-0.01 [-0.03, 0.00]	0.01	-1.69	.101	0.00 [-0.01, 0.01]	0.01	-0.23	.815
Age	-0.02 [-0.03, -0.02]	0.00	-7.35	< .001	-0.03 [-0.03, -0.02]	0.00	-10.36	< .001
Sleep duration × regioneurope	-0.03 [-0.10, 0.04]	0.04	-0.87	.426	0.01 [-0.04, 0.06]	0.03	0.42	.690
Sleep duration × regionafrica	-0.03 [-0.13, 0.07]	0.05	-0.56	.592	-0.02 [-0.08, 0.04]	0.03	-0.72	.469
Sleep duration × regionasia	-0.06 [-0.23, 0.11]	0.09	-0.68	.512	0.03 [-0.09, 0.16]	0.06	0.51	.614
Sleep duration × regiornnorth america	-0.01 [-0.10, 0.08]	0.05	-0.21	.840	0.01 [-0.11, 0.13]	0.06	0.22	.836
Sleep duration × regionsouth america	-0.05 [-0.12, 0.02]	0.04	-1.38	.220	-0.01 [-0.05, 0.03]	0.02	-0.64	.525
Regioneurope × Sleep duration <sup>2</sup>	0.01 [-0.02, 0.03]	0.01	0.54	.607	0.00 [-0.02, 0.01]	0.01	-0.41	.695
Regionafrica × Sleep duration <sup>2</sup>	0.02 [-0.02, 0.07]	0.02	1.03	.358	0.00 [-0.03, 0.02]	0.01	-0.21	.838
Regionasia × Sleep duration <sup>2</sup>	-0.01 [-0.07, 0.04]	0.03	-0.41	.681	-0.01 [-0.06, 0.04]	0.03	-0.35	.727
Regionnorth america × Sleep duration <sup>2</sup>	0.01 [-0.02, 0.05]	0.02	0.91	.361	-0.01 [-0.06, 0.04]	0.02	-0.53	.628
Regionsouth america × Sleep duration <sup>2</sup>	0.01 [0.00, 0.03]	0.01	1.59	.129	0.00 [-0.01, 0.01]	0.01	0.18	.854
Sleep efficiency								
(Intercept)	1.29 [0.86, 1.72]	0.22	5.90	< .001	1.09 [0.87, 1.32]	0.11	9.57	< .001

Table 15 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 [-0.08, 0.03]	0.03	-1.05	.325	0.01 [-0.03, 0.04]	0.02	0.34	.731
Regioneurope	-0.25 [-0.45, -0.05]	0.10	-2.49	.014	-0.16 [-0.32, -0.01]	0.08	-2.03	.043
Regionafrica	-0.17 [-0.38, 0.03]	0.10	-1.68	.094	-0.08 [-0.25, 0.09]	0.09	-0.96	.337
Regionasia	-0.51 [-0.73, -0.29]	0.11	-4.56	< .001	-0.44 [-0.62, -0.25]	0.10	-4.59	< .001
Regionnorth america	-0.34 [-0.55, -0.13]	0.11	-3.18	.002	-0.20 [-0.37, -0.03]	0.09	-2.28	.023
Regionsouth america	-0.32 [-0.52, -0.12]	0.10	-3.09	.002	-0.24 [-0.40, -0.08]	0.08	-2.89	.004
Sleep efficiency <sup>2</sup>	-0.01 [-0.03, 0.01]	0.01	-0.74	.520	0.00 [-0.02, 0.02]	0.01	0.23	.833
Age	-0.02 [-0.03, -0.02]	0.00	-7.12	.001	-0.03 [-0.03, -0.02]	0.00	-10.50	< .001
Sleep efficiency × regioneurope	0.04 [-0.03, 0.11]	0.04	1.04	.346	0.00 [-0.04, 0.04]	0.02	0.13	.894
Sleep efficiency × regionafrica	0.03 [-0.05, 0.11]	0.04	0.72	.490	-0.02 [-0.10, 0.05]	0.04	-0.62	.560
Sleep efficiency × regionasia	0.00 [-0.16, 0.17]	0.08	0.04	.973	-0.02 [-0.10, 0.07]	0.04	-0.35	.730
Sleep efficiency × regionnorth america	0.04 [-0.07, 0.14]	0.05	0.69	.505	-0.01 [-0.08, 0.05]	0.03	-0.41	.682
Sleep efficiency × regionsouth america	0.03 [-0.05, 0.11]	0.04	0.77	.471	-0.02 [-0.07, 0.03]	0.03	-0.65	.519
Regioneurope × Sleep efficiency <sup>2</sup>	0.01 [-0.02, 0.03]	0.01	0.48	.668	0.00 [-0.02, 0.02]	0.01	-0.22	.841
Regionafrica × Sleep efficiency <sup>2</sup>	0.01 [-0.02, 0.03]	0.01	0.61	.580	0.00 [-0.03, 0.03]	0.02	-0.19	.864
Regionasia × Sleep efficiency <sup>2</sup>	0.00 [-0.05, 0.05]	0.02	0.11	.920	-0.01 [-0.05, 0.02]	0.02	-0.84	.444
Regionnorth america × Sleep efficiency <sup>2</sup>	0.01 [-0.04, 0.05]	0.02	0.24	.820	-0.01 [-0.03, 0.02]	0.01	-0.58	.575
Regionsouth america × Sleep efficiency <sup>2</sup>	0.01 [-0.02, 0.04]	0.01	0.77	.499	0.00 [-0.02, 0.01]	0.01	-0.35	.749
Sleep onset								
(Intercept)	1.28 [0.90, 1.66]	0.19	6.56	< .001	1.10 [0.88, 1.31]	0.11	10.05	< .001
Sleep onset	-0.11 [-0.28, 0.06]	0.09	-1.27	.305	-0.04 [-0.10, 0.01]	0.03	-1.66	.098
Regioneurope	-0.24 [-0.48, 0.00]	0.12	-1.95	.062	-0.16 [-0.32, 0.01]	0.08	-1.83	.068
Regionafrica	-0.17 [-0.45, 0.12]	0.15	-1.14	.270	-0.11 [-0.32, 0.09]	0.11	-1.07	.286

Table 15 continued

TITLE

Term	Physical Activity Volume				Physical Activity Intensity			
	$\beta$ [95% CI]	SE	t	p	$\beta$ [95% CI]	SE	t	p
Regionasia	-0.43 [-0.73, -0.13]	0.15	-2.79	.010	-0.41 [-0.64, -0.19]	0.11	-3.64	< .001
Regionnorth america	-0.29 [-0.67, 0.09]	0.19	-1.49	.188	-0.23 [-0.43, -0.02]	0.11	-2.17	.030
Regionsouth america	-0.30 [-0.61, 0.00]	0.15	-1.98	.082	-0.23 [-0.41, -0.05]	0.09	-2.48	.013
Sleep onset <sup>2</sup>	-0.06 [-0.10, -0.01]	0.02	-2.53	.017	-0.03 [-0.06, 0.01]	0.02	-1.60	.109
Age	-0.02 [-0.03, -0.02]	0.00	-7.48	< .001	-0.03 [-0.03, -0.02]	0.00	-10.45	< .001
Sleep onset × regioneurope	0.09 [-0.08, 0.27]	0.09	1.02	.389	0.05 [-0.01, 0.11]	0.03	1.54	.133
Sleep onset × regionafrica	0.09 [-0.18, 0.36]	0.14	0.66	.533	0.00 [-0.16, 0.15]	0.08	-0.01	.993
Sleep onset × regionasia	0.15 [-0.27, 0.56]	0.21	0.70	.508	0.06 [-0.24, 0.37]	0.16	0.40	.698
Sleep onset × regionnorth america	0.19 [-0.06, 0.44]	0.13	1.47	.202	0.05 [-0.09, 0.19]	0.07	0.67	.504
Sleep onset × regionsouth america	0.07 [-0.13, 0.27]	0.10	0.68	.548	0.03 [-0.05, 0.10]	0.04	0.68	.499
Regioneurope × Sleep onset <sup>2</sup>	0.05 [0.01, 0.10]	0.02	2.42	.020	0.02 [-0.01, 0.06]	0.02	1.31	.191
Regionafrica × Sleep onset <sup>2</sup>	0.07 [-0.07, 0.20]	0.07	0.97	.359	0.03 [-0.06, 0.11]	0.04	0.61	.539
Regionasia × Sleep onset <sup>2</sup>	0.05 [-0.17, 0.26]	0.11	0.43	.674	0.00 [-0.19, 0.20]	0.10	0.01	.991
Regionnorth america × Sleep onset <sup>2</sup>	0.11 [-0.02, 0.23]	0.06	1.72	.131	0.05 [-0.04, 0.15]	0.05	1.17	.266
Regionsouth america × Sleep onset <sup>2</sup>	0.05 [-0.03, 0.12]	0.04	1.11	.317	0.01 [-0.04, 0.07]	0.03	0.46	.653
Sleep regularity								
(Intercept)	1.30 [0.87, 1.73]	0.22	5.92	< .001	1.10 [0.87, 1.32]	0.11	9.69	< .001
Sleep regularity	0.18 [0.09, 0.27]	0.05	3.85	.030	0.05 [0.01, 0.09]	0.02	2.52	.022
Regioneurope	-0.31 [-0.52, -0.10]	0.11	-2.89	.006	-0.18 [-0.34, -0.02]	0.08	-2.23	.026
Regionafrica	-0.23 [-0.45, -0.01]	0.11	-2.09	.041	-0.10 [-0.27, 0.07]	0.09	-1.16	.248
Regionasia	-0.58 [-0.82, -0.35]	0.12	-4.85	< .001	-0.46 [-0.66, -0.27]	0.10	-4.61	< .001
Regionnorth america	-0.38 [-0.59, -0.16]	0.11	-3.47	.001	-0.19 [-0.36, -0.01]	0.09	-2.10	.036
Regionsouth america	-0.36 [-0.57, -0.15]	0.11	-3.33	.002	-0.25 [-0.41, -0.08]	0.08	-2.97	.003

Table 15 continued

TITLE

Term	Physical Activity Volume				Physical Activity Intensity			
	$\beta$ [95% CI]	SE	t	p	$\beta$ [95% CI]	SE	t	p
Sleep regularity <sup>2</sup>	0.00 [-0.02, 0.02]	0.01	-0.01	.994	0.00 [-0.03, 0.02]	0.01	-0.39	.704
Age	-0.02 [-0.03, -0.02]	0.00	-7.48	< .001	-0.03 [-0.03, -0.02]	0.00	-10.72	< .001
Sleep regularity × regioneurope	-0.12 [-0.22, -0.01]	0.05	-2.24	.113	-0.04 [-0.08, 0.01]	0.02	-1.62	.129
Sleep regularity × regionafrica	-0.15 [-0.27, -0.02]	0.06	-2.28	.082	-0.01 [-0.09, 0.08]	0.05	-0.13	.901
Sleep regularity × regionasia	-0.14 [-0.28, -0.01]	0.07	-2.03	.084	0.06 [-0.03, 0.14]	0.04	1.30	.198
Sleep regularity × regionnorth america	-0.10 [-0.26, 0.06]	0.08	-1.21	.299	0.01 [-0.07, 0.09]	0.04	0.20	.842
Sleep regularity × regionsouth america	-0.10 [-0.21, 0.01]	0.06	-1.85	.147	0.00 [-0.05, 0.05]	0.03	-0.02	.981
Regioneurope × Sleep regularity <sup>2</sup>	-0.01 [-0.04, 0.02]	0.01	-0.47	.645	0.00 [-0.02, 0.02]	0.01	-0.12	.904
Regionafrica × Sleep regularity <sup>2</sup>	-0.01 [-0.05, 0.02]	0.02	-0.71	.477	0.01 [-0.03, 0.05]	0.02	0.44	.669
Regionasia × Sleep regularity <sup>2</sup>	0.00 [-0.05, 0.06]	0.03	0.15	.881	-0.02 [-0.09, 0.04]	0.03	-0.71	.495
Regionnorth america × Sleep regularity <sup>2</sup>	-0.01 [-0.07, 0.05]	0.03	-0.23	.820	-0.01 [-0.05, 0.04]	0.02	-0.34	.734
Regionsouth america × Sleep regularity <sup>2</sup>	0.00 [-0.03, 0.03]	0.02	0.22	.828	0.02 [-0.01, 0.04]	0.01	1.19	.238

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

Table 16

*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)	0.46 [0.21, 0.72]	0.13	3.59	< .001	0.43 [0.18, 0.69]	0.13	3.33	.001
Physical activity	0.13 [-0.01, 0.27]	0.07	1.86	.088	0.14 [0.02, 0.26]	0.06	2.21	.047
Daylight hours	-0.02 [-0.03, -0.01]	0.01	-2.88	.005	-0.02 [-0.03, 0.00]	0.01	-2.21	.034
Physical activity <sup>2</sup>	0.02 [-0.03, 0.07]	0.02	0.70	.521	0.04 [-0.03, 0.11]	0.04	1.02	.321
Age	0.00 [-0.01, 0.00]	0.00	-2.11	.040	0.00 [-0.01, 0.00]	0.00	-1.97	.054
Physical activity $\times$ daylight hours	-0.01 [-0.02, 0.00]	0.01	-1.14	.274	-0.01 [-0.02, 0.00]	0.00	-1.39	.187
Daylight hours $\times$ Physical activity <sup>2</sup>	0.00 [-0.01, 0.00]	0.00	-0.82	.456	0.00 [-0.01, 0.00]	0.00	-1.01	.334
Sleep efficiency								
(Intercept)	0.16 [-0.12, 0.44]	0.14	1.13	.263	0.20 [-0.10, 0.50]	0.15	1.30	.201
Physical activity	0.07 [-0.05, 0.19]	0.06	1.14	.256	0.05 [-0.06, 0.15]	0.06	0.85	.398
Daylight hours	0.00 [-0.01, 0.02]	0.01	0.50	.617	0.00 [-0.01, 0.02]	0.01	0.26	.795
Physical activity <sup>2</sup>	0.00 [-0.04, 0.04]	0.02	-0.08	.939	-0.02 [-0.08, 0.05]	0.03	-0.53	.598
Age	0.00 [0.00, 0.01]	0.00	0.90	.379	0.00 [0.00, 0.01]	0.00	0.73	.479
Physical activity $\times$ daylight hours	0.00 [-0.01, 0.01]	0.00	-0.76	.448	0.00 [-0.01, 0.01]	0.00	-0.79	.432
Daylight hours $\times$ Physical activity <sup>2</sup>	0.00 [0.00, 0.00]	0.00	-0.14	.896	0.00 [0.00, 0.01]	0.00	0.39	.698
Sleep onset								
(Intercept)	-0.15 [-0.51, 0.22]	0.19	-0.79	.433	-0.12 [-0.46, 0.22]	0.17	-0.66	.507
Physical activity	-0.07 [-0.20, 0.05]	0.07	-1.12	.318	-0.12 [-0.20, -0.05]	0.04	-3.14	.003
Daylight hours	0.01 [0.00, 0.02]	0.00	2.24	.026	0.01 [0.00, 0.02]	0.01	1.72	.087
Physical activity <sup>2</sup>	-0.01 [-0.06, 0.04]	0.02	-0.43	.702	-0.03 [-0.07, 0.01]	0.02	-1.63	.103
Age	0.00 [0.00, 0.00]	0.00	0.10	.921	0.00 [0.00, 0.00]	0.00	-0.11	.912

Table 16 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]	0.01	0.38	.721	0.01 [0.00, 0.01]	0.00	1.82	.072
Daylight hours $\times$ Physical activity <sup>2</sup>	0.00 [0.00, 0.01]	0.00	0.44	.696	0.00 [0.00, 0.01]	0.00	1.70	.089
Sleep regularity								
(Intercept)	0.47 [0.13, 0.82]	0.17	2.71	.020	0.62 [0.28, 0.95]	0.17	3.61	.002
Physical activity	0.19 [-0.01, 0.38]	0.10	1.90	.120	0.21 [0.09, 0.33]	0.06	3.48	.002
Daylight hours	0.01 [0.00, 0.03]	0.01	1.74	.098	0.01 [-0.01, 0.02]	0.01	0.91	.366
Physical activity <sup>2</sup>	0.00 [-0.08, 0.09]	0.04	0.10	.931	-0.08 [-0.15, -0.02]	0.03	-2.47	.015
Age	0.00 [-0.01, 0.01]	0.00	0.16	.881	0.00 [-0.01, 0.01]	0.00	0.09	.930
Physical activity $\times$ daylight hours	-0.01 [-0.03, 0.01]	0.01	-0.74	.509	-0.01 [-0.02, 0.00]	0.00	-2.61	.014
Daylight hours $\times$ Physical activity <sup>2</sup>	0.00 [-0.01, 0.01]	0.00	-0.25	.825	0.01 [0.00, 0.01]	0.00	1.96	.052

*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)	1.34 [0.88, 1.80]	0.23	5.70	< .001	1.40 [1.14, 1.67]	0.14	10.32	< .001
Sleep duration	0.07 [-0.04, 0.19]	0.06	1.22	.266	0.05 [-0.04, 0.15]	0.05	1.10	.308
Daylight hours	0.02 [0.00, 0.03]	0.01	2.80	.005	0.00 [-0.01, 0.01]	0.01	-0.75	.458
Sleep duration <sup>2</sup>	0.01 [-0.04, 0.05]	0.02	0.31	.767	0.00 [-0.04, 0.03]	0.02	-0.15	.886
Age	-0.02 [-0.03, -0.02]	0.00	-7.49	< .001	-0.02 [-0.03, -0.02]	0.00	-9.90	< .001
Sleep duration × daylight hours	-0.01 [-0.02, 0.00]	0.00	-1.19	.278	0.00 [-0.01, 0.00]	0.00	-0.86	.420
Daylight hours × Sleep duration <sup>2</sup>	0.00 [0.00, 0.00]	0.00	-0.32	.754	0.00 [0.00, 0.00]	0.00	0.17	.867
Sleep efficiency								
(Intercept)	1.33 [0.86, 1.80]	0.24	5.55	< .001	1.41 [1.12, 1.69]	0.15	9.61	< .001
Sleep efficiency	0.04 [-0.06, 0.14]	0.05	0.86	.404	0.03 [-0.08, 0.13]	0.05	0.54	.607
Daylight hours	0.02 [0.01, 0.03]	0.01	3.02	.003	0.00 [-0.01, 0.01]	0.00	-0.81	.421
Sleep efficiency <sup>2</sup>	0.00 [-0.04, 0.04]	0.02	-0.07	.950	-0.01 [-0.04, 0.02]	0.01	-0.62	.560
Age	-0.02 [-0.03, -0.02]	0.00	-7.37	< .001	-0.02 [-0.03, -0.02]	0.00	-9.85	< .001
Sleep efficiency × daylight hours	0.00 [-0.01, 0.01]	0.00	-0.82	.436	0.00 [-0.01, 0.01]	0.00	-0.49	.640
Daylight hours × Sleep efficiency <sup>2</sup>	0.00 [0.00, 0.00]	0.00	0.00	.999	0.00 [0.00, 0.00]	0.00	0.57	.589
Sleep onset								
(Intercept)	1.34 [0.87, 1.80]	0.24	5.62	< .001	1.42 [1.11, 1.72]	0.16	9.15	< .001
Sleep onset	-0.06 [-0.20, 0.08]	0.07	-0.82	.443	-0.06 [-0.14, 0.02]	0.04	-1.38	.168
Daylight hours	0.02 [0.00, 0.03]	0.01	2.81	.005	0.00 [-0.01, 0.00]	0.01	-0.98	.325
Sleep onset <sup>2</sup>	0.00 [-0.06, 0.06]	0.03	0.03	.980	-0.01 [-0.06, 0.05]	0.03	-0.25	.808
Age	-0.02 [-0.03, -0.02]	0.00	-7.41	< .001	-0.02 [-0.03, -0.02]	0.00	-9.77	< .001

Term	Physical Activity Volume				Physical Activity Intensity			
	$\beta$ [95% CI]	SE	t	p	$\beta$ [95% CI]	SE	t	p
Sleep onset × daylight hours	0.00 [-0.01, 0.01]	0.01	0.44	.675	0.00 [0.00, 0.01]	0.00	1.26	.208
Daylight hours × Sleep onset <sup>2</sup>	0.00 [-0.01, 0.01]	0.00	-0.12	.910	0.00 [0.00, 0.00]	0.00	0.17	.866
Sleep regularity								
(Intercept)	1.28 [0.83, 1.73]	0.23	5.60	< .001	1.37 [1.09, 1.66]	0.15	9.39	< .001
Sleep regularity	0.13 [0.06, 0.20]	0.04	3.44	.001	0.12 [0.05, 0.19]	0.03	3.49	.001
Daylight hours	0.02 [0.00, 0.03]	0.01	2.81	.006	0.00 [-0.01, 0.01]	0.01	-0.56	.575
Sleep regularity <sup>2</sup>	0.01 [-0.03, 0.05]	0.02	0.54	.589	0.01 [-0.03, 0.05]	0.02	0.37	.718
Age	-0.02 [-0.03, -0.02]	0.00	-7.30	< .001	-0.02 [-0.03, -0.02]	0.00	-9.84	< .001
Sleep regularity × daylight hours	-0.01 [-0.01, 0.00]	0.00	-1.67	.096	-0.01 [-0.01, 0.00]	0.00	-2.77	.007
Daylight hours × Sleep regularity <sup>2</sup>	0.00 [0.00, 0.00]	0.00	-0.73	.464	0.00 [0.00, 0.00]	0.00	-0.52	.615

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

Table 18

*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)	0.71 [0.45, 0.97]	0.13	5.28	< .001	0.66 [0.40, 0.92]	0.13	4.97	< .001
Physical activity	0.07 [0.01, 0.12]	0.03	2.49	.035	0.05 [0.01, 0.09]	0.02	2.48	.013
Wrist	-0.59 [-0.86, -0.32]	0.14	-4.24	< .001	-0.55 [-0.82, -0.29]	0.14	-4.07	< .001
Physical activity <sup>2</sup>	-0.01 [-0.04, 0.02]	0.02	-0.51	.623	0.00 [-0.03, 0.02]	0.01	-0.17	.865
Age	0.00 [-0.01, 0.00]	0.00	-2.39	.020	0.00 [-0.01, 0.00]	0.00	-2.14	.034
Physical activity × wrist	-0.02 [-0.08, 0.04]	0.03	-0.66	.529	0.01 [-0.04, 0.06]	0.02	0.43	.671
Wrist × Physical activity <sup>2</sup>	0.01 [-0.02, 0.04]	0.02	0.46	.656	0.00 [-0.03, 0.03]	0.02	0.21	.831
Sleep efficiency								
(Intercept)	-0.30 [-0.46, -0.13]	0.08	-3.50	.002	-0.34 [-0.51, -0.17]	0.09	-3.95	.001
Physical activity	0.12 [0.07, 0.17]	0.03	4.62	.001	0.04 [0.00, 0.09]	0.02	1.86	.069
Wrist	0.68 [0.55, 0.82]	0.07	9.92	< .001	0.75 [0.60, 0.91]	0.08	9.48	< .001
Physical activity <sup>2</sup>	-0.01 [-0.05, 0.03]	0.02	-0.45	.678	-0.01 [-0.05, 0.03]	0.02	-0.27	.793
Age	0.00 [0.00, 0.00]	0.00	0.97	.335	0.00 [0.00, 0.00]	0.00	0.67	.508
Physical activity × wrist	-0.13 [-0.18, -0.08]	0.02	-5.36	< .001	-0.06 [-0.11, -0.02]	0.02	-2.58	.010
Wrist × Physical activity <sup>2</sup>	0.01 [-0.04, 0.05]	0.02	0.36	.735	-0.01 [-0.05, 0.03]	0.02	-0.39	.707
Sleep onset								
(Intercept)	-0.97 [-1.43, -0.52]	0.23	-4.20	< .001	-0.95 [-1.40, -0.51]	0.23	-4.21	< .001
Physical activity	-0.01 [-0.04, 0.03]	0.02	-0.38	.710	-0.03 [-0.06, 0.00]	0.01	-2.09	.037
Wrist	1.17 [0.72, 1.62]	0.23	5.09	< .001	1.16 [0.71, 1.60]	0.23	5.04	< .001
Physical activity <sup>2</sup>	0.00 [-0.02, 0.02]	0.01	-0.15	.886	0.00 [-0.02, 0.02]	0.01	-0.23	.819
Age	0.00 [0.00, 0.00]	0.00	0.26	.795	0.00 [0.00, 0.00]	0.00	0.01	.991

Table 18 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	[-0.09, -0.01]	0.02	-2.35	.047	-0.04	[-0.08, 0.00]	0.02	-2.18	.035
Wrist $\times$ Physical activity <sup>2</sup>	0.00	[-0.02, 0.03]	0.01	0.15	.885	0.00	[-0.03, 0.03]	0.01	-0.05	.962
Sleep regularity										
(Intercept)	0.41	[0.09, 0.73]	0.16	2.51	.015	0.35	[0.02, 0.69]	0.17	2.08	.042
Physical activity	0.16	[0.12, 0.20]	0.02	7.66	< .001	0.16	[0.11, 0.21]	0.02	6.78	< .001
Wrist	0.35	[0.01, 0.70]	0.18	2.01	.051	0.49	[0.16, 0.83]	0.17	2.90	.004
Physical activity <sup>2</sup>	-0.04	[-0.09, 0.01]	0.03	-1.68	.186	-0.07	[-0.11, -0.04]	0.02	-3.90	.004
Age	0.00	[-0.01, 0.01]	0.00	-0.22	.835	0.00	[-0.01, 0.00]	0.00	-0.44	.678
Physical activity $\times$ wrist	-0.09	[-0.17, -0.01]	0.04	-2.25	.083	-0.13	[-0.19, -0.08]	0.03	-4.55	< .001
Wrist $\times$ Physical activity <sup>2</sup>	0.04	[-0.01, 0.09]	0.02	1.68	.176	0.06	[0.02, 0.10]	0.02	2.91	.018

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

Table 19

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

Term	Physical Activity Volume				Physical Activity Intensity			
	$\beta$ [95% CI]	SE	t	p	$\beta$ [95% CI]	SE	t	p
Sleep duration								
(Intercept)	0.41 [-0.15, 0.97]	0.29	1.42	.157	1.05 [0.70, 1.40]	0.18	5.87	< .001
Sleep duration	-0.01 [-0.02, 0.01]	0.01	-0.59	.563	0.01 [-0.01, 0.02]	0.01	1.09	.277
Wrist	1.39 [0.81, 1.97]	0.30	4.66	< .001	0.40 [0.06, 0.74]	0.17	2.31	.021
Sleep duration <sup>2</sup>	0.00 [0.00, 0.00]	0.00	-0.13	.901	0.00 [0.00, 0.00]	0.00	0.67	.506
Age	-0.02 [-0.03, -0.02]	0.00	-7.94	< .001	-0.02 [-0.03, -0.02]	0.00	-10.06	< .001
Sleep duration × wrist	0.01 [-0.01, 0.03]	0.01	0.91	.360	0.01 [-0.01, 0.03]	0.01	0.73	.470
Wrist × Sleep duration <sup>2</sup>	-0.01 [-0.04, 0.01]	0.01	-0.79	.503	0.00 [-0.01, 0.01]	0.01	-0.79	.479
Sleep efficiency								
(Intercept)	0.42 [-0.15, 0.98]	0.29	1.45	.149	1.07 [0.72, 1.42]	0.18	5.96	< .001
Sleep efficiency	0.01 [-0.02, 0.03]	0.01	0.55	.605	0.01 [0.00, 0.02]	0.01	1.42	.155
Wrist	1.39 [0.80, 1.97]	0.30	4.63	< .001	0.39 [0.04, 0.74]	0.18	2.21	.027
Sleep efficiency <sup>2</sup>	0.00 [0.00, 0.00]	0.00	-0.24	.818	0.00 [0.00, 0.00]	0.00	0.00	.998
Age	-0.02 [-0.03, -0.02]	0.00	-7.79	< .001	-0.02 [-0.03, -0.02]	0.00	-10.00	< .001
Sleep efficiency × wrist	-0.02 [-0.05, 0.01]	0.01	-1.49	.141	-0.02 [-0.04, 0.00]	0.01	-1.60	.113
Wrist × Sleep efficiency <sup>2</sup>	-0.01 [-0.02, 0.01]	0.01	-0.71	.525	0.00 [-0.01, 0.02]	0.01	0.29	.790
Sleep onset								
(Intercept)	0.40 [-0.16, 0.96]	0.29	1.41	.161	1.06 [0.71, 1.41]	0.18	5.90	< .001
Sleep onset	0.01 [-0.06, 0.07]	0.03	0.24	.814	0.00 [-0.07, 0.06]	0.03	-0.14	.887
Wrist	1.39 [0.81, 1.98]	0.30	4.69	< .001	0.39 [0.05, 0.74]	0.17	2.26	.024
Sleep onset <sup>2</sup>	0.01 [-0.03, 0.05]	0.02	0.46	.649	-0.01 [-0.05, 0.04]	0.02	-0.26	.803
Age	-0.02 [-0.03, -0.02]	0.00	-7.88	< .001	-0.02 [-0.03, -0.02]	0.00	-10.08	< .001

Table 19 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 [-0.12, 0.03]	0.04	-1.18	.242	0.00 [-0.08, 0.07]	0.04	-0.10	.921
Wrist × Sleep onset <sup>2</sup>	-0.01 [-0.05, 0.03]	0.02	-0.44	.664	0.01 [-0.04, 0.05]	0.02	0.25	.807
Sleep regularity								
(Intercept)	0.38 [-0.16, 0.93]	0.28	1.37	.172	1.05 [0.70, 1.40]	0.18	5.88	< .001
Sleep regularity	0.07 [0.04, 0.10]	0.02	4.39	< .001	0.06 [0.04, 0.09]	0.01	5.16	< .001
Wrist	1.35 [0.78, 1.93]	0.29	4.61	< .001	0.40 [0.05, 0.74]	0.18	2.26	.024
Sleep regularity <sup>2</sup>	0.00 [-0.02, 0.01]	0.01	-0.38	.705	0.01 [-0.01, 0.02]	0.01	0.97	.338
Age	-0.02 [-0.03, -0.02]	0.00	-7.89	< .001	-0.02 [-0.03, -0.02]	0.00	-10.23	< .001
Sleep regularity × wrist	0.00 [-0.03, 0.04]	0.02	0.20	.842	-0.05 [-0.08, -0.03]	0.01	-3.78	.001
Wrist × Sleep regularity <sup>2</sup>	0.00 [-0.02, 0.02]	0.01	-0.27	.790	-0.01 [-0.03, 0.01]	0.01	-1.04	.347

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

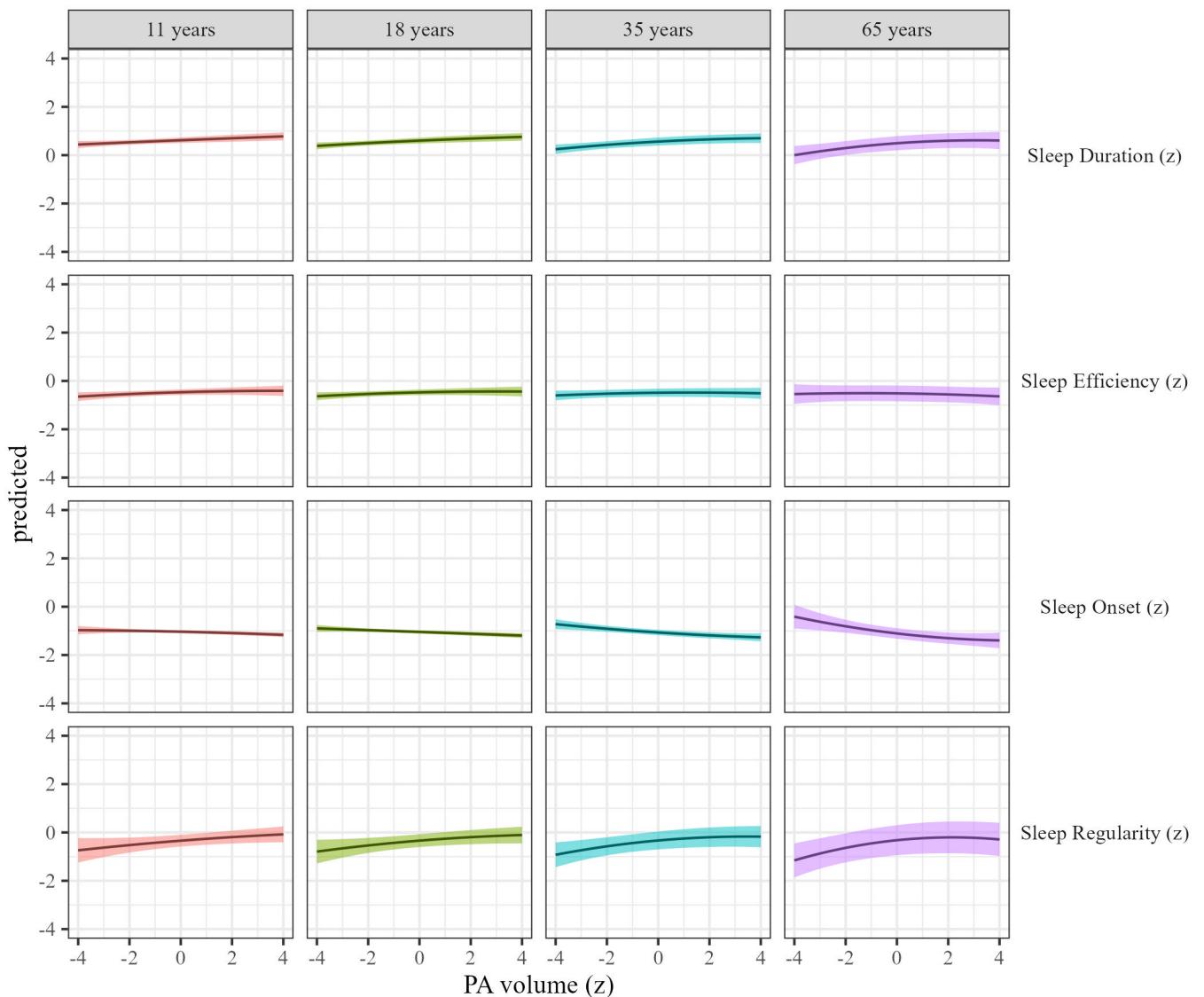


Figure 1. Sleep metrics on Physical activity volume

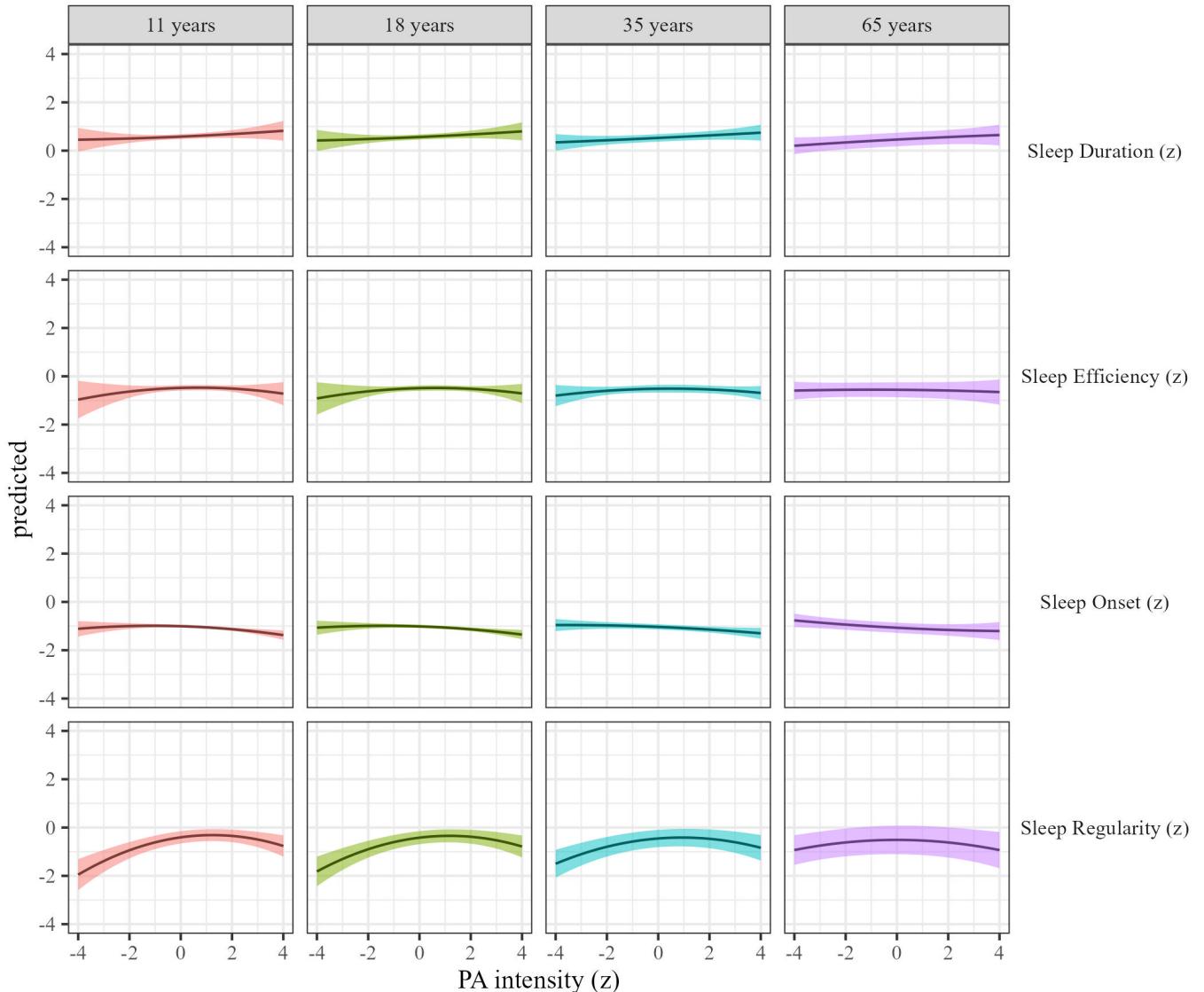


Figure 2. Sleep metrics on Physical activity intensity

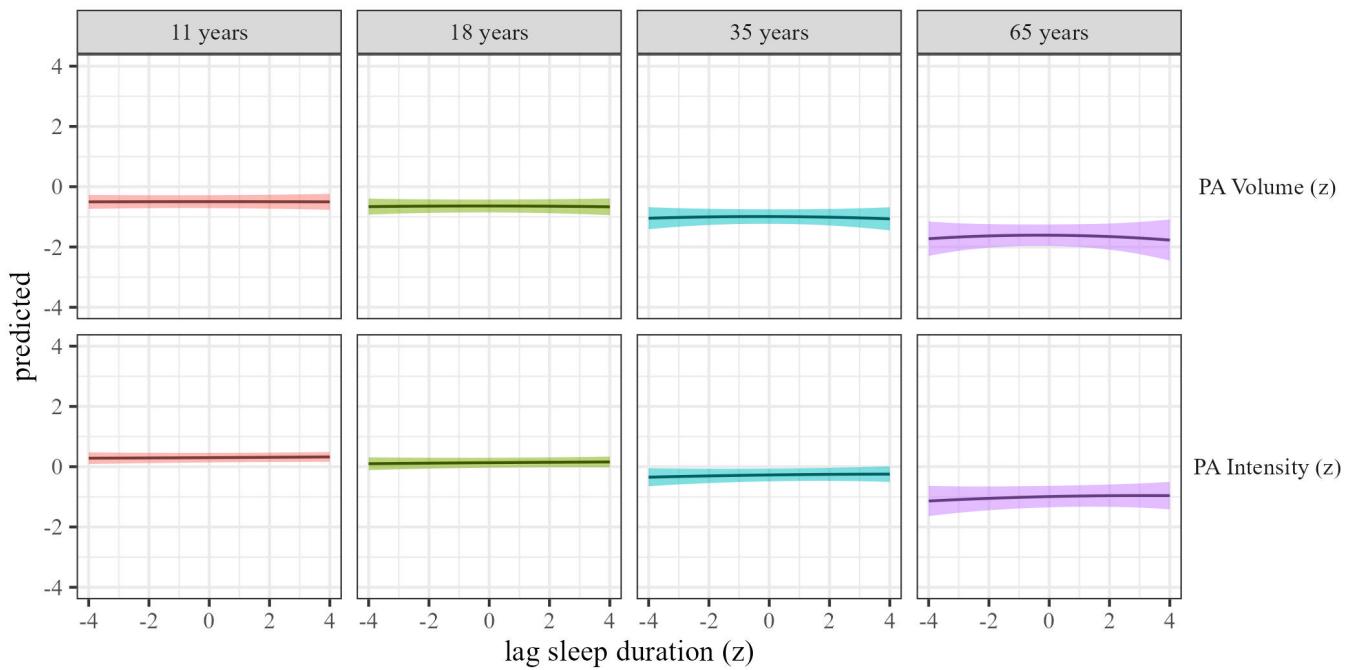


Figure 3. Physical activity by sleep duration

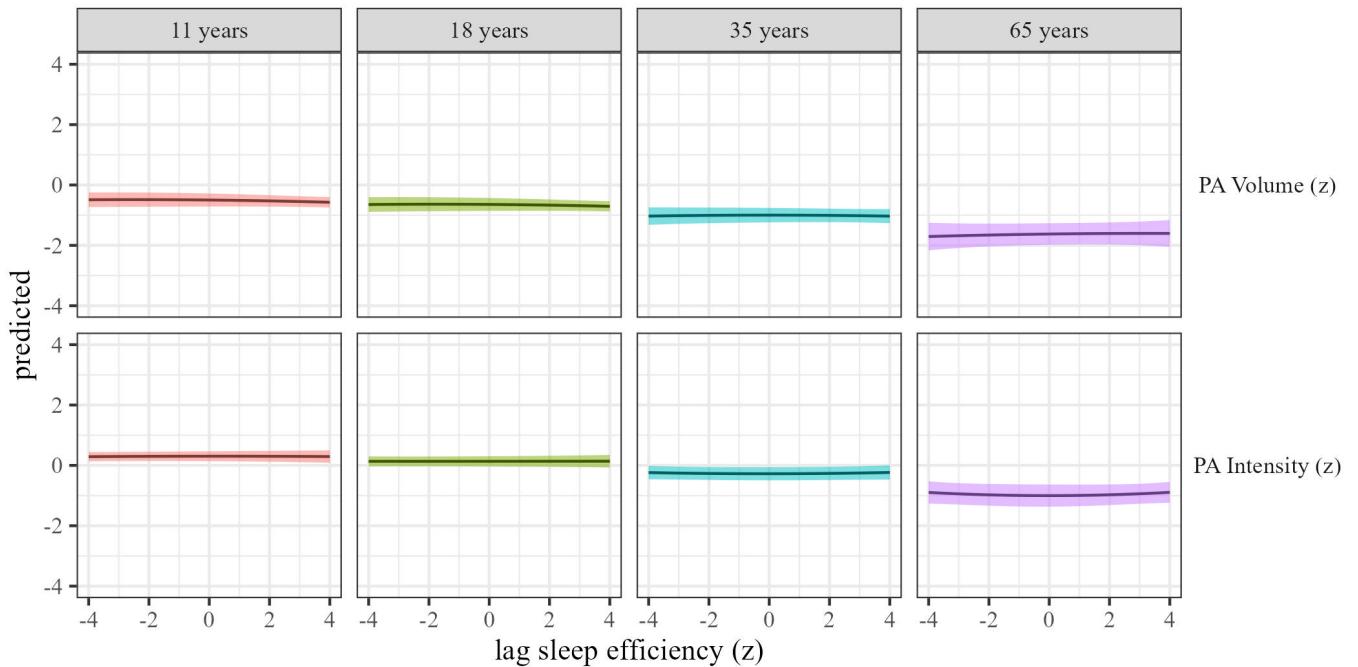


Figure 4. Physical activity by sleep efficiency

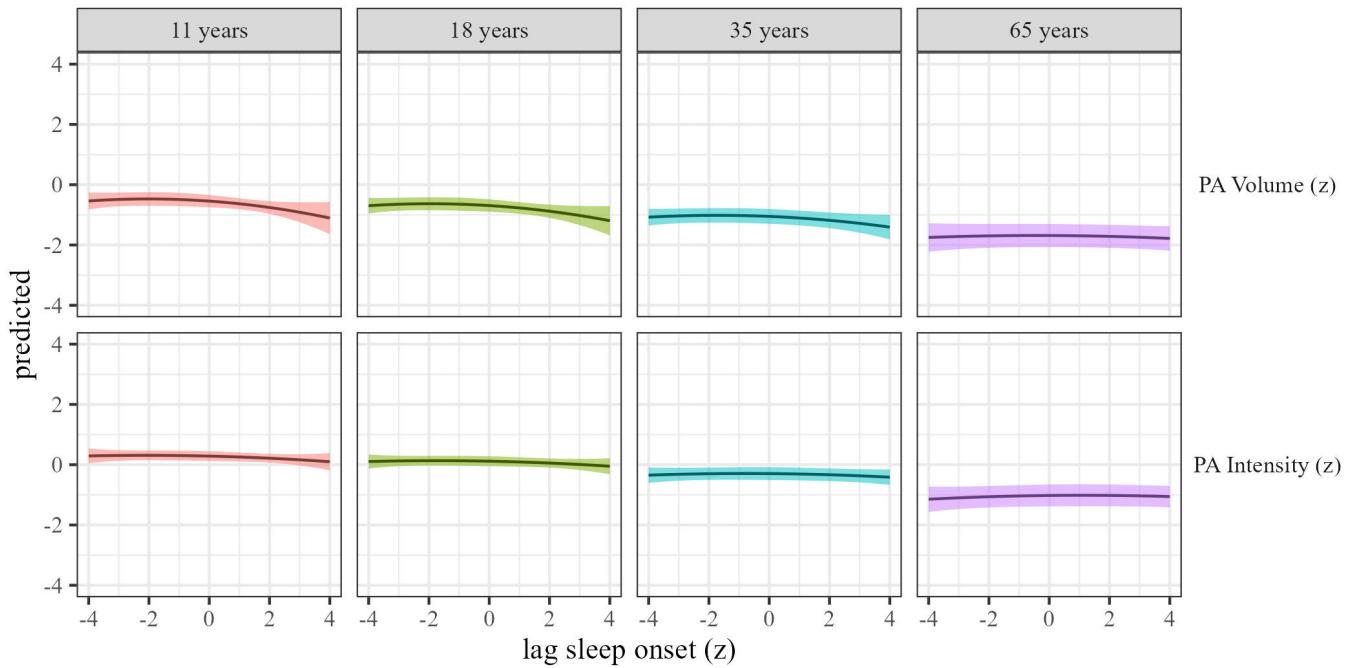


Figure 5. Physical activity by sleep onset

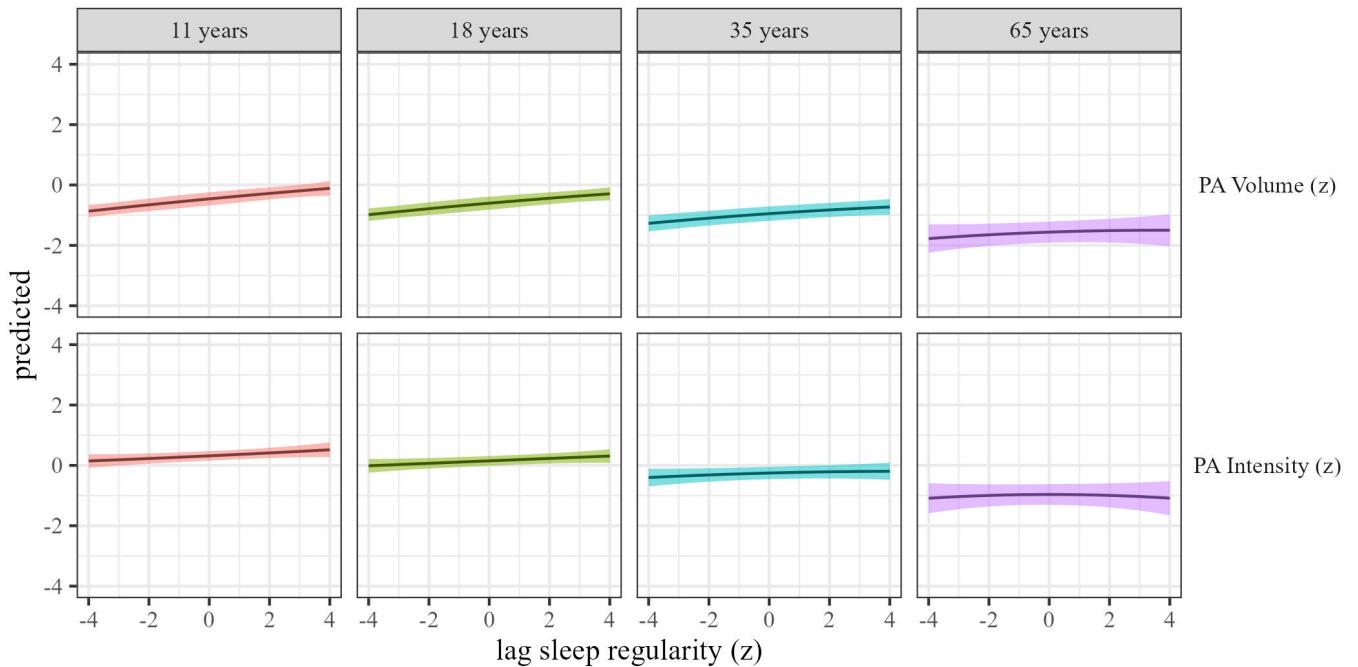


Figure 6. Physical activity by sleep regularity

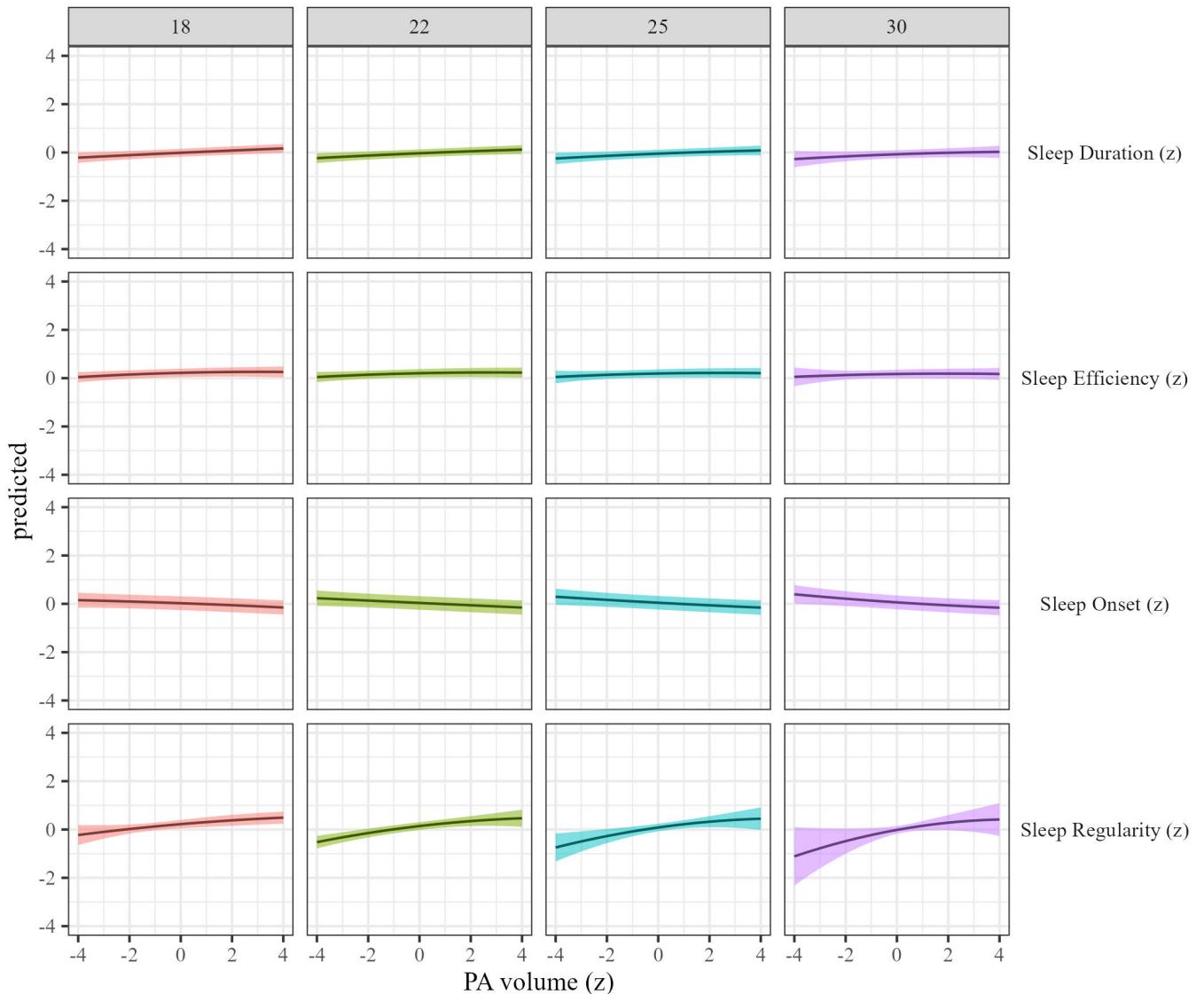


Figure 7. Sleep metrics on Physical activity volume by BMI

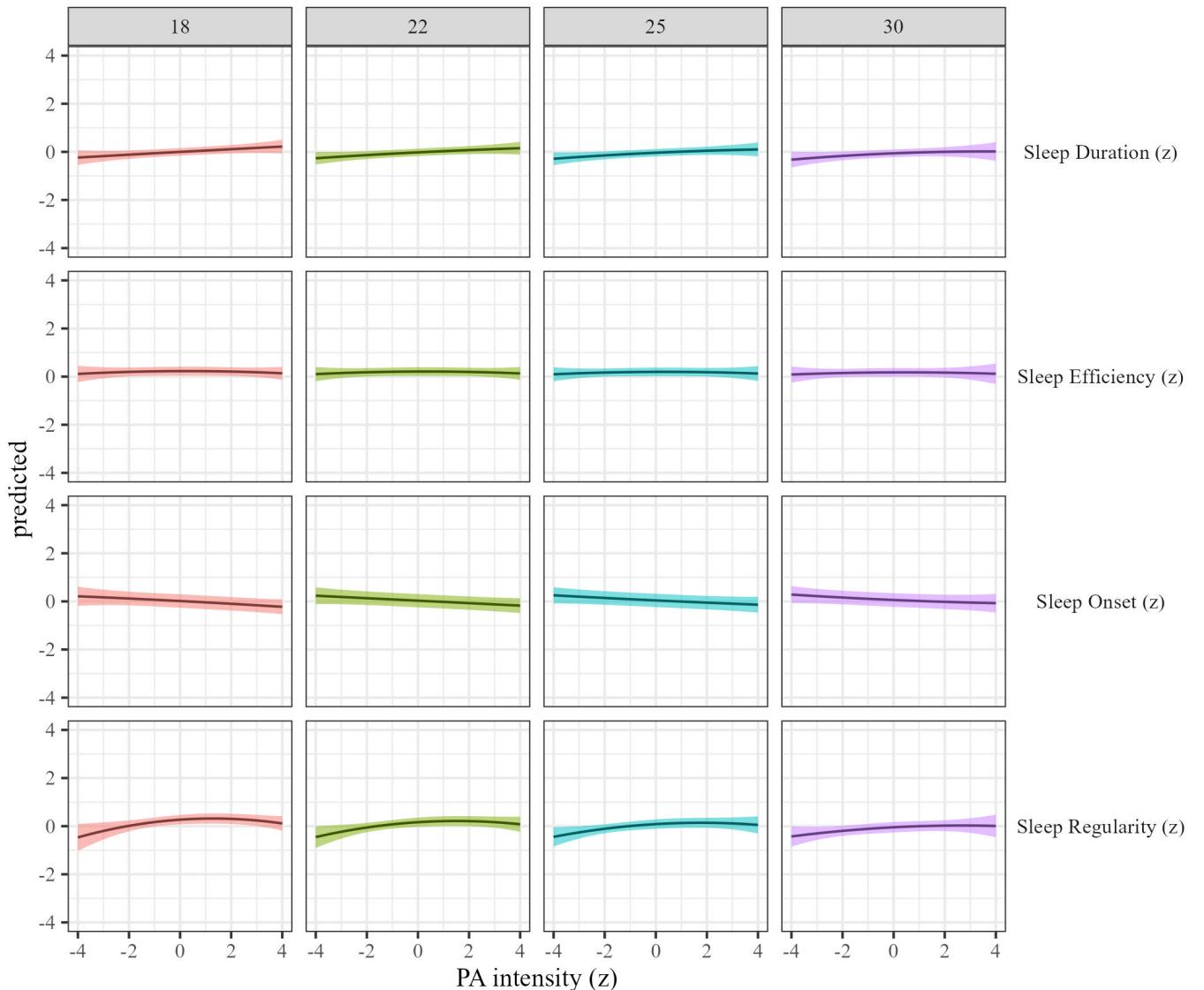


Figure 8. Sleep metrics on Physical activity intensity moderated by BMI

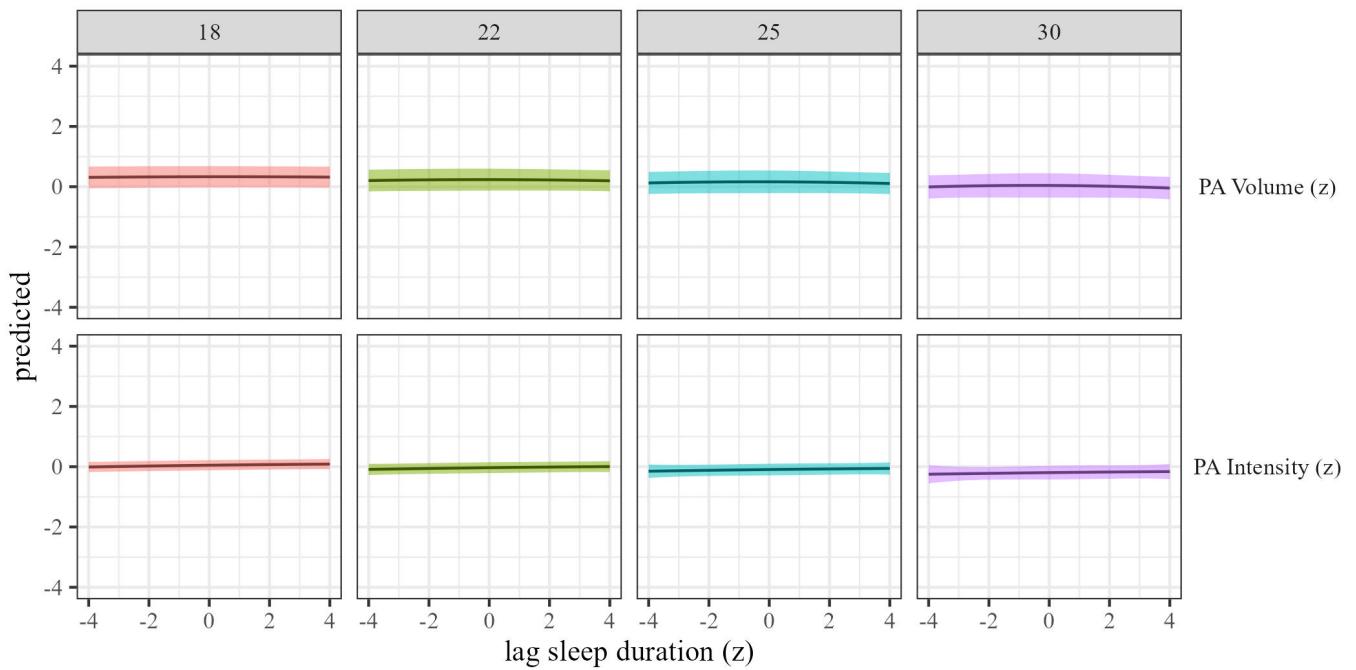


Figure 9. Physical activity by sleep duration moderated by BMI

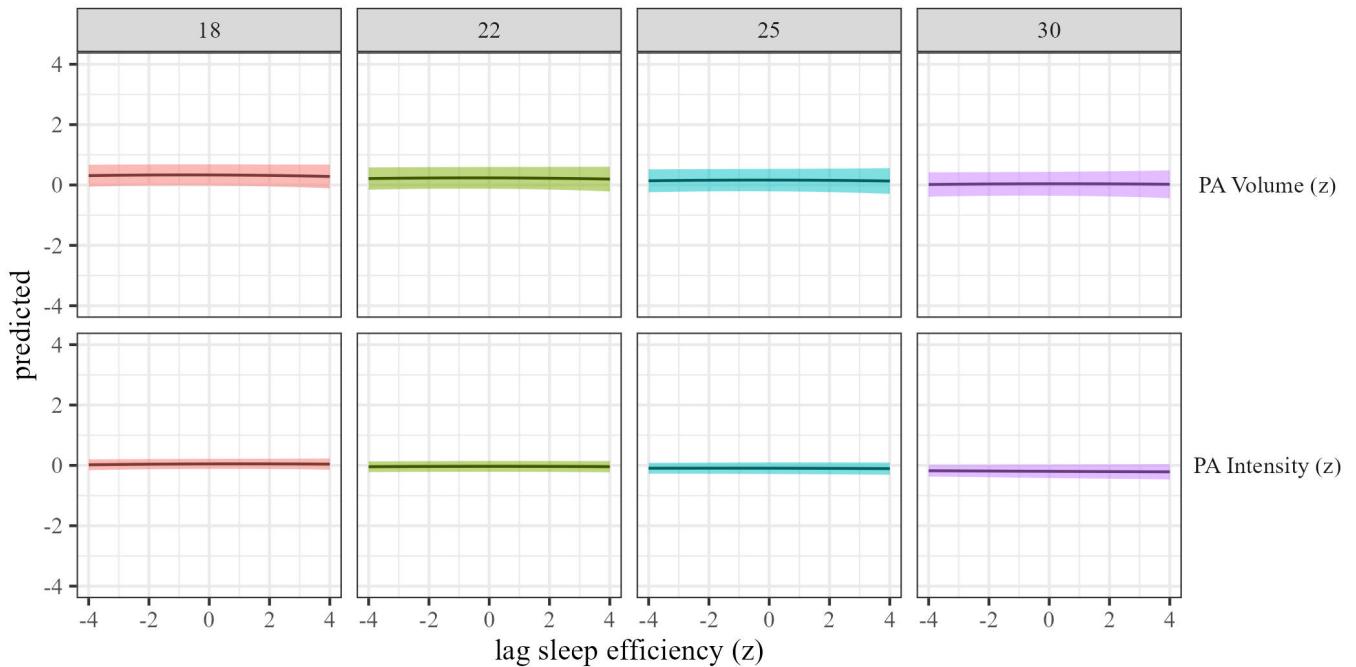


Figure 10. Physical activity by sleep efficiency moderated by BMI

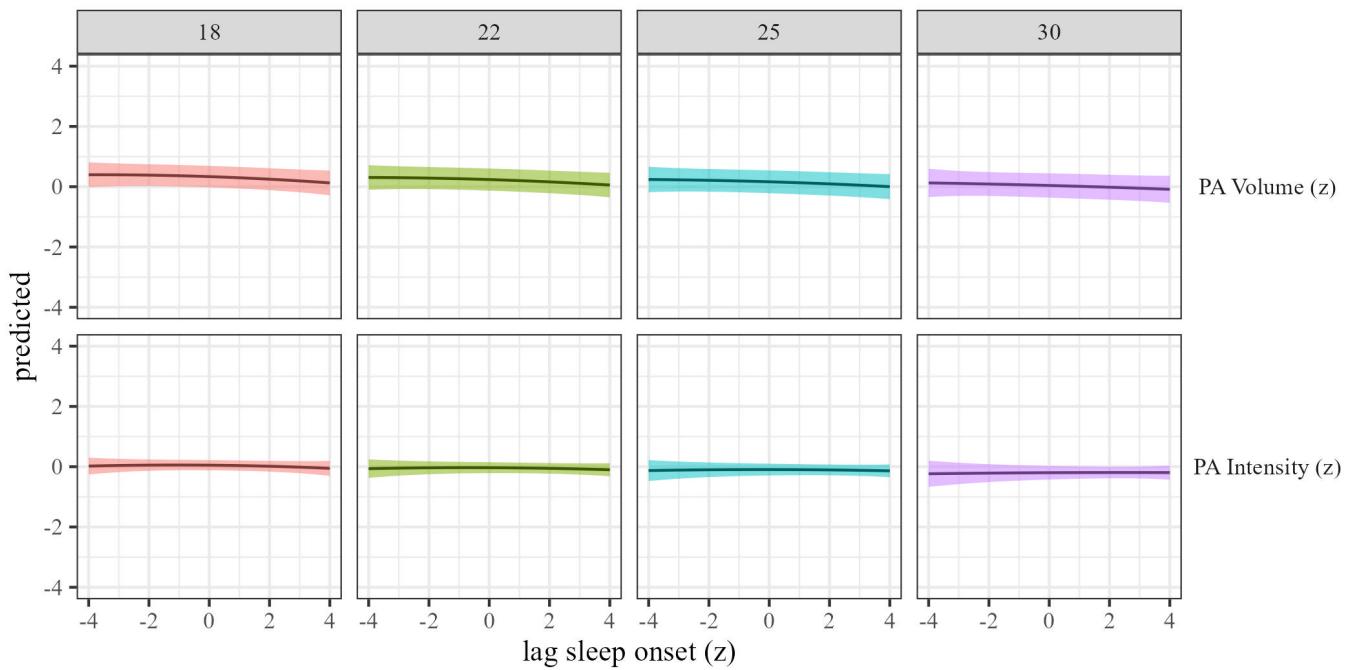


Figure 11. Physical activity by sleep onset moderated by BMI

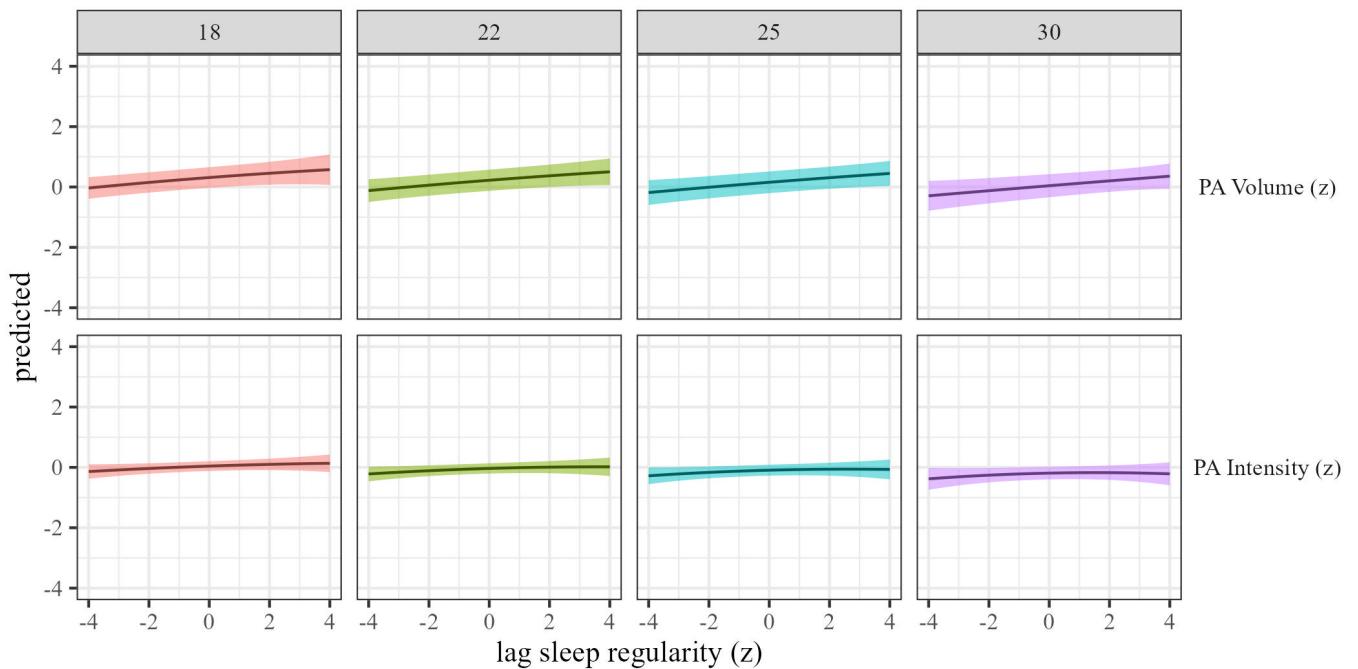


Figure 12. Physical activity by sleep regularity moderated by BMI

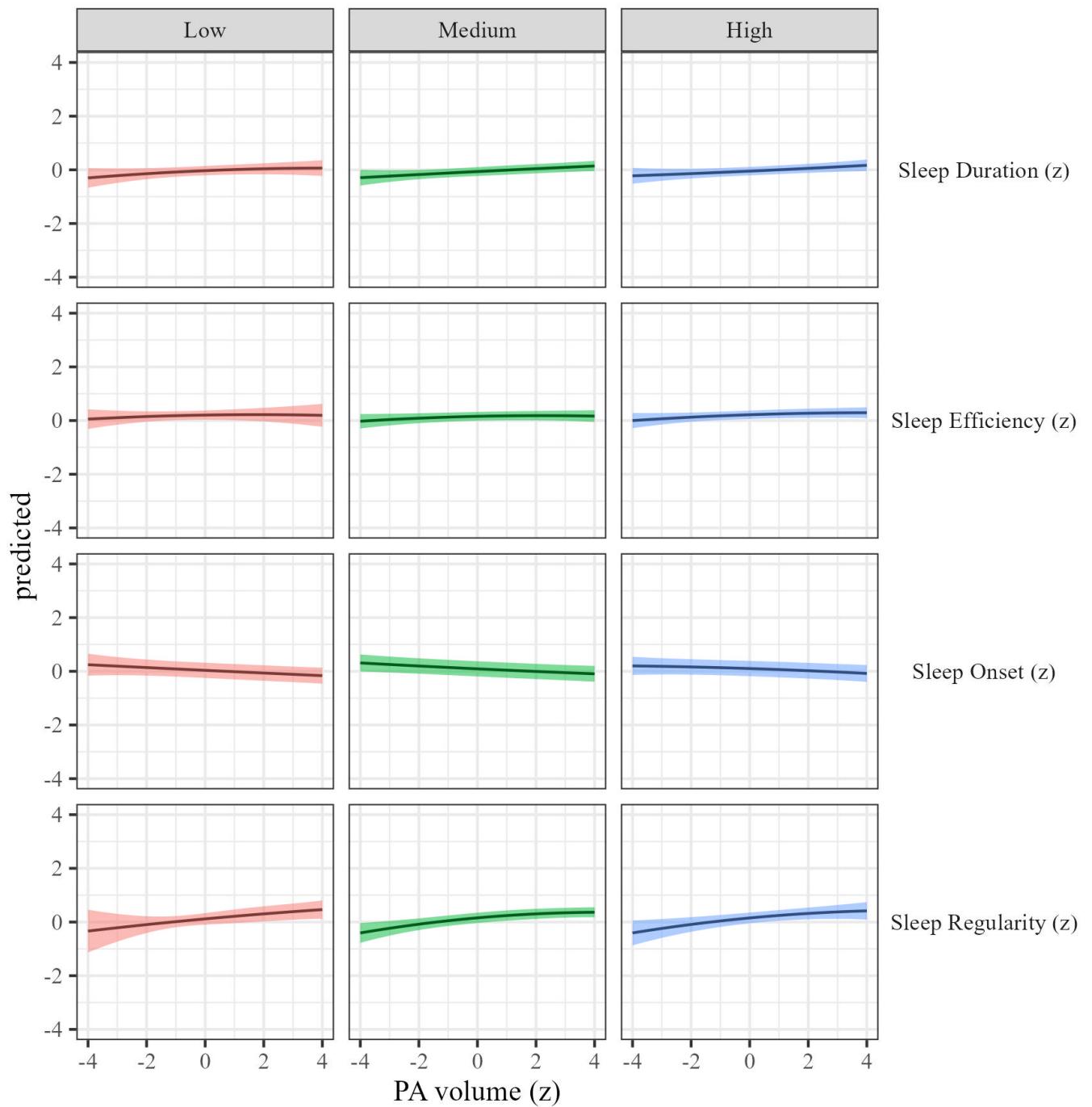


Figure 13. Sleep metrics on Physical activity volume by SES

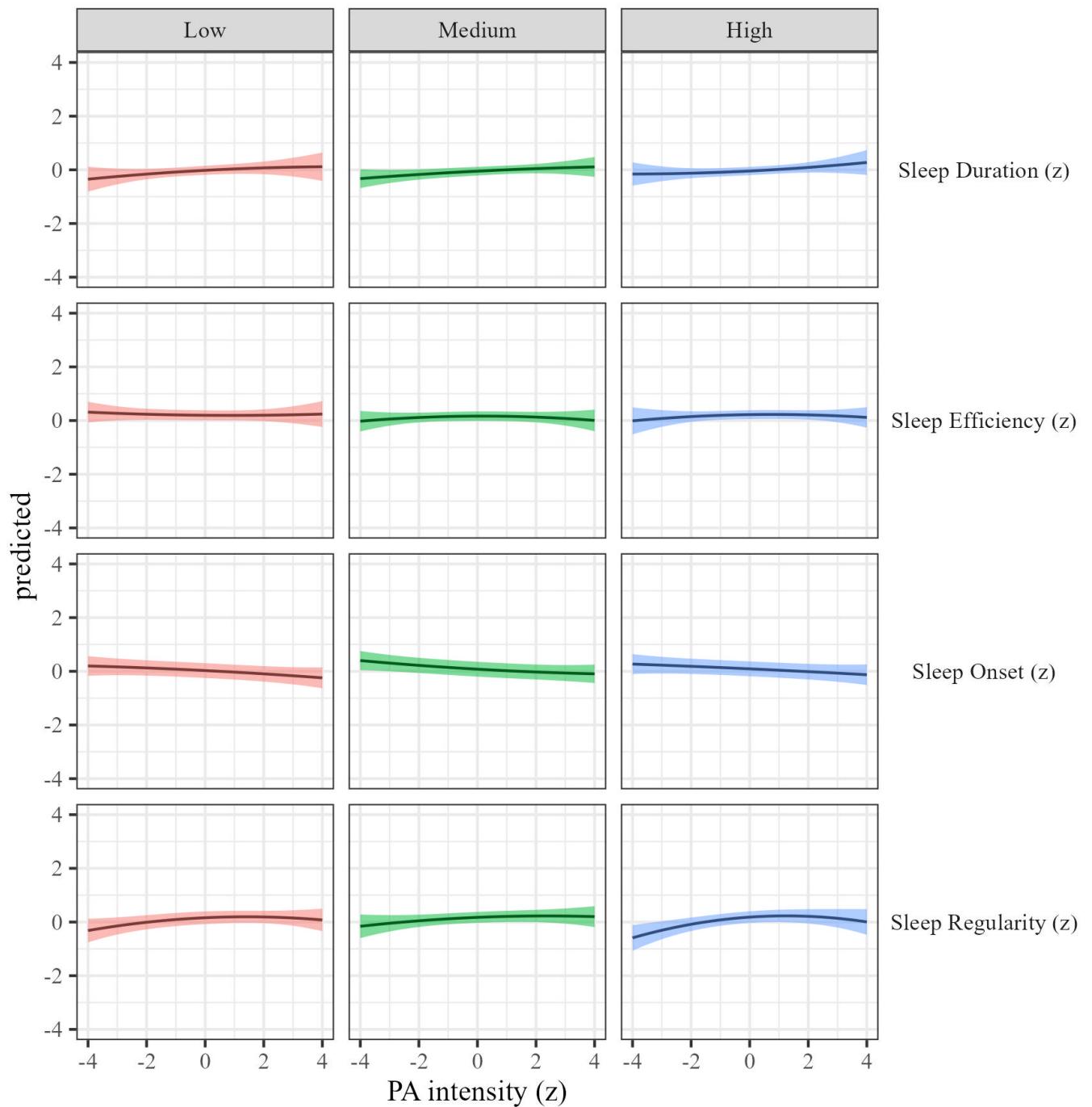


Figure 14. Sleep metrics on Physical activity intensity moderated by SES

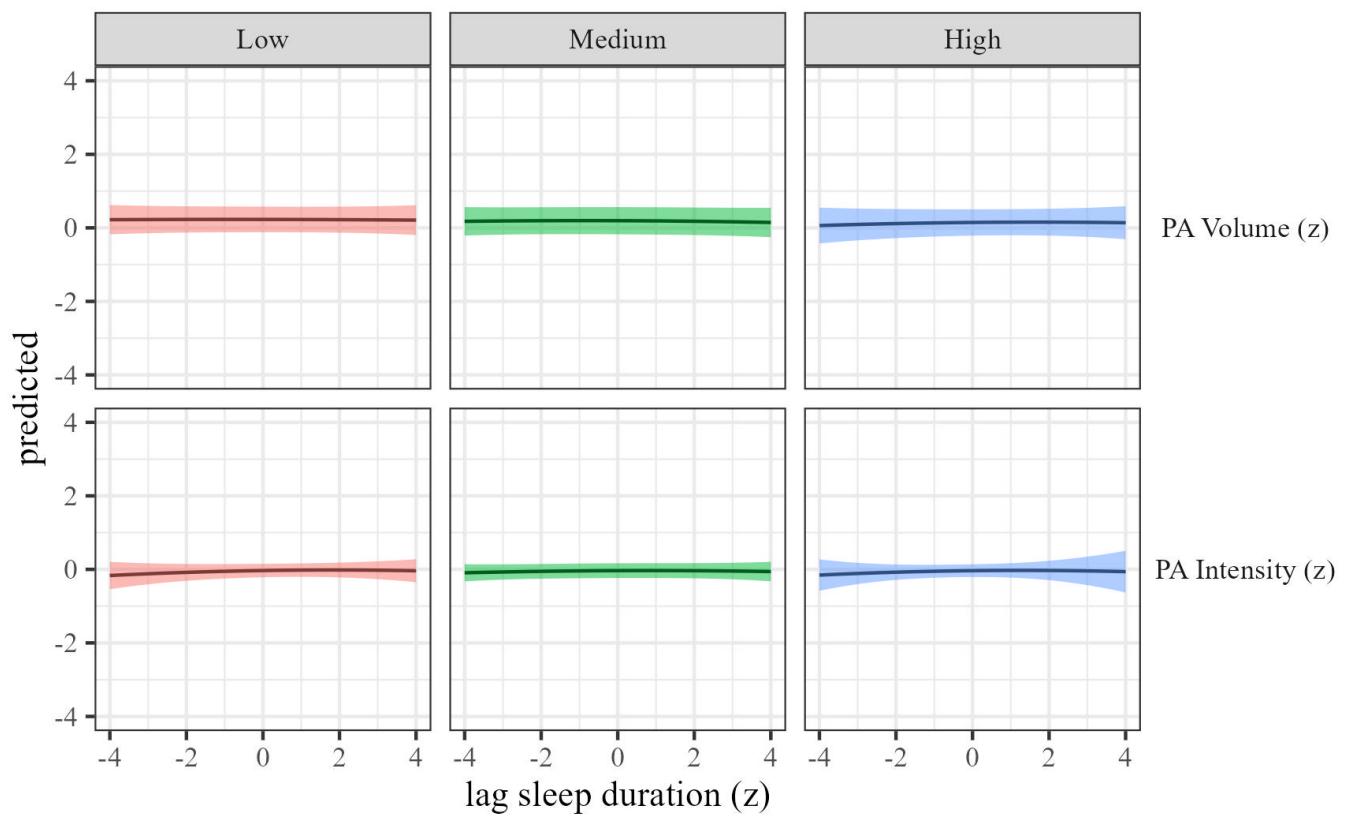


Figure 15. Physical activity by sleep duration moderated by SES

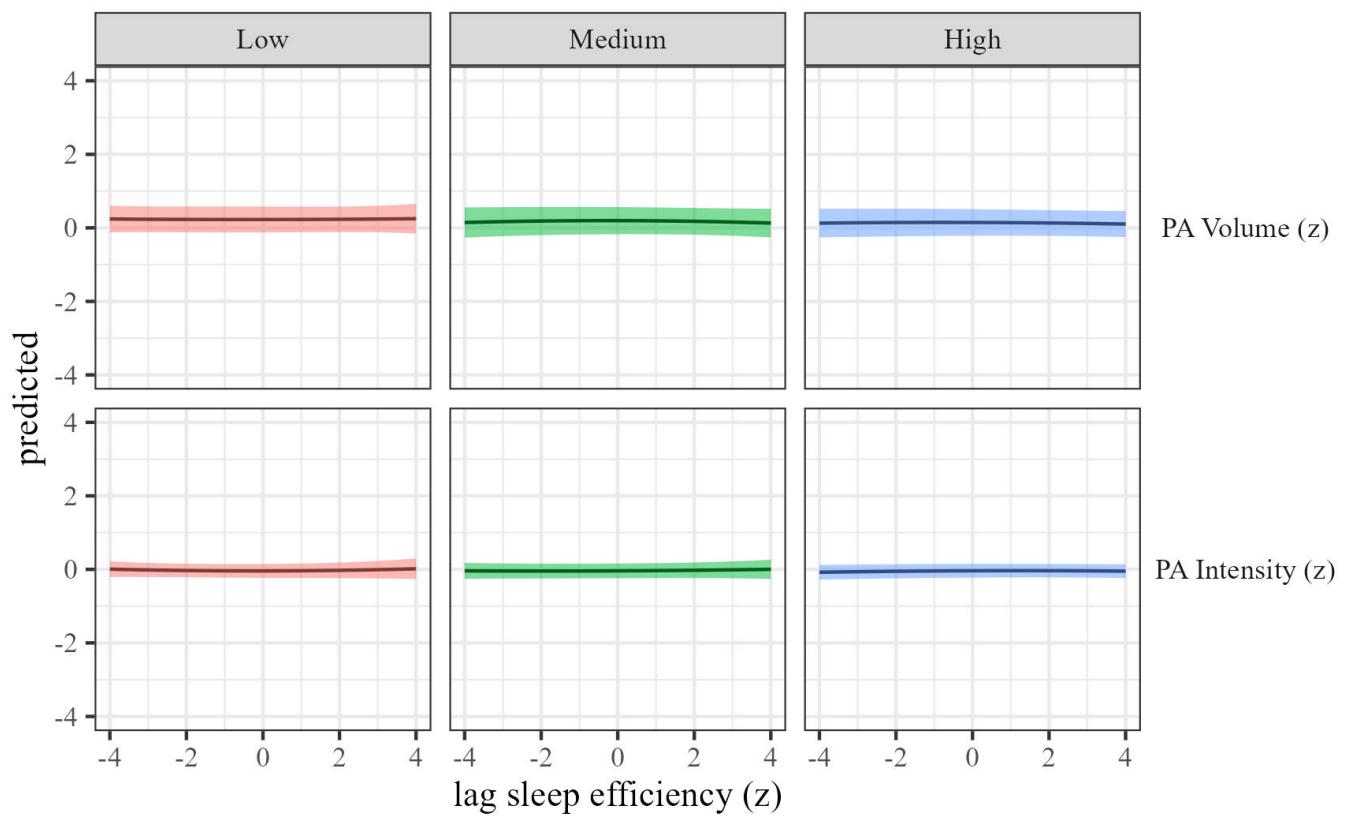


Figure 16. Physical activity by sleep efficiency moderated by SES

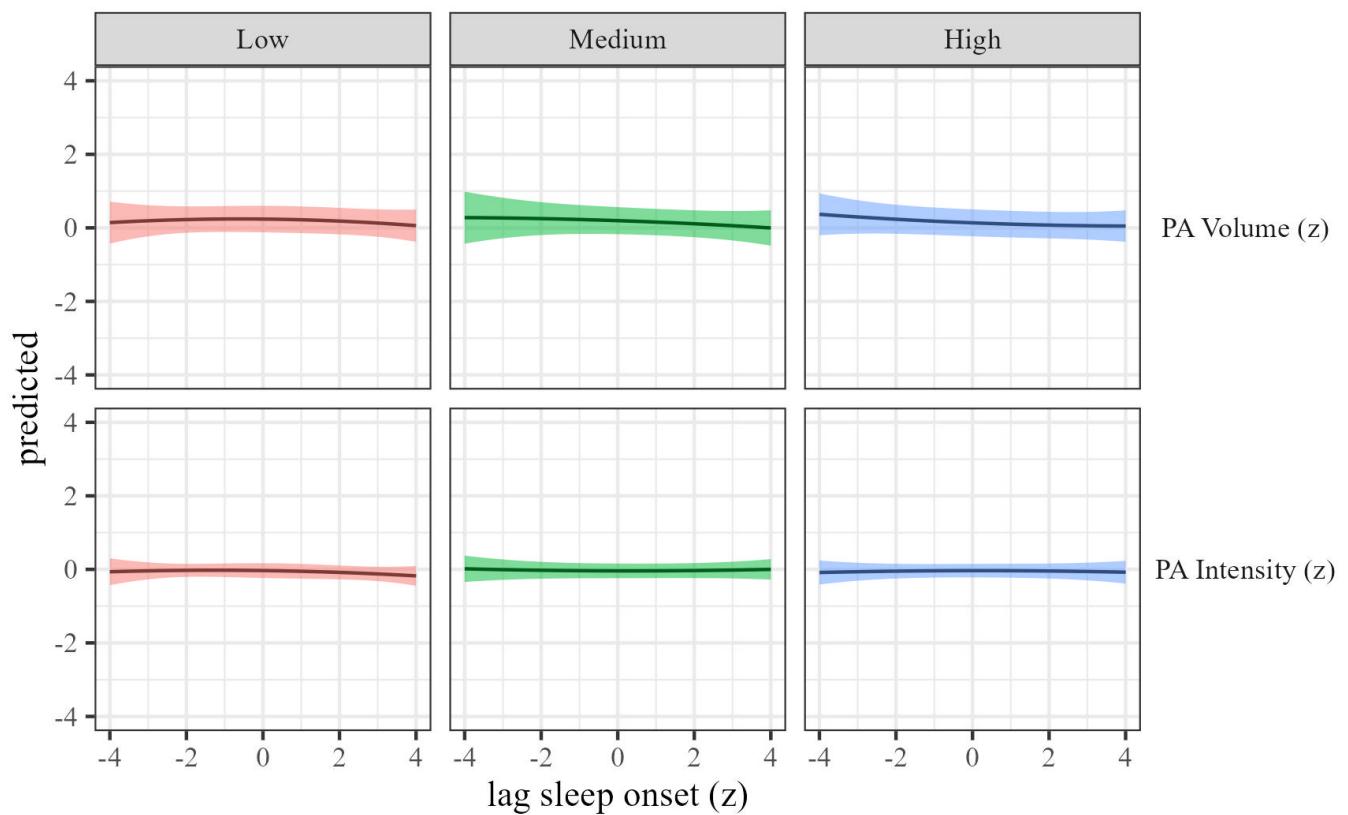


Figure 17. Physical activity by sleep onset moderated by SES

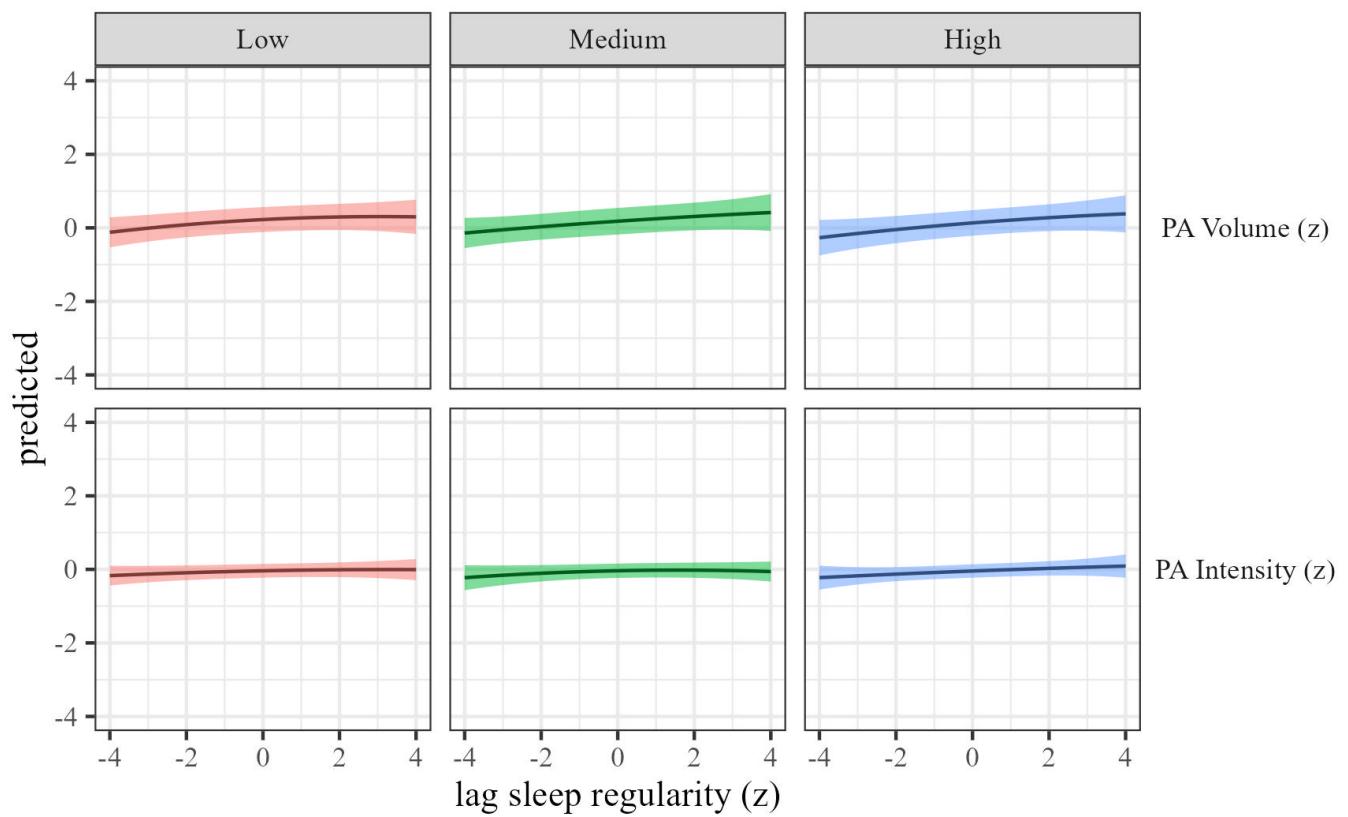


Figure 18. Physical activity by sleep regularity moderated by SES

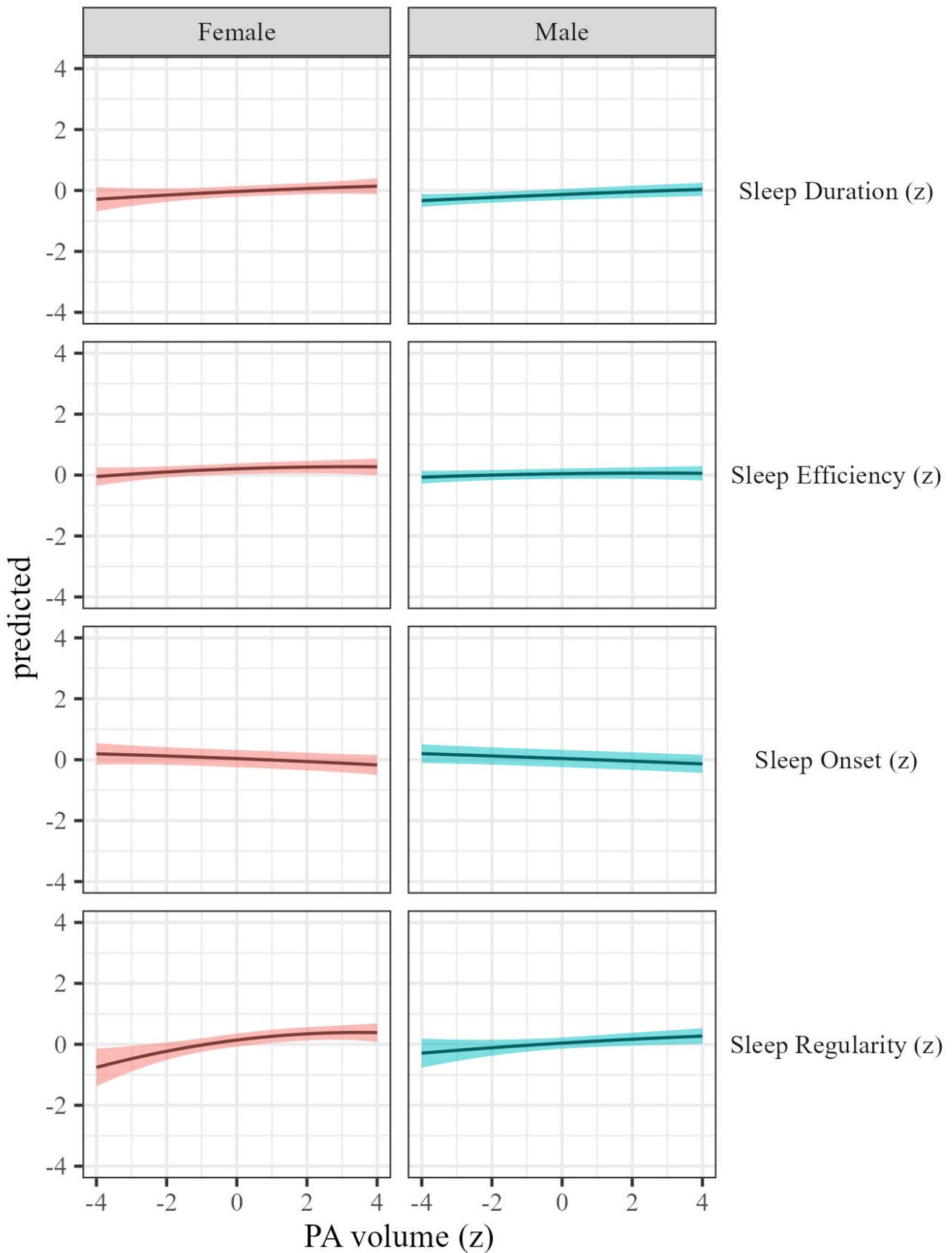


Figure 19. Sleep metrics on Physical activity volume by sex

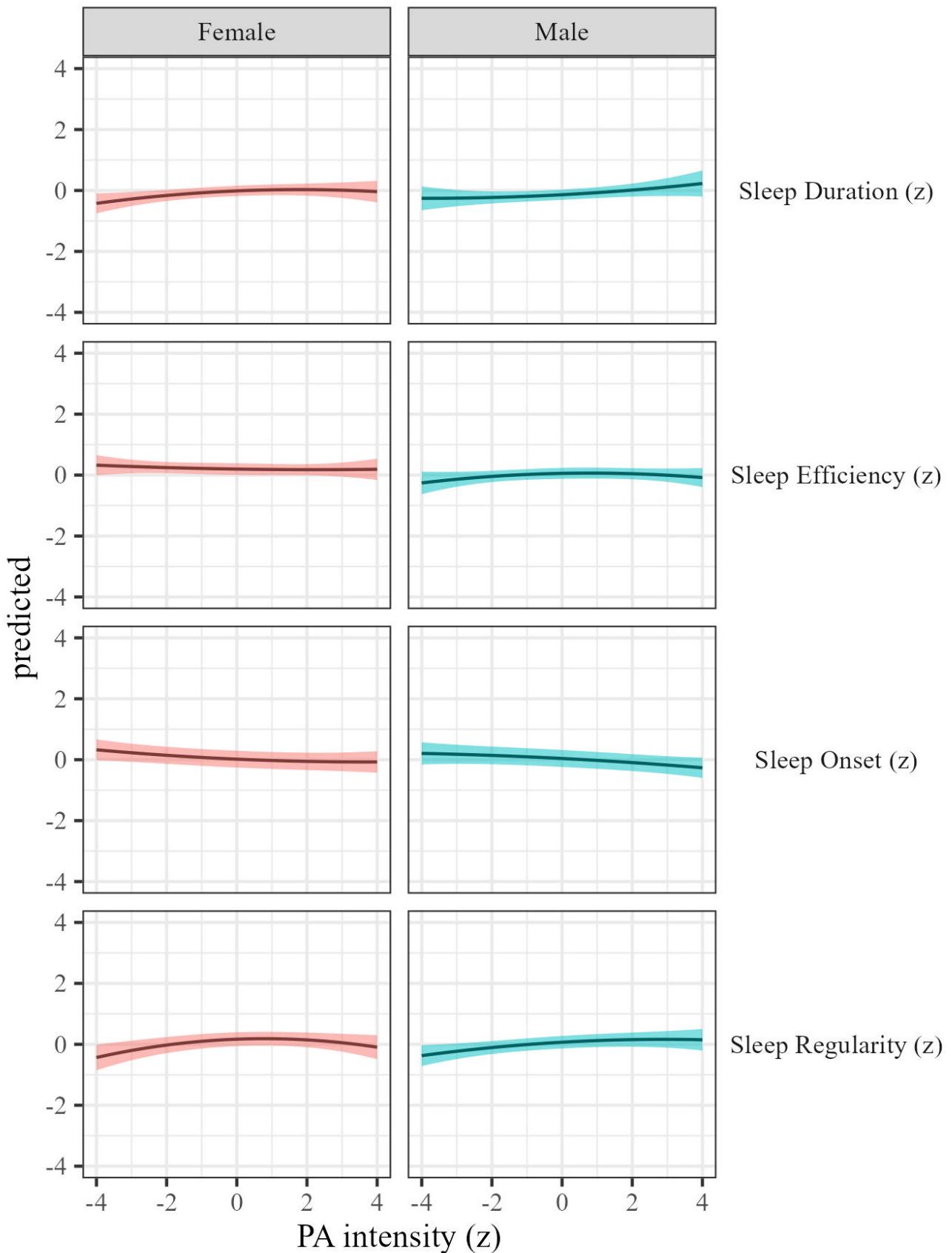


Figure 20. Sleep metrics on Physical activity intensity moderated by sex

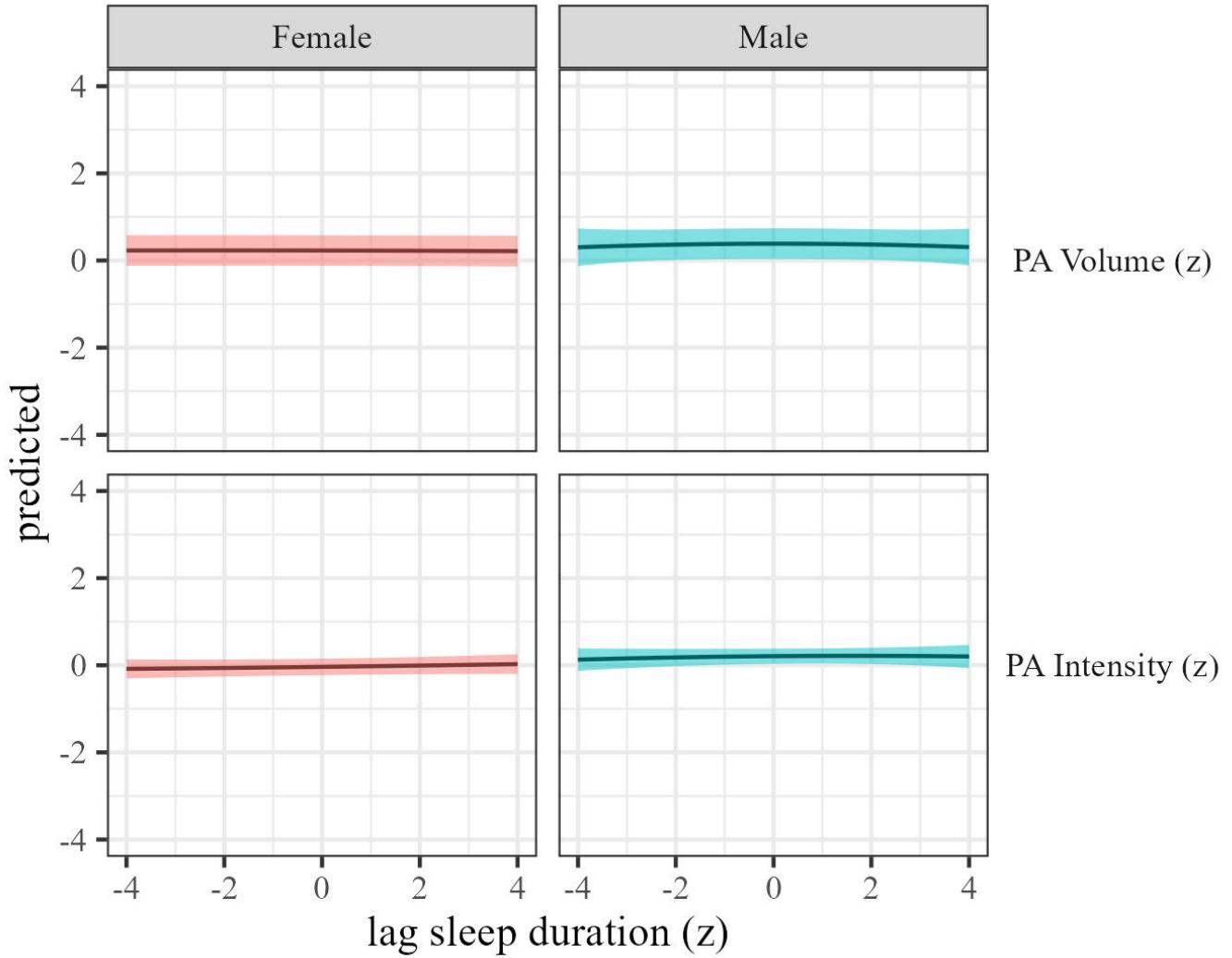


Figure 21. Physical activity by sleep duration moderated by sex

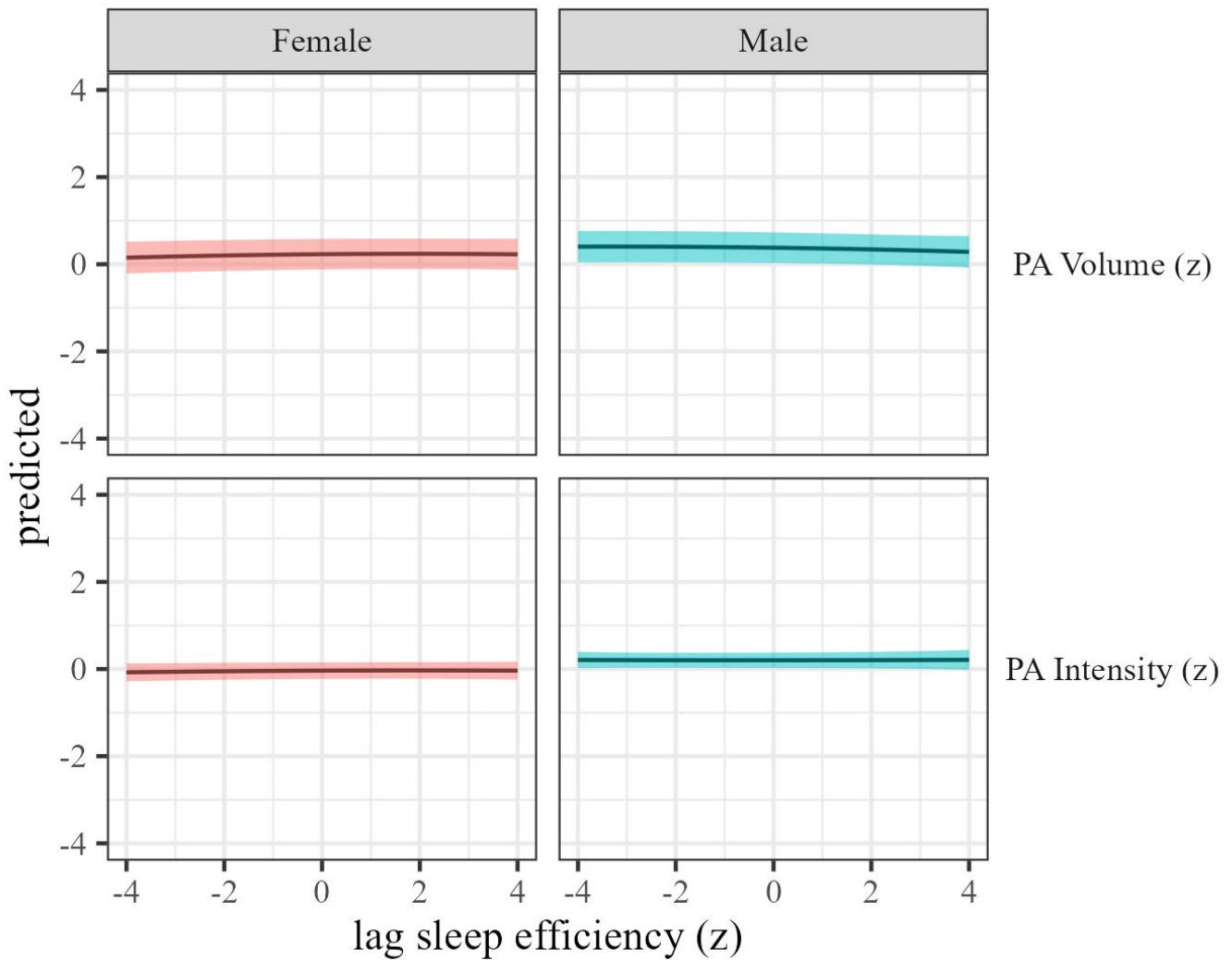


Figure 22. Physical activity by sleep efficiency moderated by sex

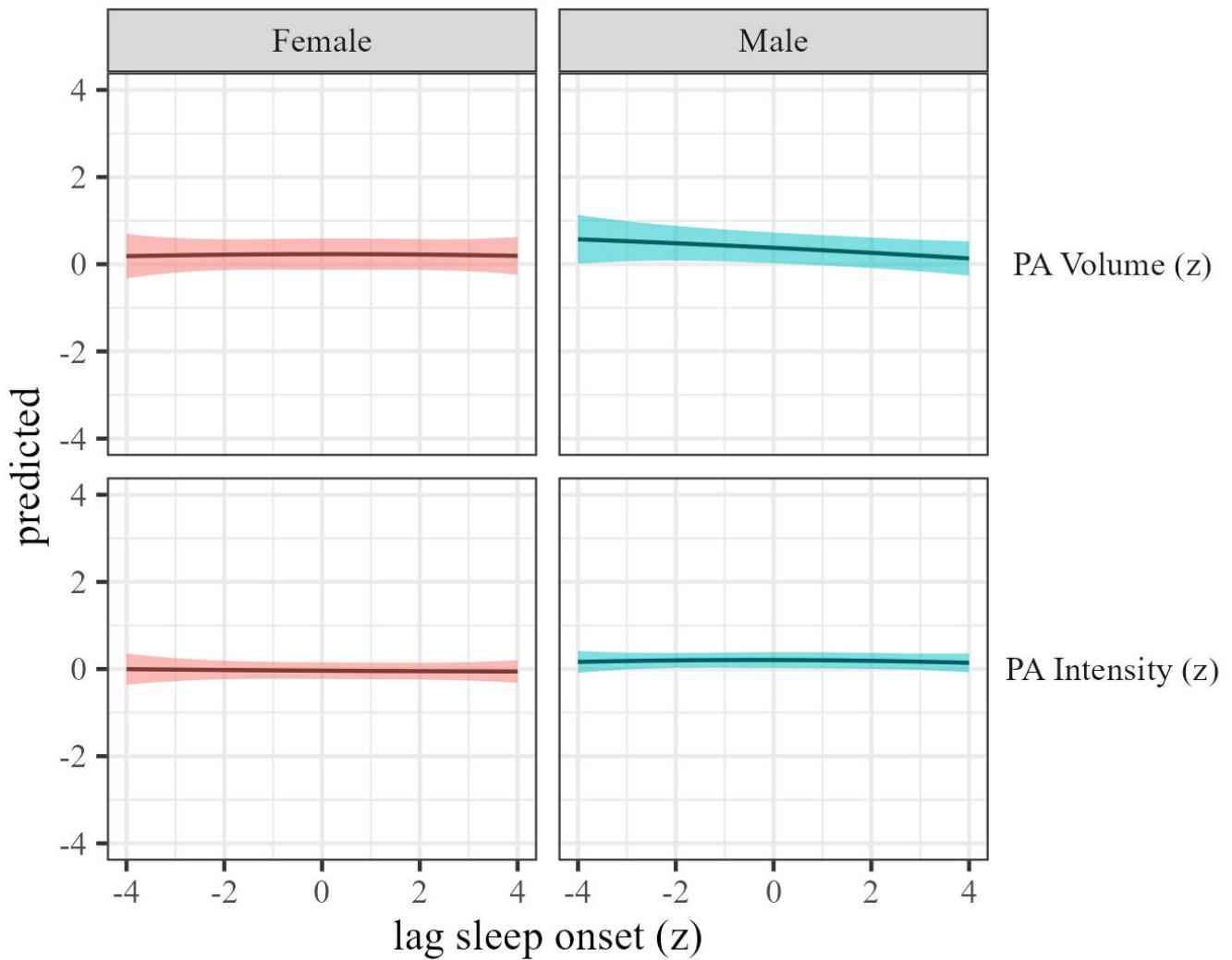


Figure 23. Physical activity by sleep onset moderated by sex

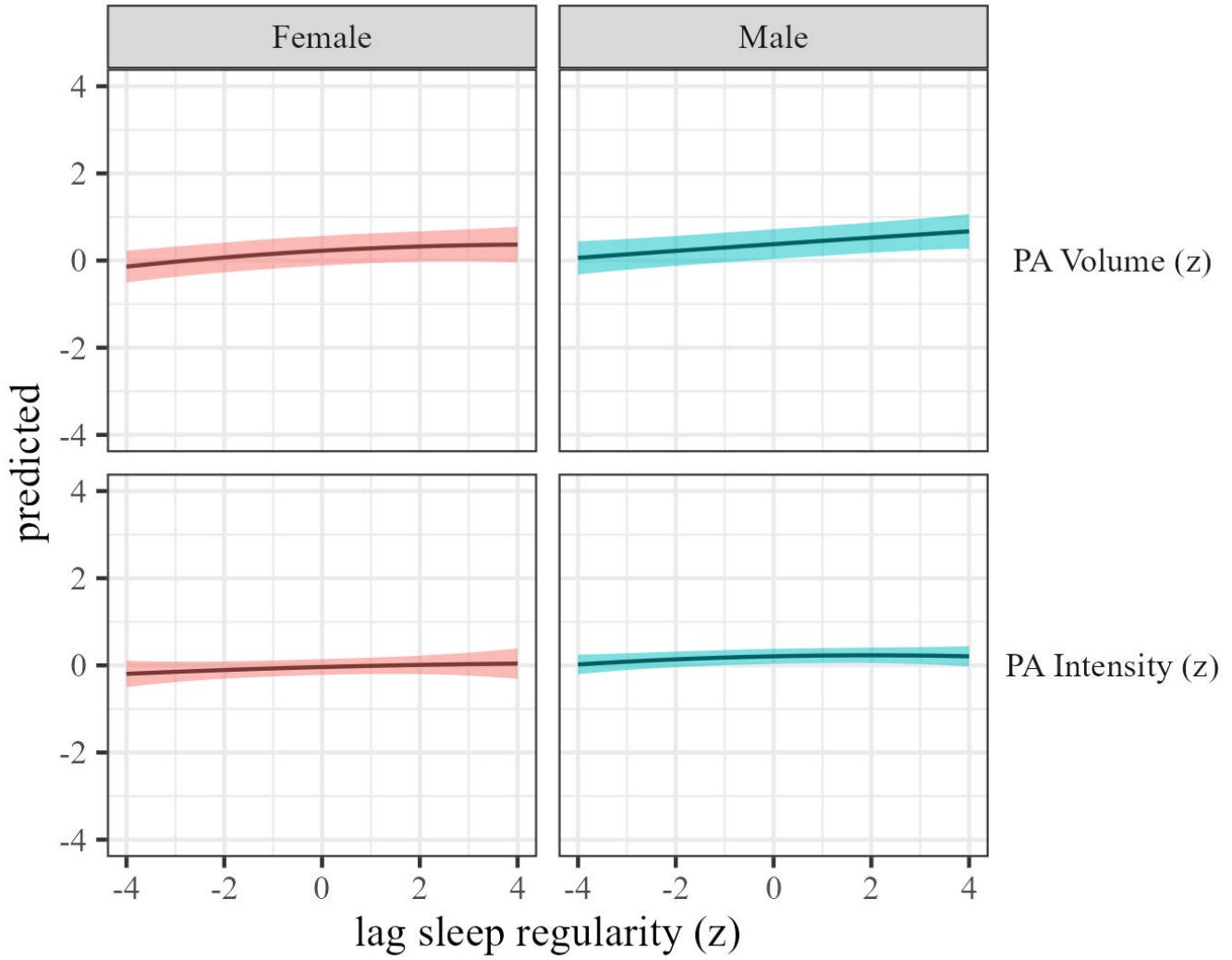


Figure 24. Physical activity by sleep regularity moderated by sex

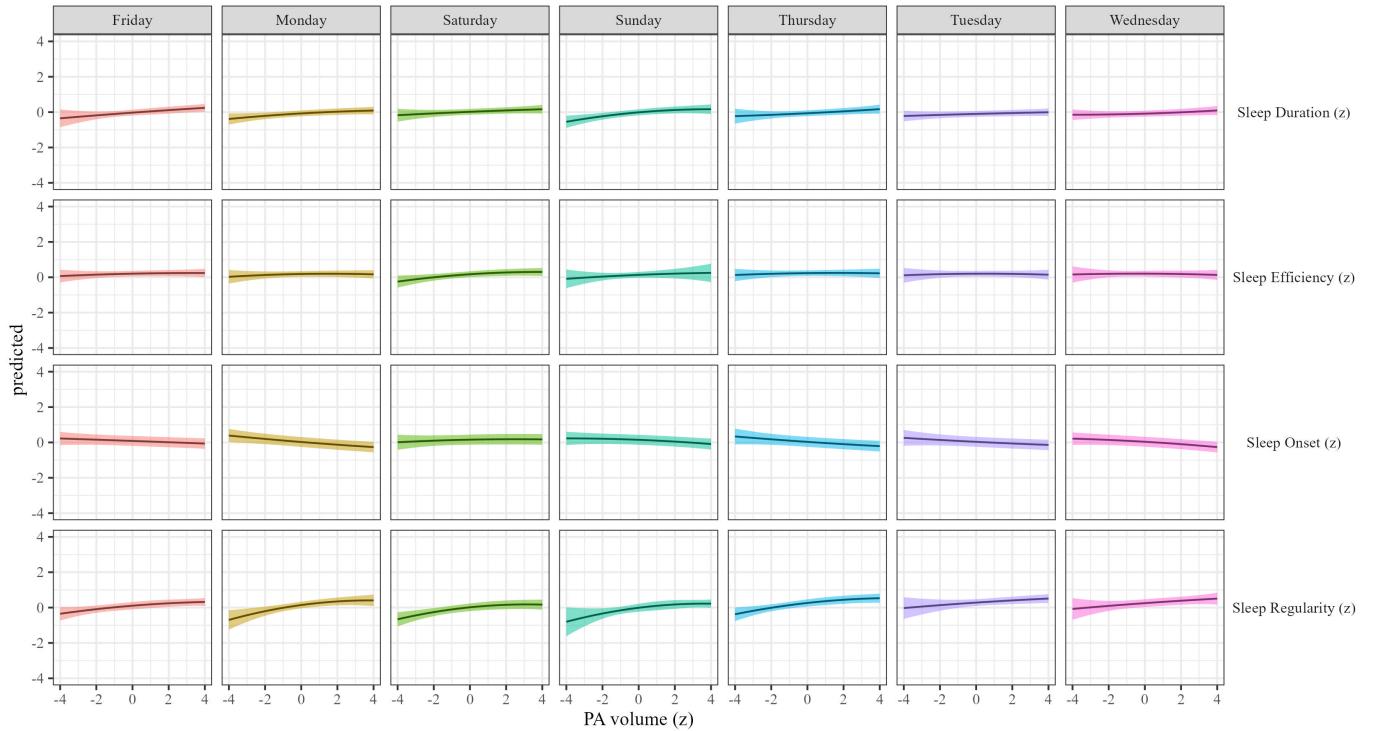


Figure 25. Sleep metrics on Physical activity volume by weekday

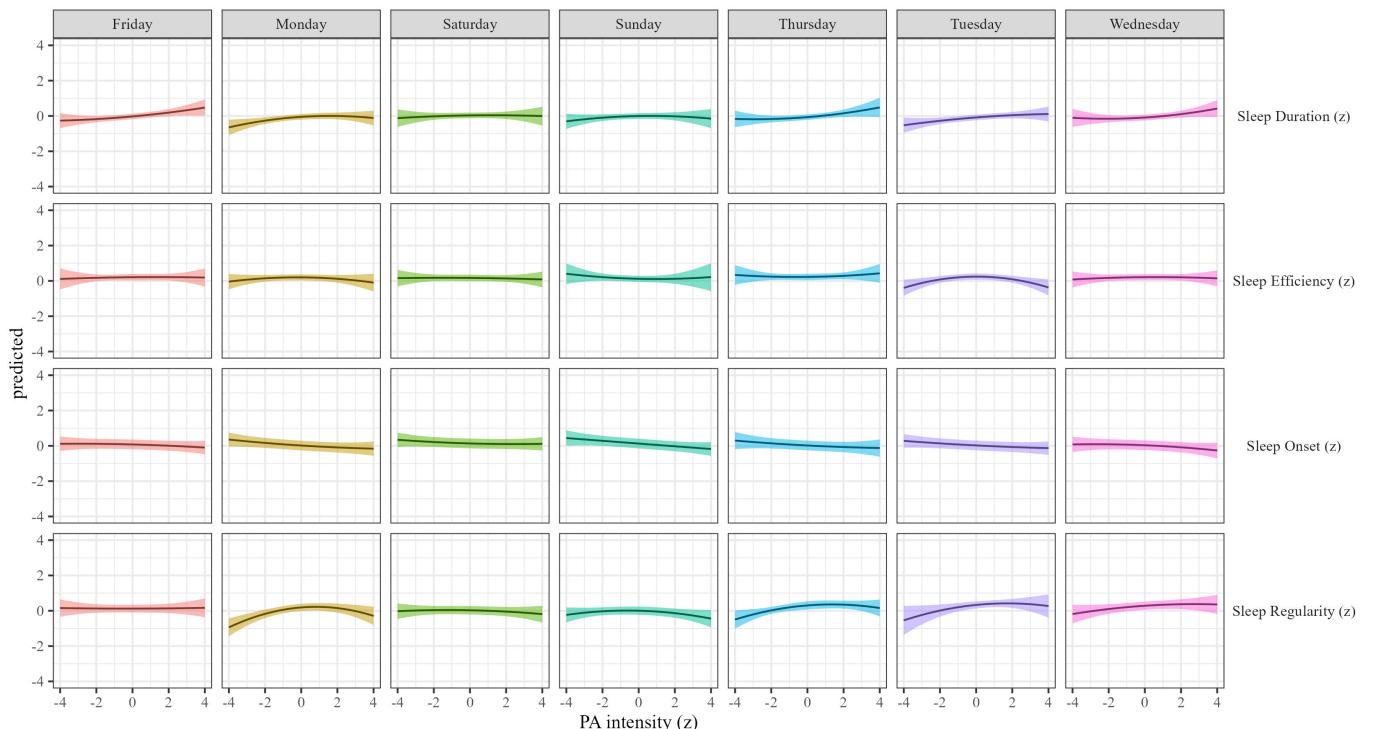


Figure 26. Sleep metrics on Physical activity intensity moderated by weekday

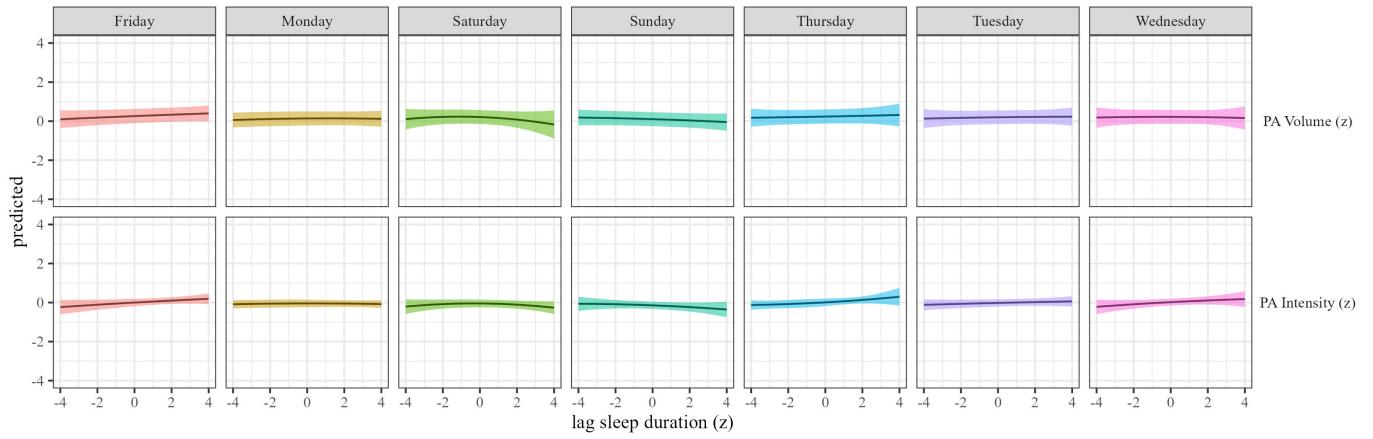


Figure 27. Physical activity by sleep duration moderated by weekday

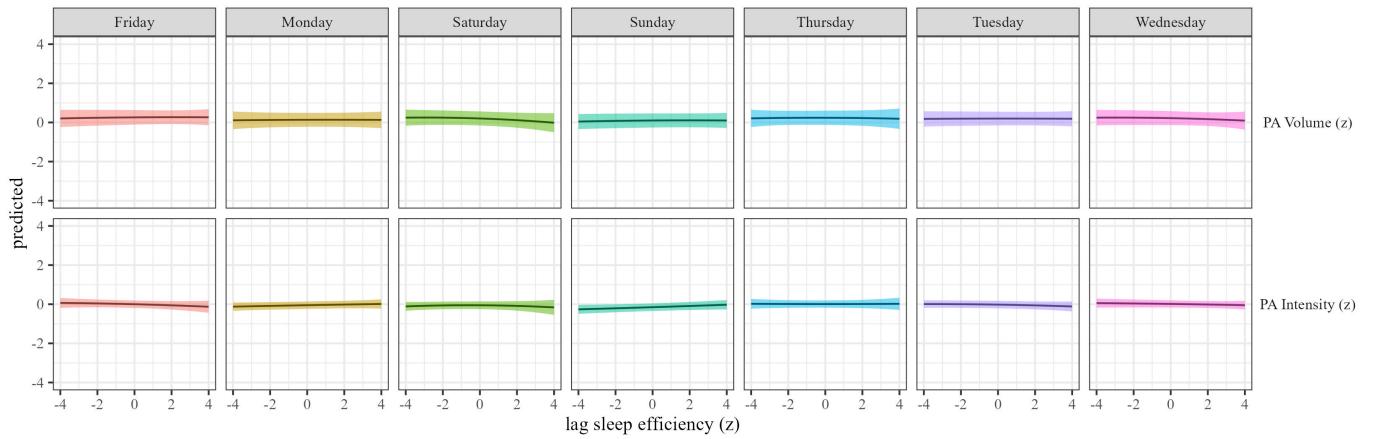


Figure 28. Physical activity by sleep efficiency moderated by weekday

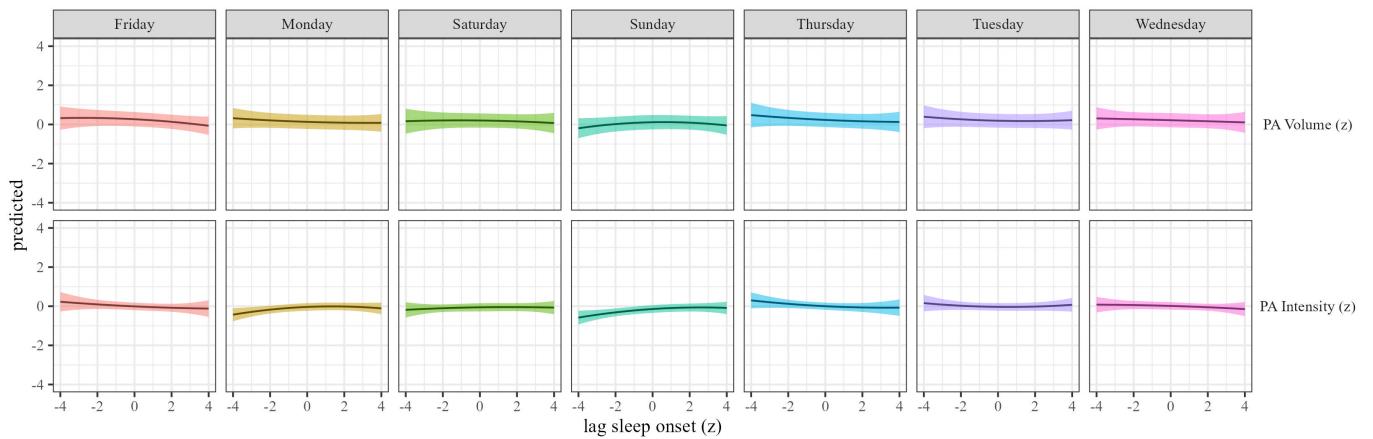


Figure 29. Physical activity by sleep onset moderated by weekday

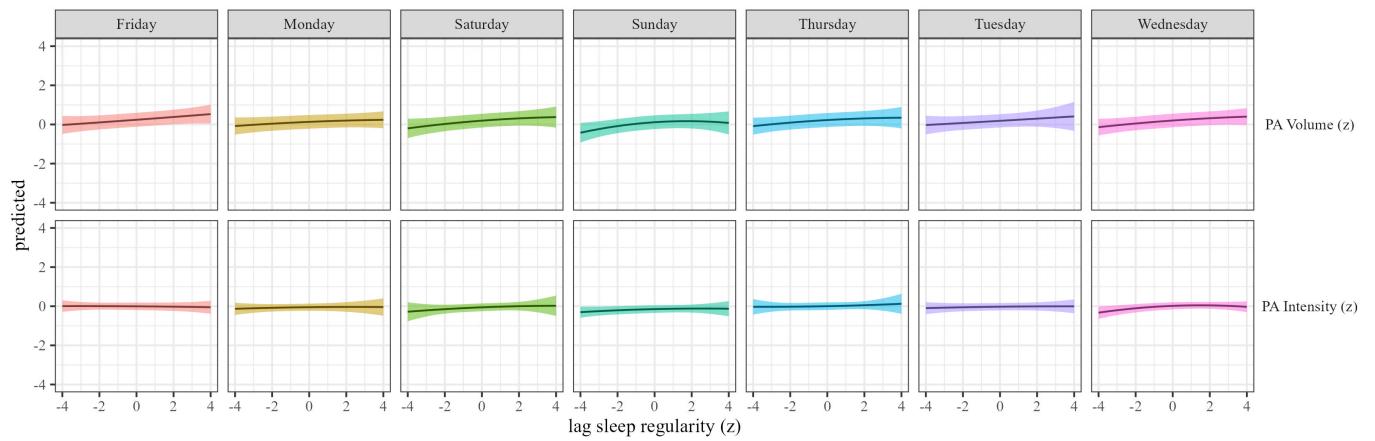


Figure 30. Physical activity by sleep regularity moderated by weekday

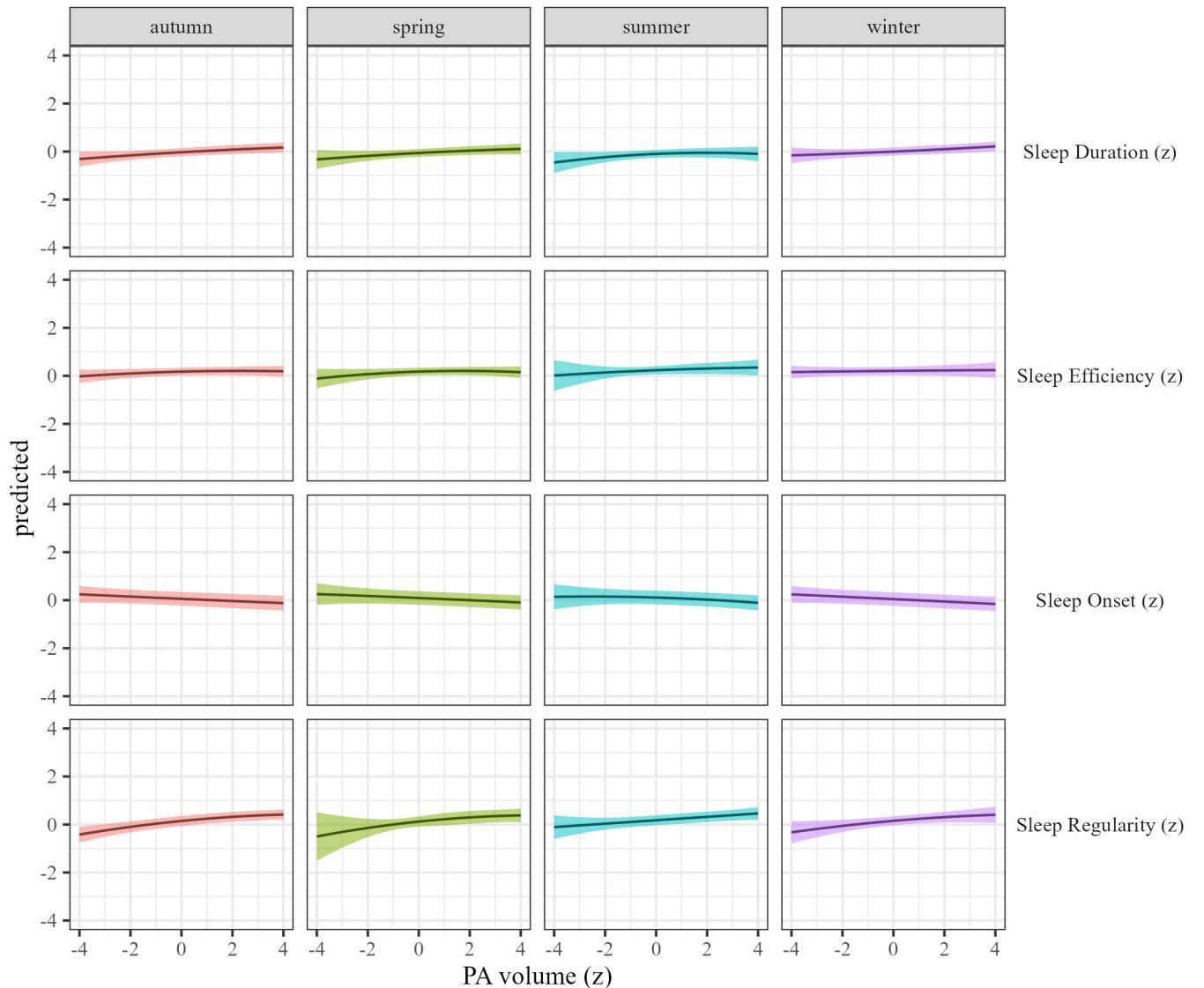


Figure 31. Sleep metrics on Physical activity volume by season

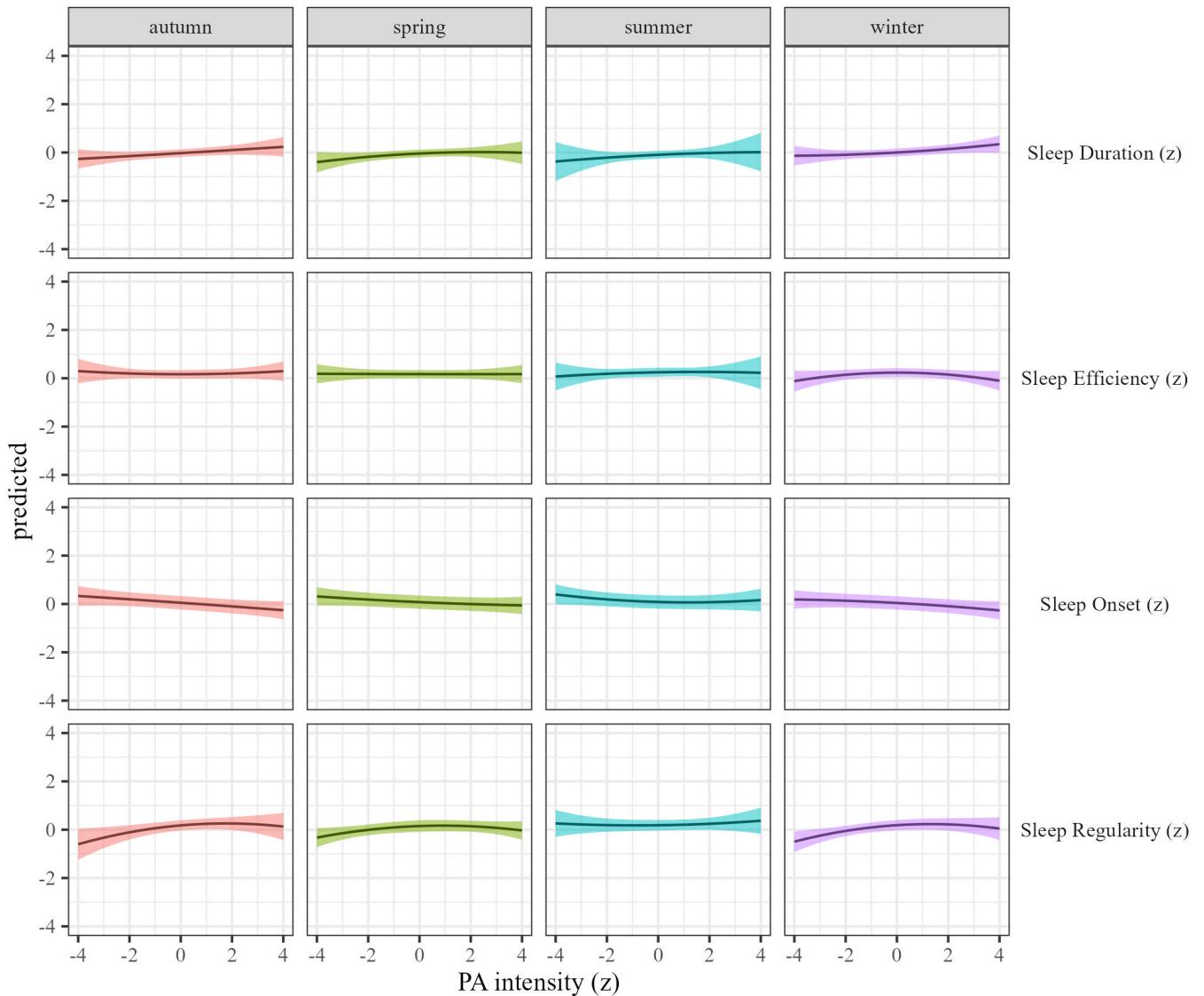


Figure 32. Sleep metrics on Physical activity intensity moderated by season

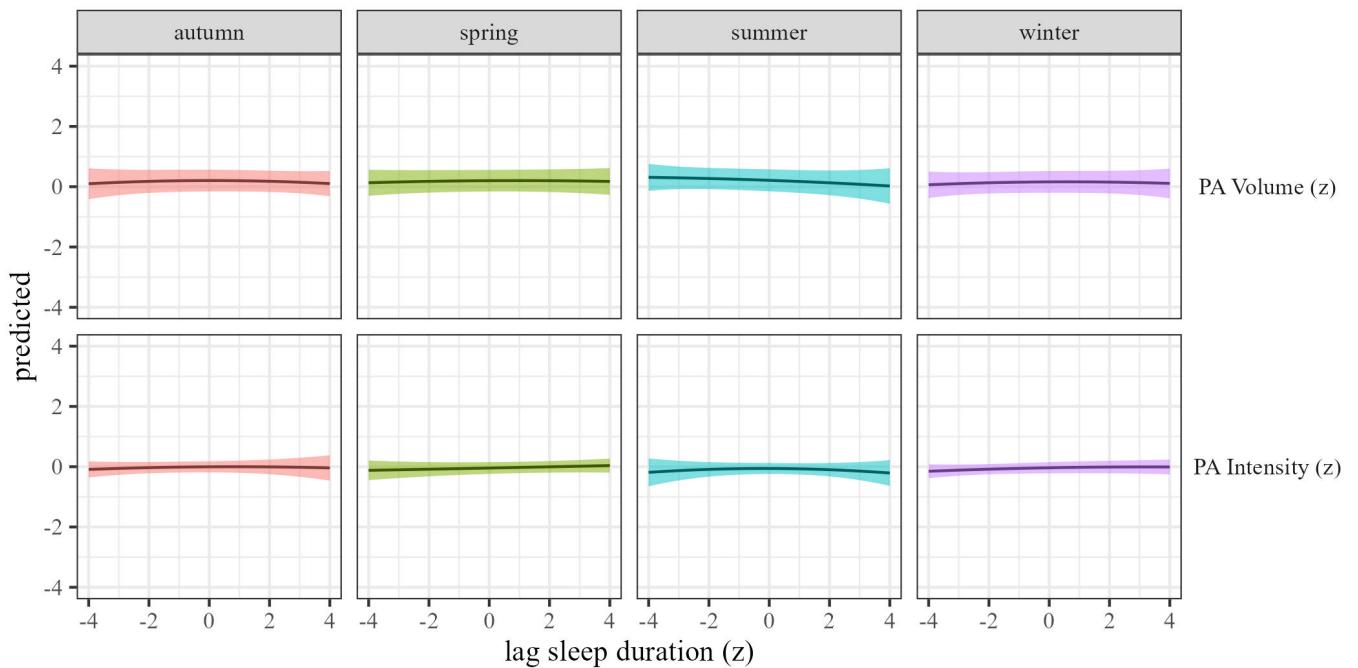


Figure 33. Physical activity by sleep duration moderated by season

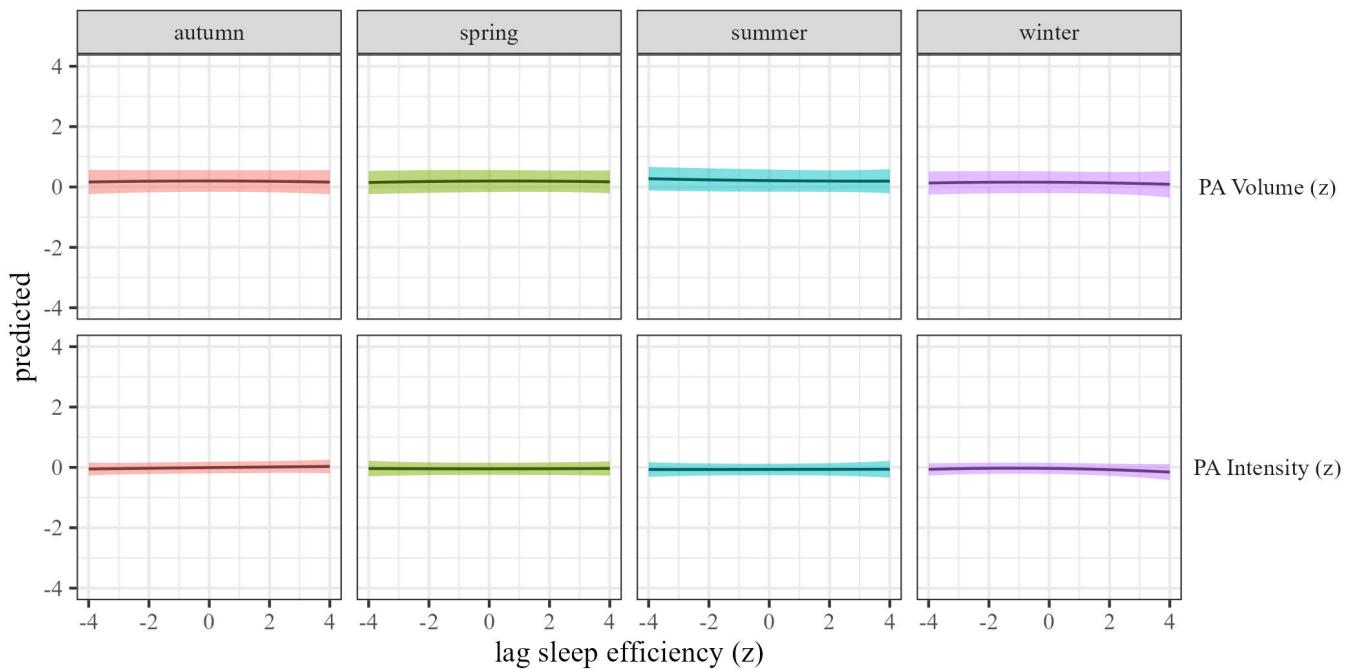
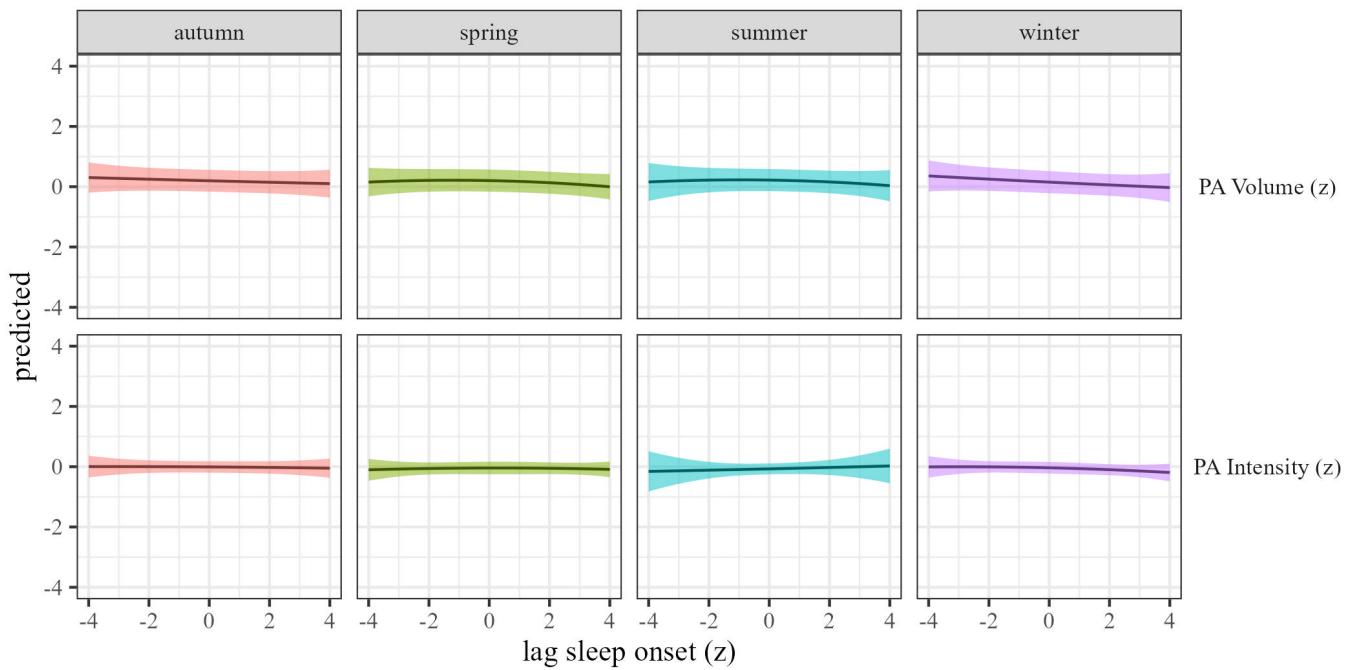
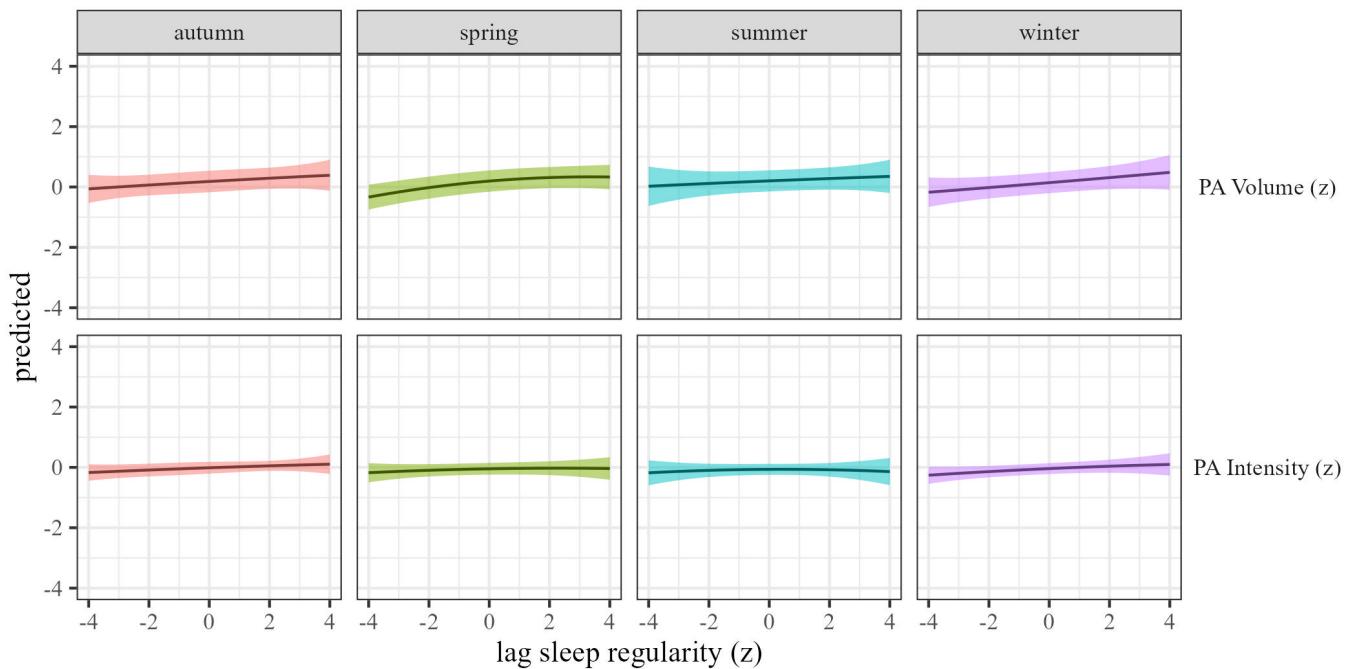


Figure 34. Physical activity by sleep efficiency moderated by season



*Figure 35.* Physical activity by sleep onset moderated by season



*Figure 36.* Physical activity by sleep regularity moderated by season

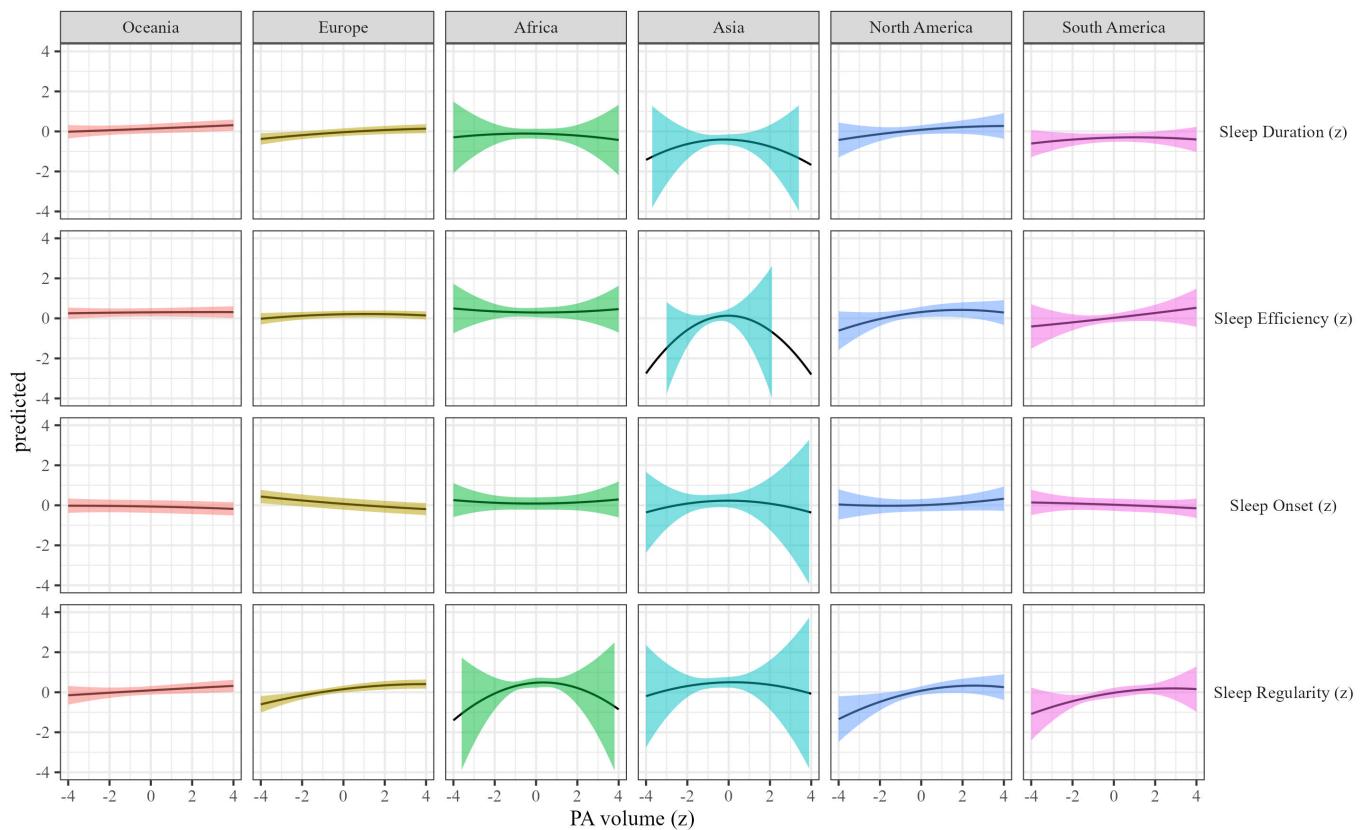


Figure 37. Sleep metrics on Physical activity volume by region

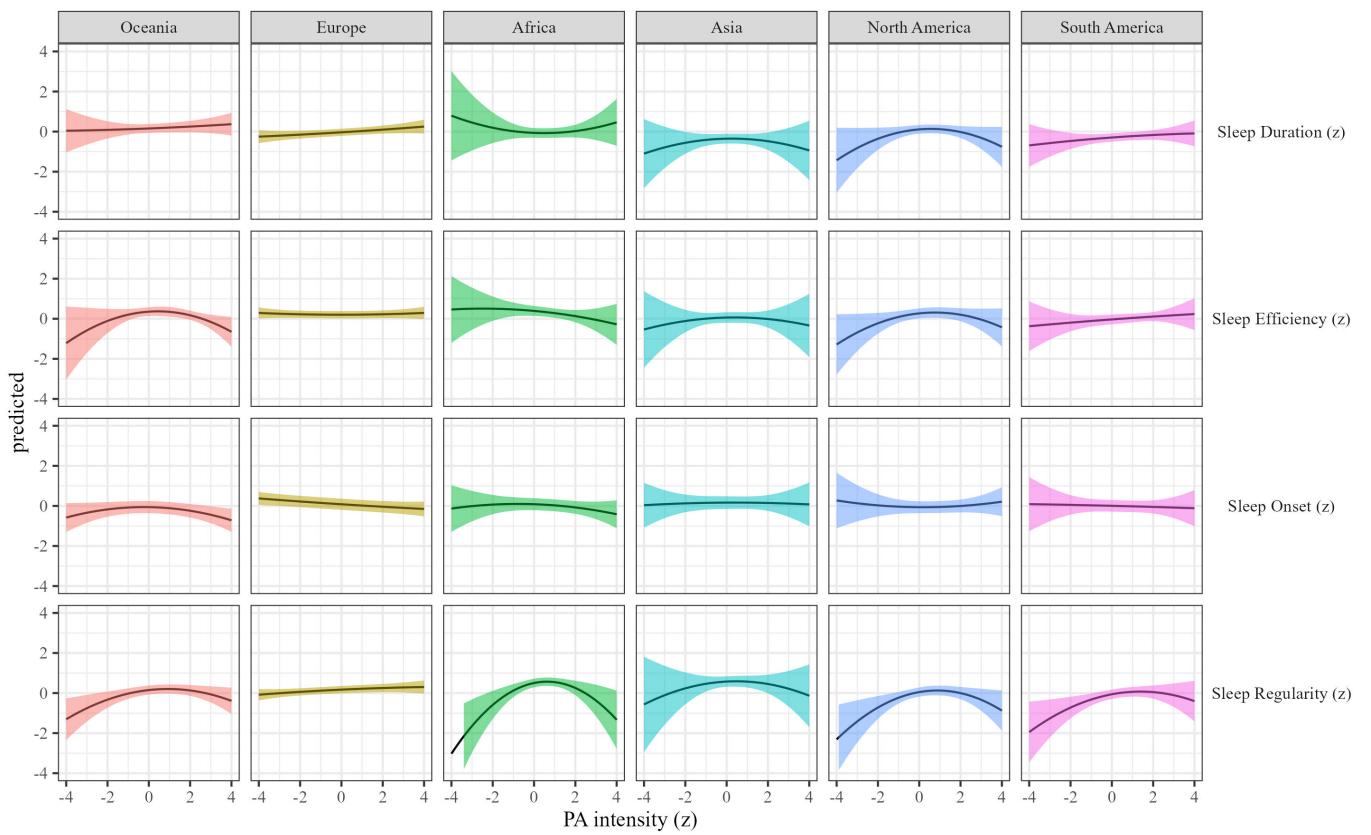


Figure 38. Sleep metrics on Physical activity intensity moderated by region

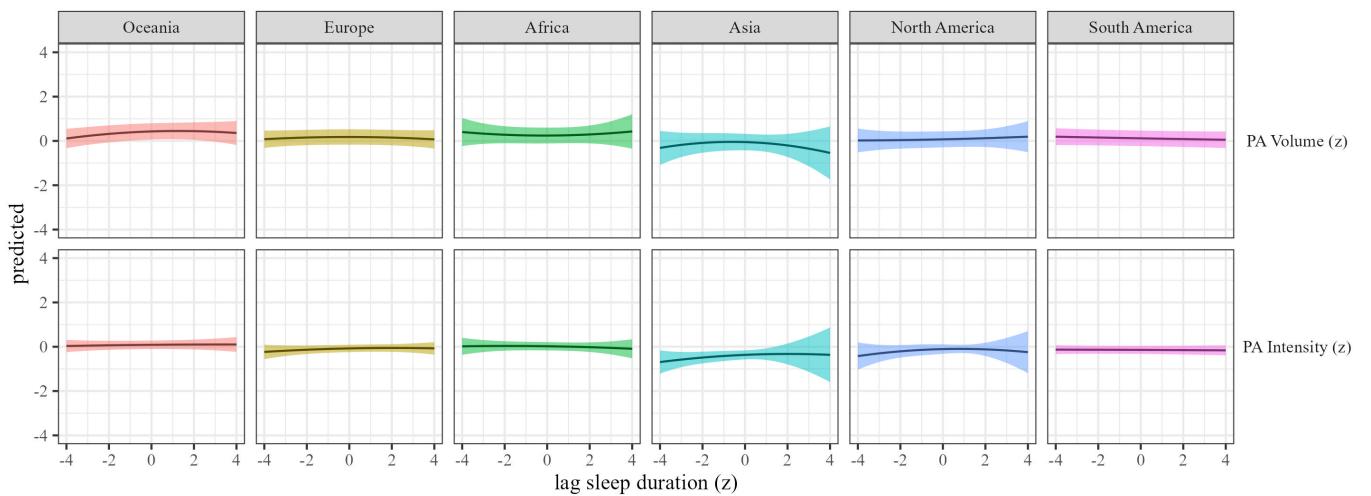
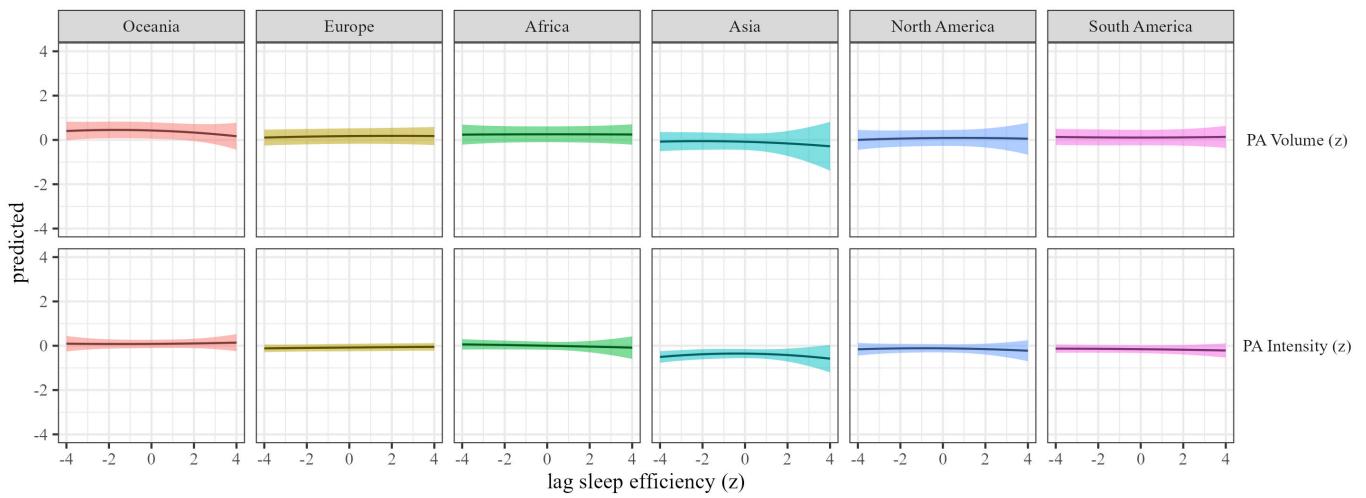
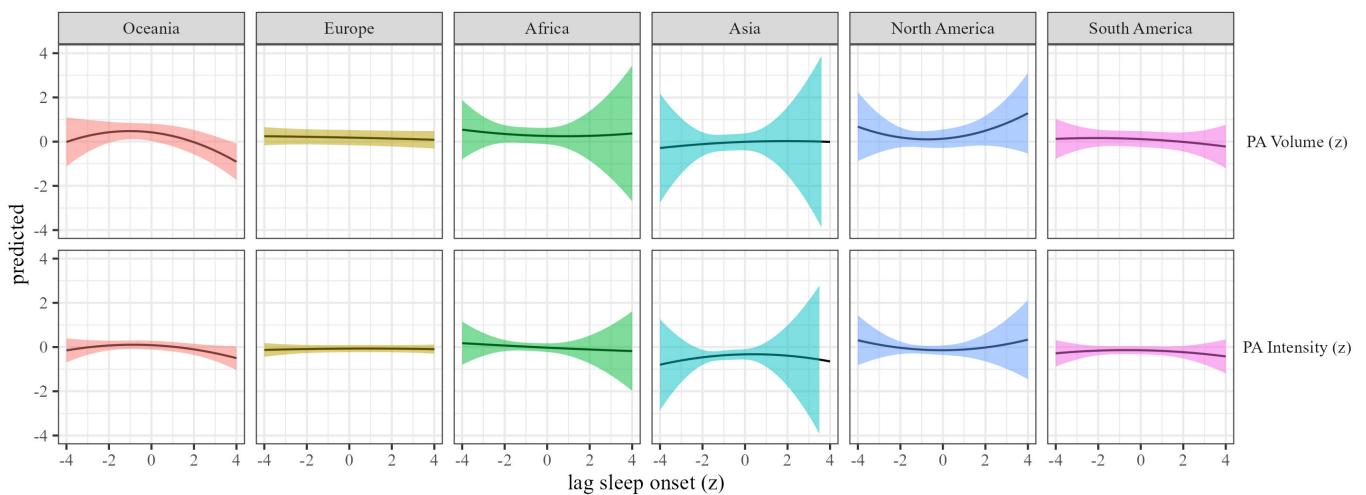


Figure 39. Physical activity by sleep duration moderated by region



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



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

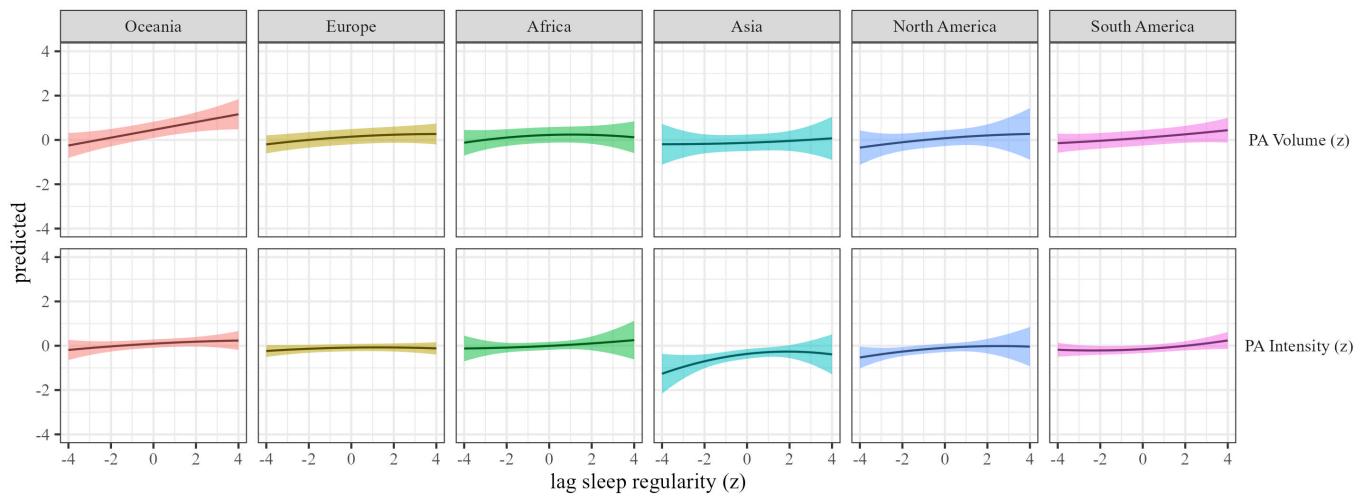


Figure 42. Physical activity by sleep regularity moderated by region

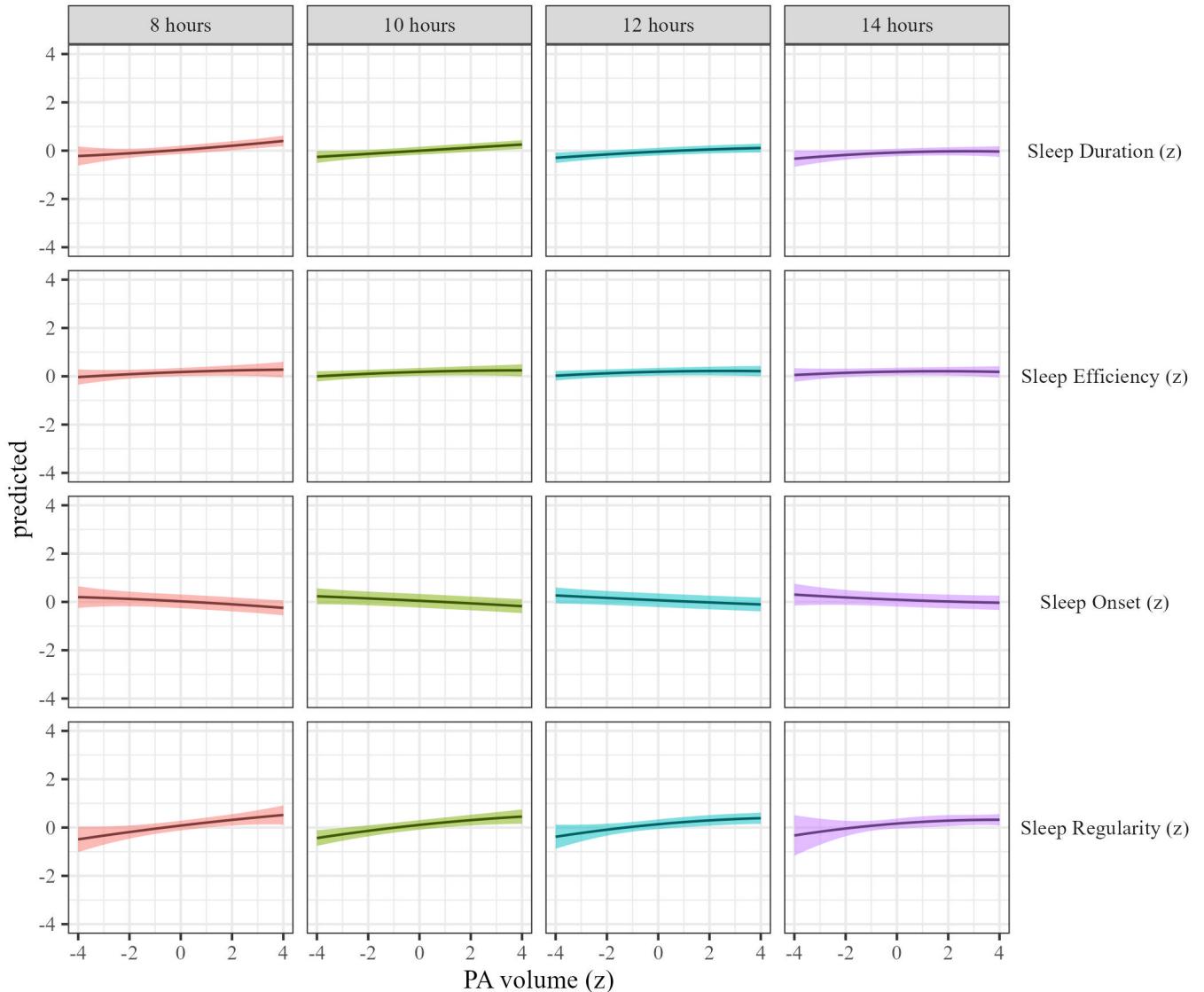


Figure 43. Sleep metrics on Physical activity volume by daylight hours

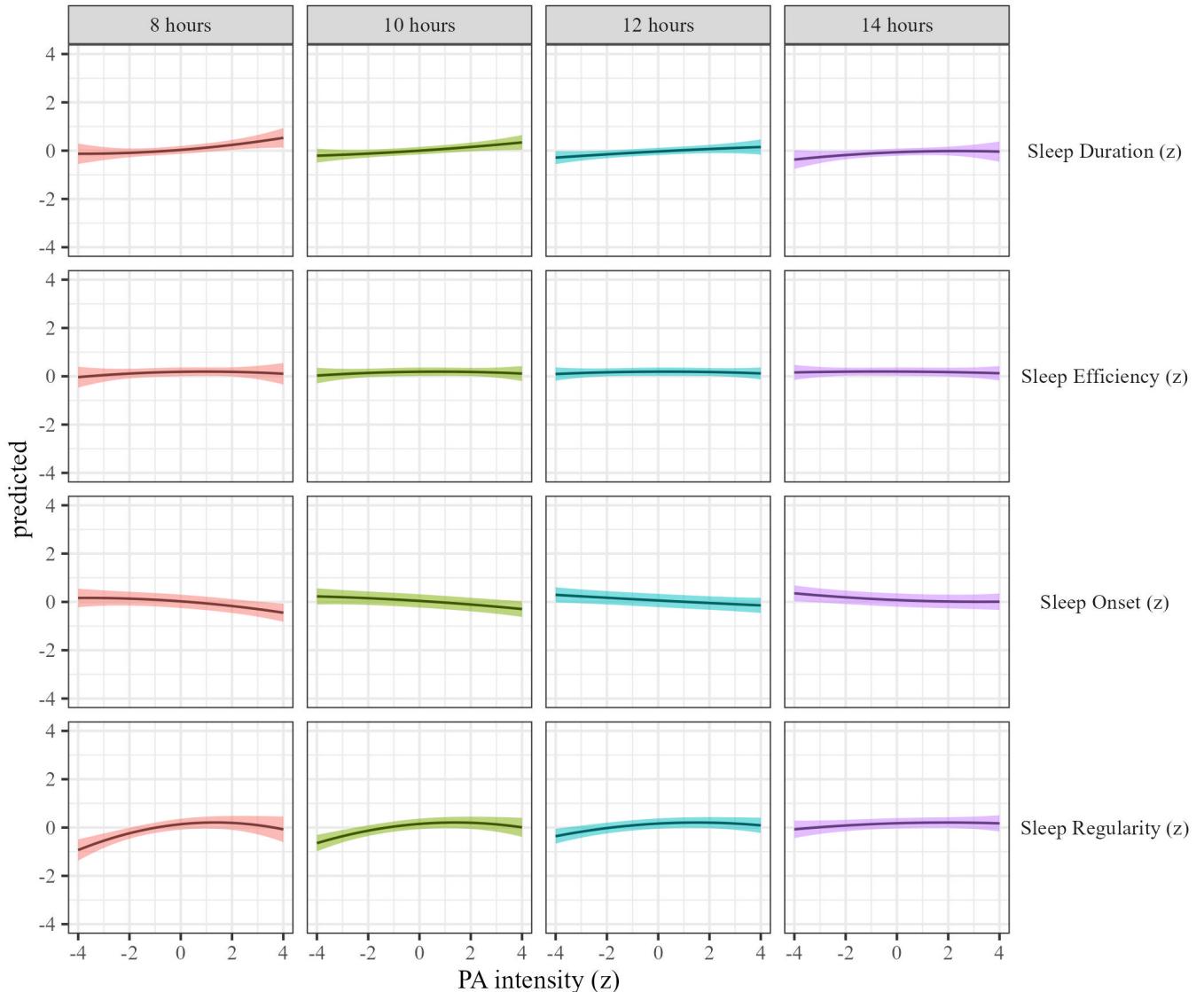


Figure 44. Sleep metrics on Physical activity intensity moderated by daylight hours

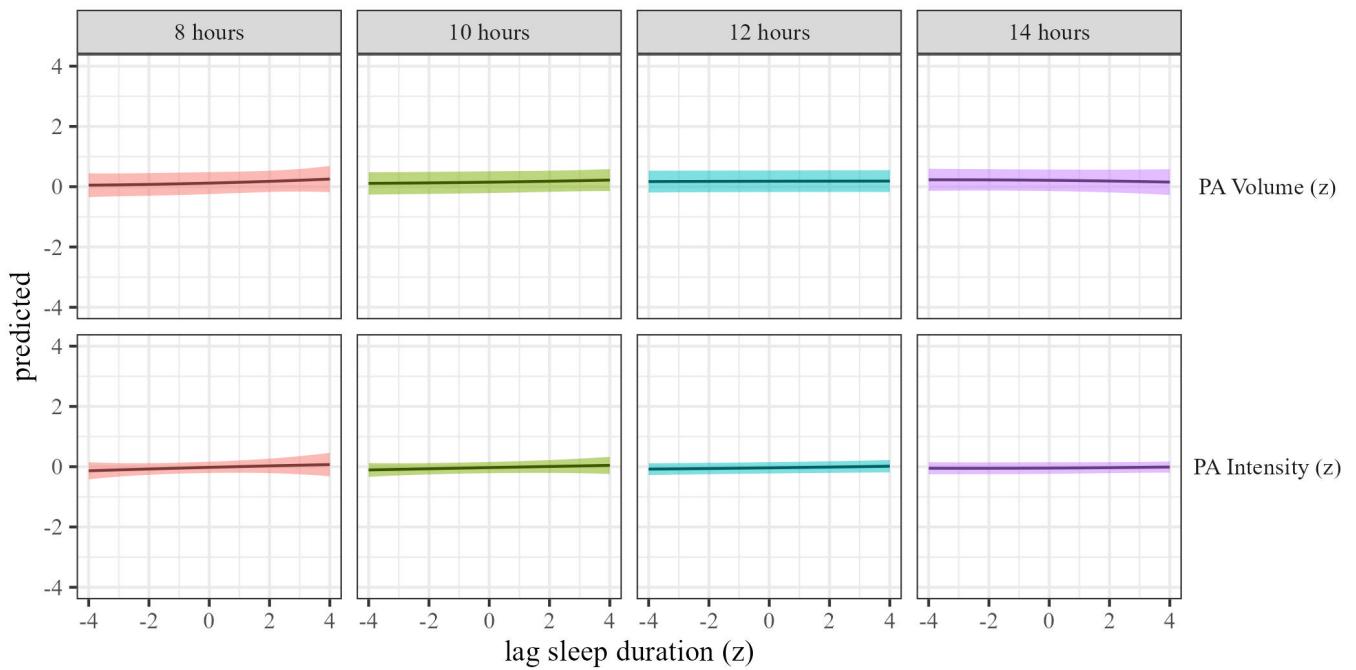


Figure 45. Physical activity by sleep duration moderated by daylight hours

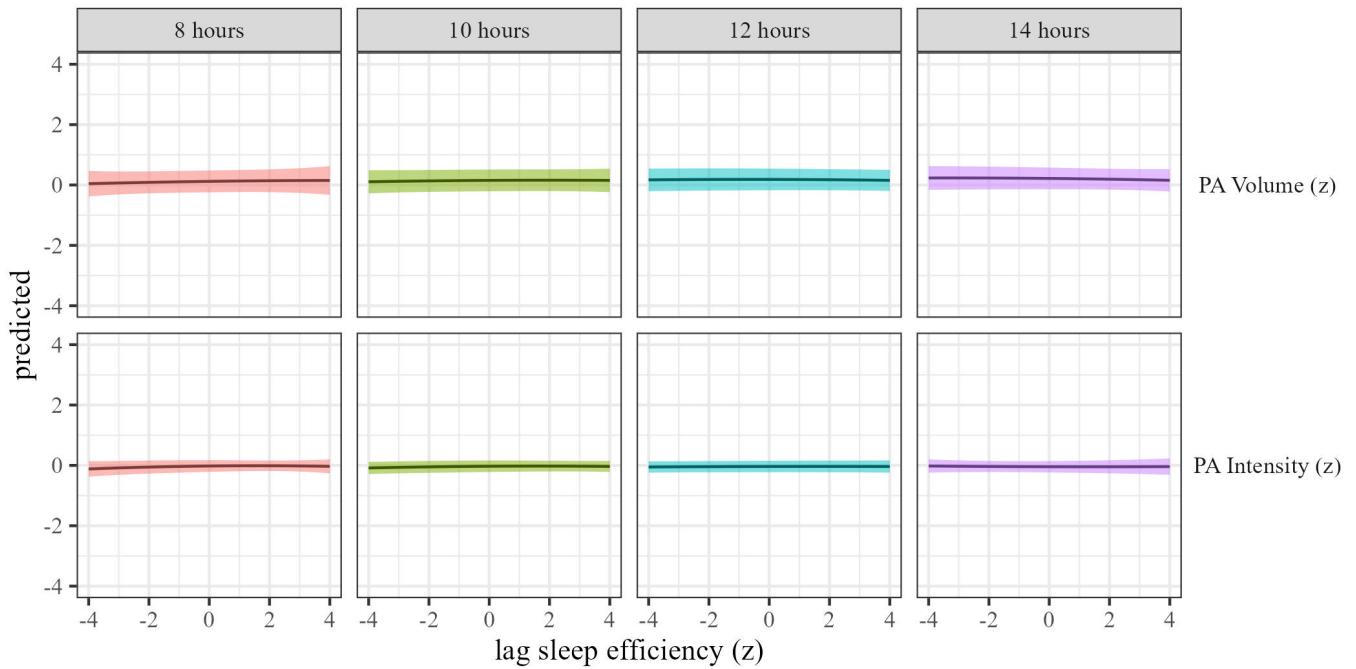
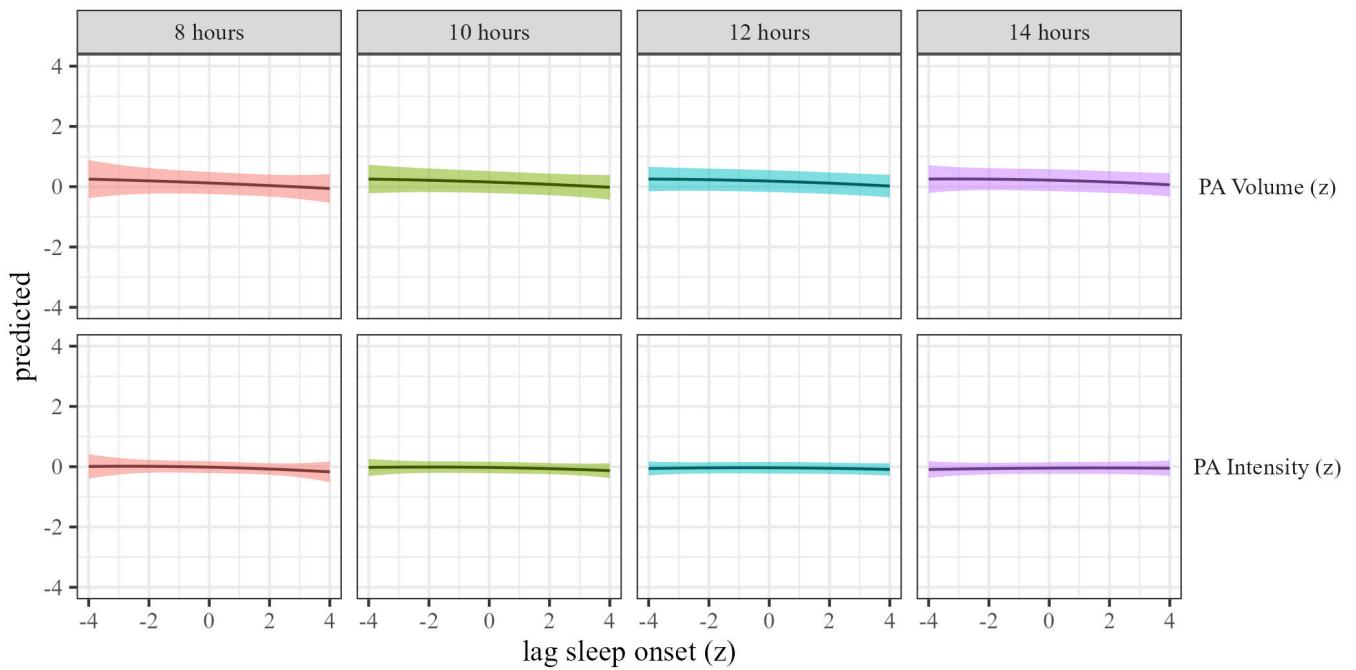
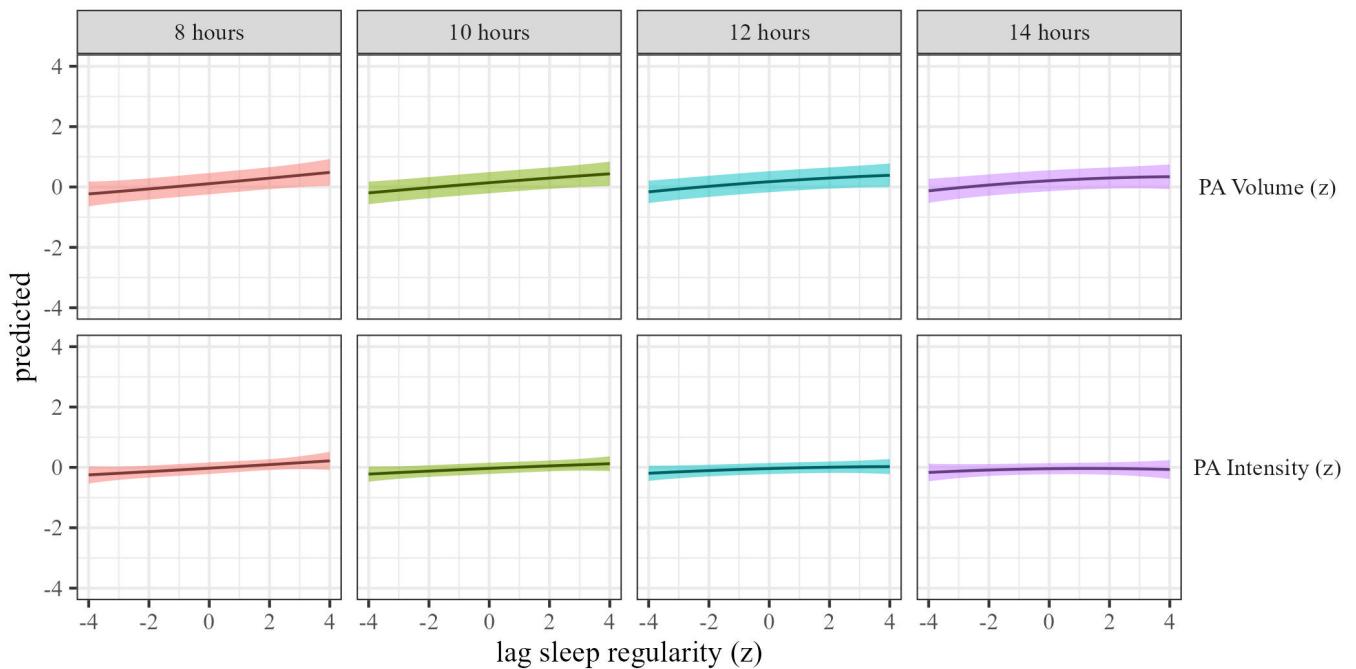


Figure 46. Physical activity by sleep efficiency moderated by daylight hours



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



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

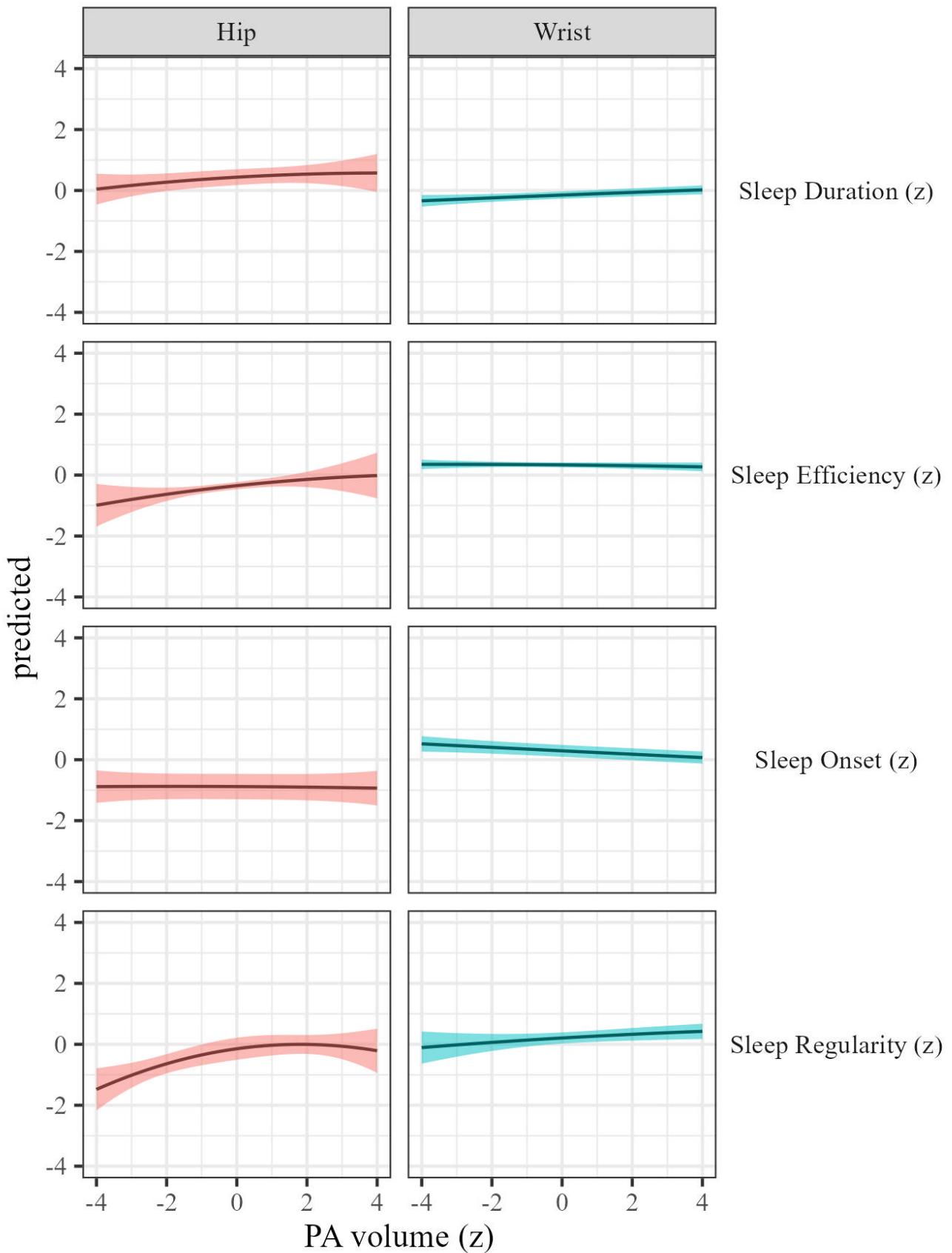


Figure 49. Sleep metrics on Physical activity volume by wear location

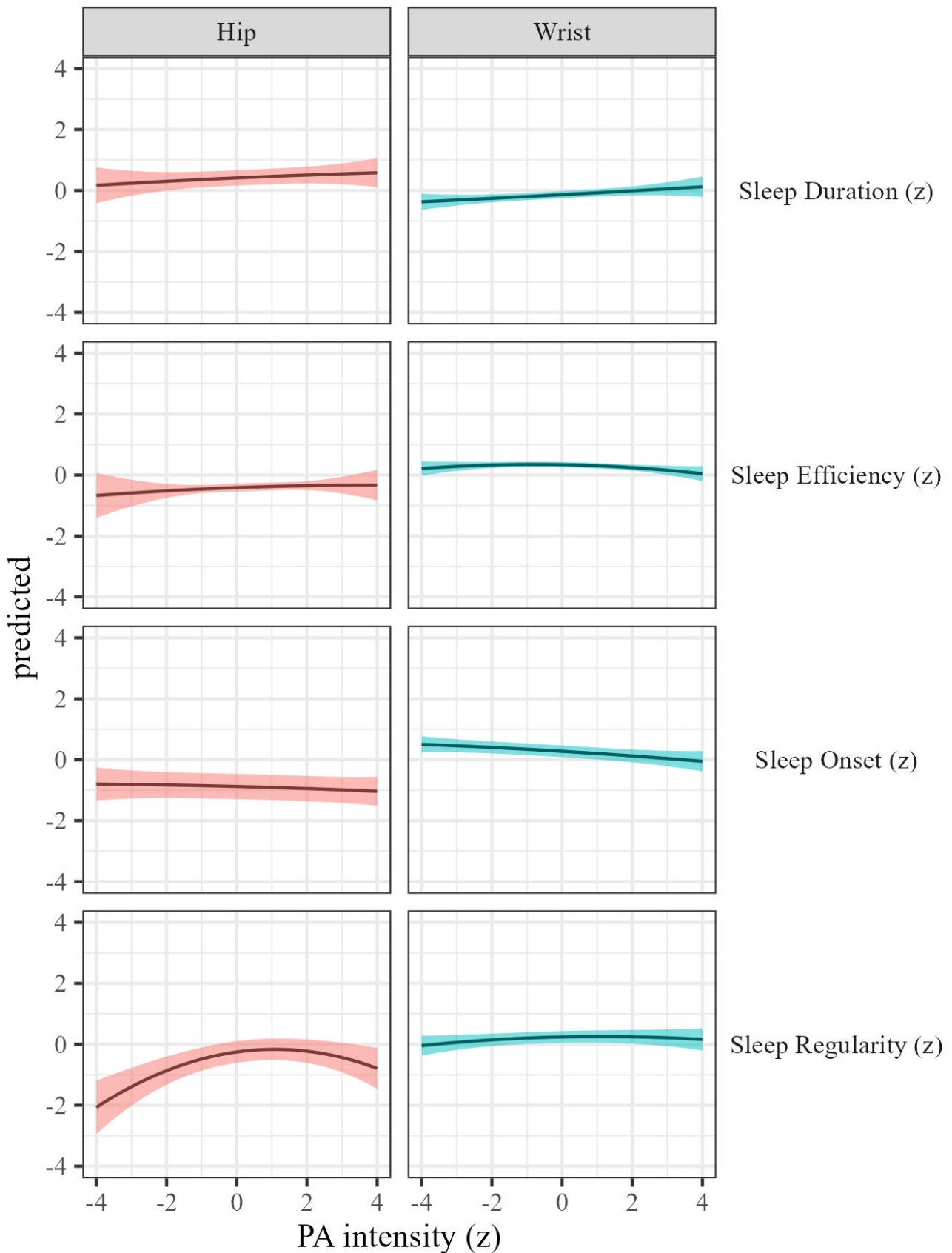


Figure 50. Sleep metrics on Physical activity intensity moderated by wear location

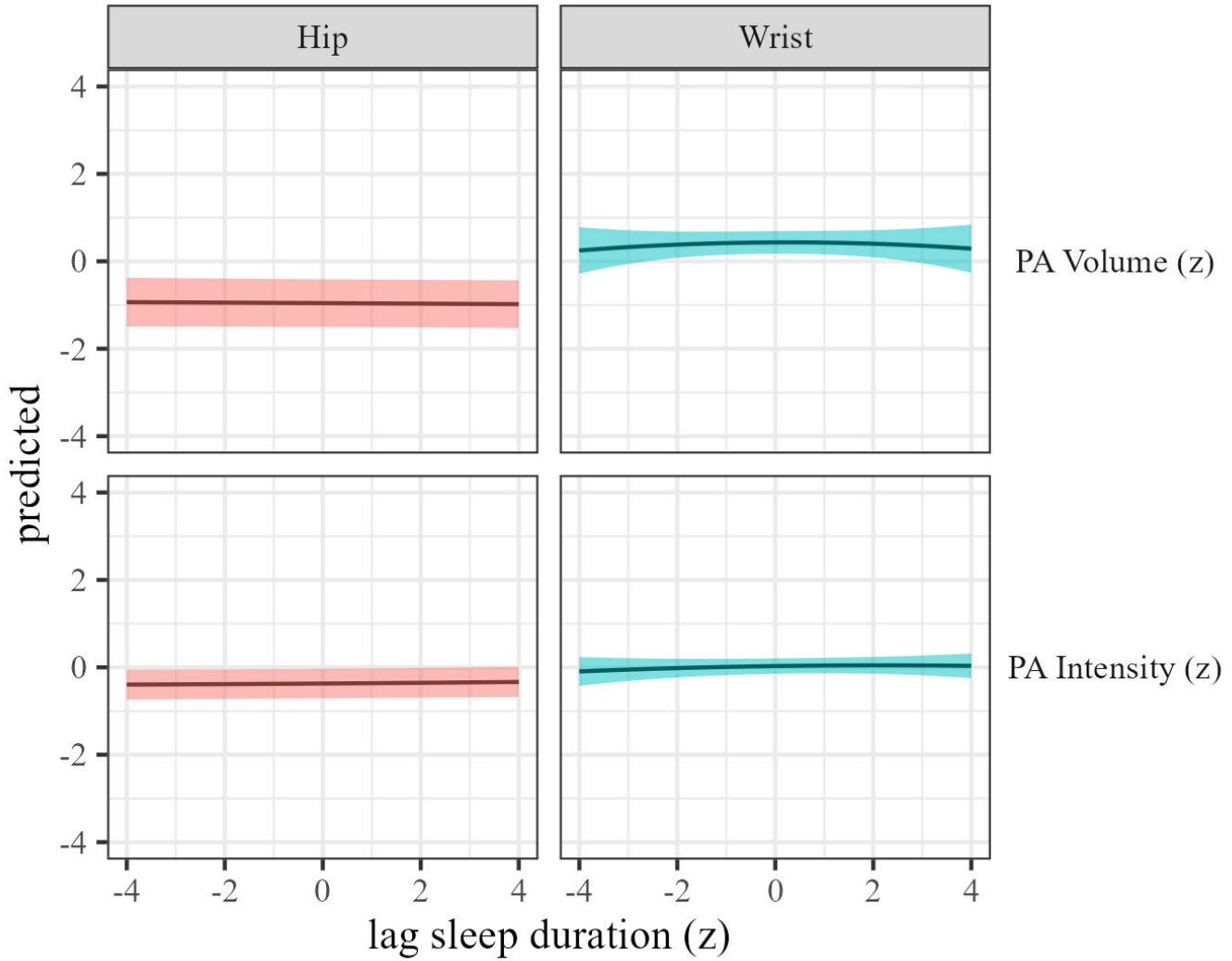


Figure 51. Physical activity by sleep duration moderated by wear location

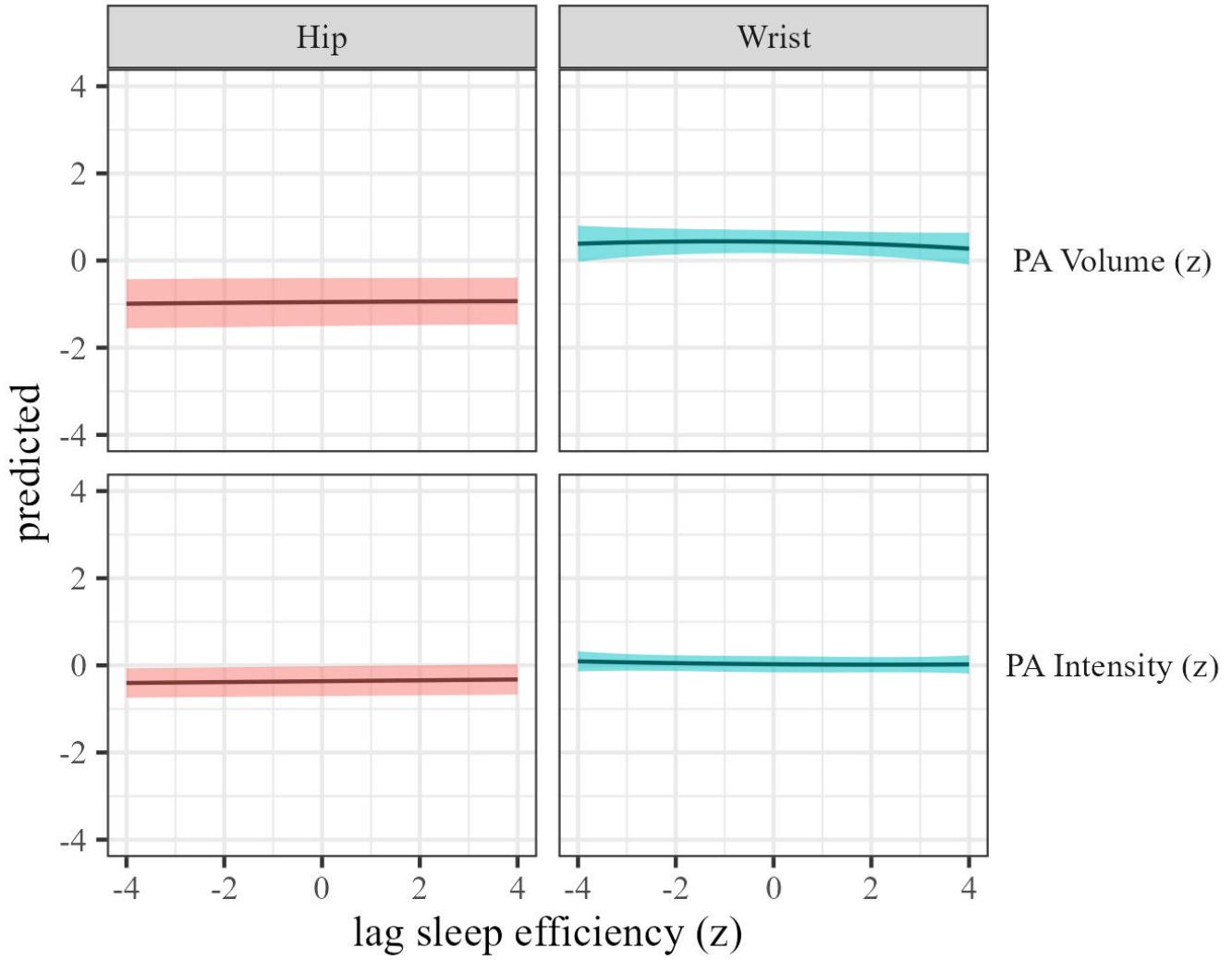


Figure 52. Physical activity by sleep efficiency moderated by wear location

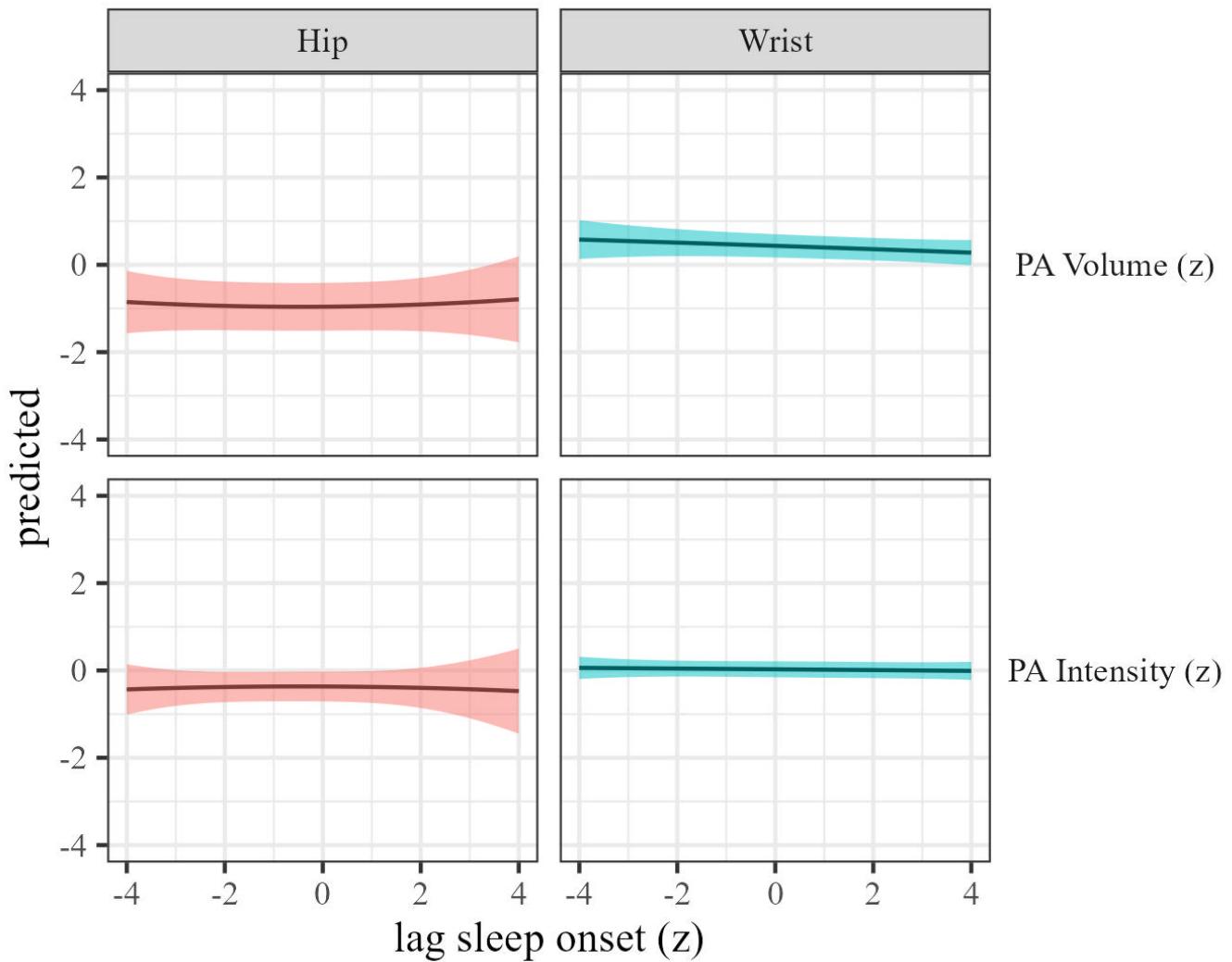


Figure 53. Physical activity by sleep onset moderated by wear location

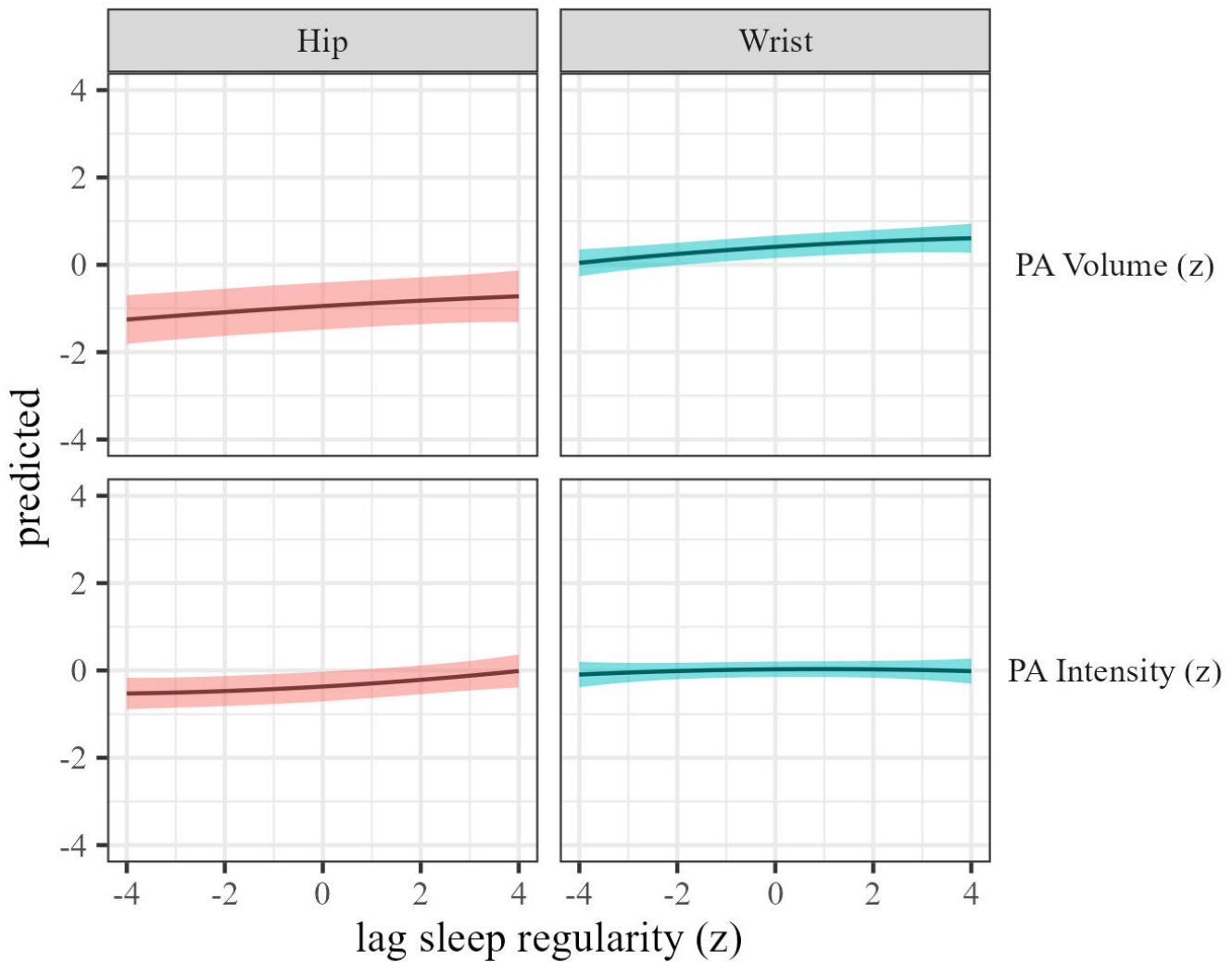


Figure 54. Physical activity by sleep regularity moderated by wear location