

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

### Fixed Effect Model

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 fixed-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.

### **Without Log Transforming PA Volume**

Based on preliminary modelling on a subset of the data, we chose to log transform the physical activity volume variable. Below, we present the results had we not made this decision. These results are all moderated by age, as this was our primary analysis.

**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 4 and Figure 7.

**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 5 and Figure 8.

**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 5 and Figure 9.

**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 5 and Figure 10.

**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 5 and Figure 11.

### **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 6 and Figure 12

**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 6 and Figure 13.

**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 7 and Figure 14.

**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 7 and Figure 15.

**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 7 and Figure 16.

**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 7 and Figure 17.

**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 8 and Figure 18

**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 8 and Figure 19.

**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 9 and Figure 20.

**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 9 and Figure 21.

**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 9 and Figure 22.

**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 9 and Figure 23.

**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 10 and Figure 24

**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 10 and Figure 25.

**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 11 and Figure 26.

**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 11 and Figure 27.

**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 11 and Figure 28.

**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 11 and Figure 29.

**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 12 and Figure 30

**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 12 and Figure 31.

**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 13 and Figure 32.

**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 13 and Figure 33.

**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 13 and Figure 34.

**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 13 and Figure 35.

**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 14 and Figure 36

**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 14 and Figure 37.

**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 15 and Figure 38.

**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 15 and Figure 39.

**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 15 and Figure 40.

**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 15 and Figure 41.

**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 16 and Figure 42

**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 16 and Figure 43.

**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 17 and Figure 44.

**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 17 and Figure 45.

**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 17 and Figure 46.

**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 17 and Figure 47.

**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 18 and Figure 48

**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 18 and Figure 49.

**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 19 and Figure 50.

**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 19 and Figure 51.

**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 19 and Figure 52.

**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 19 and Figure 53.

**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 20 and Figure 54

**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 20 and Figure 55.

**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 21 and Figure 56.

**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 21 and Figure 57.

**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 21 and Figure 58.

**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 21 and Figure 59.

**most active hour**

**The effects of physical activity volume on sleep by most active hour.** 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 most active hour, and the results are presented in Table 22 and Figure 60

**The effects of physical activity intensity on sleep by most active hour.** We estimated how physical activity intensity affects sleep across most active hour. We present the results in Table 22 and Figure 61.

**The effects of sleep duration on physical activity.** We estimated the effect of sleep duration on physical activity by most active hour. Results, controlling for sex, SES, and BMI are presented in Table 23 and Figure 62.

**The effects of sleep efficiency on physical activity.** We estimated the effect of sleep efficiency on physical activity by most active hour. Results, controlling for sex, SES, and BMI are presented in Table 23 and Figure 63.

**The effects of sleep onset on physical activity.** We estimated the effect of sleep onset on physical activity by most active hour. Results, controlling for sex, SES, and BMI are presented in Table 23 and Figure 64.

**The effects of sleep regularity on physical activity.** We estimated the effect of sleep regularity on physical activity by most active hour. Results are presented in Table 23 and Figure 65.

Table 1

*Model diagnostics*

Model name	Skewness	Kurtosis	Converged (%)
Models moderated by age			
Scale sleep duration by log PA volume	-0.09	-1.95	100.00%
Scale sleep efficiency by log PA volume	-0.89	-3.23	100.00%
Scale sleep onset by log PA volume	0.20	-6.36	100.00%
Scale sleep regularity by log PA volume	-0.73	-2.02	100.00%
Scale sleep duration by PA intensity	-0.09	-1.93	100.00%
Scale sleep efficiency by PA intensity	-0.89	-3.28	100.00%
Scale sleep onset by PA intensity	0.22	-6.29	100.00%
Scale sleep regularity by PA intensity	-0.73	-2.03	100.00%
Log PA volume by sleep duration(lagged)	-0.45	-2.55	100.00%
Scale PA intensity by sleep duration(lagged)	0.09	-2.06	100.00%
Log PA volume by sleep efficiency(lagged)	-0.46	-2.55	100.00%
Scale PA intensity by sleep efficiency(lagged)	0.09	-2.05	100.00%
Log PA volume by sleep onset(lagged)	-0.45	-2.55	100.00%
Scale PA intensity by sleep onset(lagged)	0.09	-2.04	100.00%
Log PA volume by sleep regularity(lagged)	-0.37	-2.28	100.00%
Scale PA intensity by sleep regularity(lagged)	0.15	-1.98	100.00%
Models moderated by age fixedef			
Scale sleep duration by log PA volume	-0.08	-1.95	100.00%
Scale sleep efficiency by log PA volume	-0.89	-3.23	100.00%
Scale sleep onset by log PA volume	0.20	-6.36	100.00%
Scale sleep regularity by log PA volume	-0.73	-2.02	100.00%
Scale sleep duration by PA intensity	-0.09	-1.94	100.00%
Scale sleep efficiency by PA intensity	-0.89	-3.27	100.00%
Scale sleep onset by PA intensity	0.22	-6.30	100.00%
Scale sleep regularity by PA intensity	-0.73	-2.03	100.00%
Log PA volume by sleep duration(lagged)	-0.45	-2.55	100.00%
Scale PA intensity by sleep duration(lagged)	0.09	-2.06	100.00%
Log PA volume by sleep efficiency(lagged)	-0.46	-2.55	100.00%
Scale PA intensity by sleep efficiency(lagged)	0.09	-2.05	100.00%
Log PA volume by sleep onset(lagged)	-0.45	-2.55	100.00%
Scale PA intensity by sleep onset(lagged)	0.09	-2.04	100.00%
Log PA volume by sleep regularity(lagged)	-0.37	-2.28	100.00%
Scale PA intensity by sleep regularity(lagged)	0.15	-1.98	100.00%

Table 1 continued

Model name	Skewness	Kurtosis	Converged (%)
Models moderated by age nolog			
Scale sleep duration by PA volume	-0.08	-1.95	100.00%
Scale sleep efficiency by PA volume	-0.89	-3.26	100.00%
Scale sleep onset by PA volume	0.20	-6.37	100.00%
Scale sleep regularity by PA volume	-0.73	-2.02	100.00%
Scale sleep duration by PA intensity	-0.09	-1.93	100.00%
Scale sleep efficiency by PA intensity	-0.89	-3.28	100.00%
Scale sleep onset by PA intensity	0.22	-6.29	100.00%
Scale sleep regularity by PA intensity	-0.73	-2.03	100.00%
Scale PA volume by sleep duration(lagged)	1.45	-19.82	100.00%
Scale PA intensity by sleep duration(lagged)	0.09	-2.06	100.00%
Scale PA volume by sleep efficiency(lagged)	1.45	-19.80	100.00%
Scale PA intensity by sleep efficiency(lagged)	0.09	-2.05	100.00%
Scale PA volume by sleep onset(lagged)	1.45	-19.81	100.00%
Scale PA intensity by sleep onset(lagged)	0.09	-2.04	100.00%
Scale PA volume by sleep regularity(lagged)	1.50	-20.16	100.00%
Scale PA intensity by sleep regularity(lagged)	0.15	-1.98	100.00%
Models moderated by bmi			
Scale sleep duration by log PA volume	-0.08	-1.95	100.00%
Scale sleep efficiency by log PA volume	-0.88	-3.21	100.00%
Scale sleep onset by log PA volume	0.21	-6.38	100.00%
Scale sleep regularity by log PA volume	-0.73	-2.03	100.00%
Scale sleep duration by PA intensity	-0.09	-1.93	100.00%
Scale sleep efficiency by PA intensity	-0.89	-3.28	100.00%
Scale sleep onset by PA intensity	0.22	-6.32	100.00%
Scale sleep regularity by PA intensity	-0.73	-2.03	100.00%
Log PA volume by sleep duration(lagged)	-0.45	-2.55	100.00%
Scale PA intensity by sleep duration(lagged)	0.09	-2.05	100.00%
Log PA volume by sleep efficiency(lagged)	-0.46	-2.55	100.00%
Scale PA intensity by sleep efficiency(lagged)	0.09	-2.05	100.00%
Log PA volume by sleep onset(lagged)	-0.45	-2.55	100.00%
Scale PA intensity by sleep onset(lagged)	0.09	-2.05	100.00%
Log PA volume by sleep regularity(lagged)	-0.38	-2.28	100.00%
Scale PA intensity by sleep regularity(lagged)	0.14	-1.98	100.00%
Models moderated by ses			

Table 1 continued

Model name	Skewness	Kurtosis	Converged (%)
Scale sleep duration by log PA volume	-0.08	-1.95	100.00%
Scale sleep efficiency by log PA volume	-0.88	-3.20	100.00%
Scale sleep onset by log PA volume	0.21	-6.40	100.00%
Scale sleep regularity by log PA volume	-0.73	-2.02	100.00%
Scale sleep duration by PA intensity	-0.09	-1.93	100.00%
Scale sleep efficiency by PA intensity	-0.89	-3.28	100.00%
Scale sleep onset by PA intensity	0.22	-6.29	100.00%
Scale sleep regularity by PA intensity	-0.73	-2.02	100.00%
Log PA volume by sleep duration(lagged)	-0.45	-2.55	100.00%
Scale PA intensity by sleep duration(lagged)	0.09	-2.05	100.00%
Log PA volume by sleep efficiency(lagged)	-0.46	-2.55	100.00%
Scale PA intensity by sleep efficiency(lagged)	0.09	-2.05	100.00%
Log PA volume by sleep onset(lagged)	-0.46	-2.55	100.00%
Scale PA intensity by sleep onset(lagged)	0.09	-2.05	100.00%
Log PA volume by sleep regularity(lagged)	-0.38	-2.29	100.00%
Scale PA intensity by sleep regularity(lagged)	0.14	-1.99	100.00%
Models moderated by weekday			
Scale sleep duration by log PA volume	-0.11	-1.92	100.00%
Scale sleep efficiency by log PA volume	-0.88	-3.21	100.00%
Scale sleep onset by log PA volume	0.17	-6.64	100.00%
Scale sleep regularity by log PA volume	-0.75	-2.12	100.00%
Scale sleep duration by PA intensity	-0.11	-1.91	100.00%
Scale sleep efficiency by PA intensity	-0.88	-3.26	100.00%
Scale sleep onset by PA intensity	0.20	-6.39	100.00%
Scale sleep regularity by PA intensity	-0.76	-2.15	100.00%
Log PA volume by sleep duration(lagged)	-0.39	-2.52	100.00%
Scale PA intensity by sleep duration(lagged)	0.12	-2.10	100.00%
Log PA volume by sleep efficiency(lagged)	-0.38	-2.51	100.00%
Scale PA intensity by sleep efficiency(lagged)	0.12	-2.14	100.00%
Log PA volume by sleep onset(lagged)	-0.37	-2.52	100.00%
Scale PA intensity by sleep onset(lagged)	0.13	-2.12	100.00%
Log PA volume by sleep regularity(lagged)	-0.32	-2.26	100.00%
Scale PA intensity by sleep regularity(lagged)	0.16	-2.05	100.00%
Models moderated by season			
Scale sleep duration by log PA volume	-0.09	-1.95	100.00%

Table 1 continued

Model name	Skewness	Kurtosis	Converged (%)
Scale sleep efficiency by log PA volume	-0.89	-3.23	100.00%
Scale sleep onset by log PA volume	0.21	-6.39	100.00%
Scale sleep regularity by log PA volume	-0.73	-2.02	100.00%
Scale sleep duration by PA intensity	-0.09	-1.94	100.00%
Scale sleep efficiency by PA intensity	-0.89	-3.29	100.00%
Scale sleep onset by PA intensity	0.22	-6.30	100.00%
Scale sleep regularity by PA intensity	-0.73	-1.99	100.00%
Log PA volume by sleep duration(lagged)	-0.45	-2.55	100.00%
Scale PA intensity by sleep duration(lagged)	0.09	-2.05	100.00%
Log PA volume by sleep efficiency(lagged)	-0.45	-2.54	100.00%
Scale PA intensity by sleep efficiency(lagged)	0.09	-2.05	100.00%
Log PA volume by sleep onset(lagged)	-0.46	-2.56	100.00%
Scale PA intensity by sleep onset(lagged)	0.09	-2.05	100.00%
Log PA volume by sleep regularity(lagged)	-0.38	-2.26	100.00%
Scale PA intensity by sleep regularity(lagged)	0.14	-1.96	100.00%
Models moderated by region			
Scale sleep duration by log PA volume	-0.08	-1.94	100.00%
Scale sleep efficiency by log PA volume	-0.88	-3.21	100.00%
Scale sleep onset by log PA volume	0.20	-6.36	100.00%
Scale sleep regularity by log PA volume	-0.73	-2.01	100.00%
Scale sleep duration by PA intensity	-0.08	-1.92	100.00%
Scale sleep efficiency by PA intensity	-0.89	-3.28	100.00%
Scale sleep onset by PA intensity	0.22	-6.31	100.00%
Scale sleep regularity by PA intensity	-0.73	-2.03	100.00%
Log PA volume by sleep duration(lagged)	-0.45	-2.54	100.00%
Scale PA intensity by sleep duration(lagged)	0.09	-2.05	100.00%
Log PA volume by sleep efficiency(lagged)	-0.46	-2.56	100.00%
Scale PA intensity by sleep efficiency(lagged)	0.09	-2.06	100.00%
Log PA volume by sleep onset(lagged)	-0.45	-2.55	100.00%
Scale PA intensity by sleep onset(lagged)	0.09	-2.04	100.00%
Log PA volume by sleep regularity(lagged)	-0.38	-2.28	100.00%
Scale PA intensity by sleep regularity(lagged)	0.14	-2.00	100.00%
Models moderated by daylight			
Scale sleep duration by log PA volume	-0.08	-1.96	100.00%
Scale sleep efficiency by log PA volume	-0.89	-3.23	100.00%

Table 1 continued

Model name	Skewness	Kurtosis	Converged (%)
Scale sleep onset by log PA volume	0.21	-6.38	100.00%
Scale sleep regularity by log PA volume	-0.73	-2.02	100.00%
Scale sleep duration by PA intensity	-0.09	-1.94	100.00%
Scale sleep efficiency by PA intensity	-0.89	-3.29	100.00%
Scale sleep onset by PA intensity	0.22	-6.32	100.00%
Scale sleep regularity by PA intensity	-0.73	-2.03	100.00%
Log PA volume by sleep duration(lagged)	-0.45	-2.54	100.00%
Scale PA intensity by sleep duration(lagged)	0.09	-2.05	100.00%
Log PA volume by sleep efficiency(lagged)	-0.46	-2.55	100.00%
Scale PA intensity by sleep efficiency(lagged)	0.09	-2.05	100.00%
Log PA volume by sleep onset(lagged)	-0.45	-2.55	100.00%
Scale PA intensity by sleep onset(lagged)	0.09	-2.05	100.00%
Log PA volume by sleep regularity(lagged)	-0.38	-2.28	100.00%
Scale PA intensity by sleep regularity(lagged)	0.14	-1.99	100.00%
Models moderated by wear location			
Scale sleep duration by log PA volume	-0.09	-1.95	100.00%
Scale sleep efficiency by log PA volume	-0.89	-3.23	100.00%
Scale sleep onset by log PA volume	0.20	-6.34	100.00%
Scale sleep regularity by log PA volume	-0.73	-2.03	100.00%
Scale sleep duration by PA intensity	-0.09	-1.94	100.00%
Scale sleep efficiency by PA intensity	-0.89	-3.27	100.00%
Scale sleep onset by PA intensity	0.22	-6.28	100.00%
Scale sleep regularity by PA intensity	-0.73	-2.04	100.00%
Log PA volume by sleep duration(lagged)	-0.45	-2.55	100.00%
Scale PA intensity by sleep duration(lagged)	0.09	-2.05	100.00%
Log PA volume by sleep efficiency(lagged)	-0.46	-2.55	100.00%
Scale PA intensity by sleep efficiency(lagged)	0.09	-2.05	100.00%
Log PA volume by sleep onset(lagged)	-0.45	-2.56	100.00%
Scale PA intensity by sleep onset(lagged)	0.09	-2.05	100.00%
Log PA volume by sleep regularity(lagged)	-0.37	-2.28	100.00%
Scale PA intensity by sleep regularity(lagged)	0.15	-1.99	100.00%
Models moderated by PA mostactivehr			
Scale sleep duration by log PA volume	-0.08	-1.95	100.00%
Scale sleep efficiency by log PA volume	-0.89	-3.22	100.00%
Scale sleep onset by log PA volume	0.21	-6.41	100.00%

Table 1 continued

Model name	Skewness	Kurtosis	Converged (%)
Scale sleep regularity by log PA volume	-0.73	-2.03	100.00%
Scale sleep duration by PA intensity	-0.09	-1.93	100.00%
Scale sleep efficiency by PA intensity	-0.89	-3.28	100.00%
Scale sleep onset by PA intensity	0.22	-6.31	100.00%
Scale sleep regularity by PA intensity	-0.73	-2.03	100.00%
Log PA volume by sleep duration(lagged)	-0.46	-2.54	100.00%
Scale PA intensity by sleep duration(lagged)	0.09	-2.04	100.00%
Log PA volume by sleep efficiency(lagged)	-0.46	-2.55	100.00%
Scale PA intensity by sleep efficiency(lagged)	0.09	-2.05	100.00%
Log PA volume by sleep onset(lagged)	-0.46	-2.56	100.00%
Scale PA intensity by sleep onset(lagged)	0.09	-2.05	100.00%
Log PA volume by sleep regularity(lagged)	-0.38	-2.27	100.00%
Scale PA intensity by sleep regularity(lagged)	0.13	-1.97	100.00%

Table 2

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

Term	Physical activity volume (ln)				Physical activity intensity (z)					
	$\beta$	[95% CI]	SE	t	p	$\beta$	[95% CI]	SE	t	p
<i>Sleep duration (z)</i>										
(Intercept)	0.03	[0.75, 0.80]	0.39	0.07	.946	0.73	[0.59, 0.88]	0.07	9.96	< .001
Log pa volume	0.23	[-0.20, 0.66]	0.22	1.04	.297	0.08	[0.04, 0.13]	0.02	3.60	< .001
Age	0.02	[0.00, 0.05]	0.01	1.77	.077	0.00	[-0.01, 0.00]	0.00	-0.39	.695
Log pa volume <sup>2</sup>	0.00	[-0.06, 0.06]	0.03	-0.11	.914	0.00	[-0.02, 0.03]	0.01	0.33	.741
Log pa volume × age	-0.01	[-0.03, 0.00]	0.01	-1.68	.092	0.00	[0.00, 0.00]	0.00	-1.21	.227
Age × log pa volume <sup>2</sup>	0.00	[0.00, 0.00]	0.00	1.52	.129	0.00	[0.00, 0.00]	0.00	-0.63	.526
<i>Sleep efficiency (z)</i>										
(Intercept)	-3.32	[-4.10, -2.54]	0.40	-8.36	< .001	-0.46	[-0.60, -0.31]	0.08	-6.03	< .001
Log pa volume	1.43	[0.99, 1.87]	0.22	6.40	< .001	0.07	[0.02, 0.11]	0.02	2.83	.005
Age	0.04	[0.02, 0.07]	0.01	3.39	.001	0.00	[-0.01, 0.00]	0.00	-0.85	.397
Log pa volume <sup>2</sup>	-0.17	[-0.23, -0.11]	0.03	-5.30	< .001	-0.02	[-0.04, 0.01]	0.01	-1.08	.278
Log pa volume × age	-0.02	[-0.03, -0.01]	0.01	-2.83	.005	0.00	[0.00, 0.00]	0.00	-2.10	.036
Age × log pa volume <sup>2</sup>	0.00	[0.00, 0.00]	0.00	2.17	.030	0.00	[0.00, 0.00]	0.00	1.49	.137
<i>Sleep onset (z)</i>										
(Intercept)	-2.15	[-2.70, -1.61]	0.28	-7.70	< .001	-1.02	[-1.14, -0.91]	0.06	-17.41	< .001
Log pa volume	0.69	[0.39, 1.00]	0.16	4.47	< .001	-0.05	[-0.08, -0.02]	0.02	-3.22	.001
Age	0.02	[0.01, 0.04]	0.01	2.78	.005	0.00	[-0.01, 0.00]	0.00	-1.61	.108
Log pa volume <sup>2</sup>	-0.11	[-0.15, -0.06]	0.02	-4.81	< .001	-0.04	[-0.06, -0.02]	0.01	-3.67	< .001
Log pa volume × age	-0.01	[-0.02, 0.00]	0.00	-2.48	.013	0.00	[0.00, 0.00]	0.00	-0.26	.793
Age × log pa volume <sup>2</sup>	0.00	[0.00, 0.00]	0.00	1.79	.073	0.00	[0.00, 0.00]	0.00	3.70	< .001
<i>Sleep regularity (z)</i>										

Table 2 continued

Term	Physical activity volume (ln)				Physical activity intensity (z)					
	$\beta$	[95% CI]	SE	t	p	$\beta$	[95% CI]	SE	t	p
(Intercept)	-2.57	[-3.30, -1.84]	0.37	-6.92	< .001	0.15	[0.00, 0.29]	0.07	1.99	.047
Log pa volume	1.17	[0.76, 1.58]	0.21	5.63	< .001	0.28	[0.24, 0.32]	0.02	12.61	< .001
Age	-0.03	[-0.05, 0.00]	0.01	-2.06	.050	0.00	[-0.01, 0.00]	0.00	-1.64	.102
Log pa volume <sup>2</sup>	-0.11	[-0.17, -0.05]	0.03	-3.66	< .001	-0.09	[-0.11, -0.06]	0.01	-6.46	< .001
Log pa volume × age	0.02	[0.00, 0.03]	0.01	2.25	.034	0.00	[-0.01, 0.00]	0.00	-9.36	< .001
Age × log pa volume <sup>2</sup>	0.00	[0.00, 0.00]	0.00	-2.40	.026	0.00	[0.00, 0.00]	0.00	2.50	.012

*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 (ln)				Physical activity intensity (z)			
	$\beta$ [95% CI]	SE	t	p	$\beta$ [95% CI]	SE	t	p
<b>Sleep duration (z)</b>								
(Intercept)	3.75 [3.68, 3.82]	0.04	102.74	< .001	1.10 [0.98, 1.22]	0.06	17.73	< .001
Sleep duration	-0.02 [-0.03, 0.00]	0.01	-2.78	.006	-0.04 [-0.06, -0.02]	0.01	-3.79	< .001
Age	-0.01 [-0.02, -0.01]	0.00	-5.22	.011	-0.02 [-0.03, -0.02]	0.00	-6.27	.007
Sleep duration <sup>2</sup>	-0.01 [-0.01, 0.00]	0.00	-2.35	.021	-0.01 [-0.02, -0.01]	0.00	-2.97	.003
Sleep duration × age	0.00 [0.00, 0.00]	0.00	1.27	.206	0.00 [0.00, 0.00]	0.00	5.03	< .001
Age × Sleep duration <sup>2</sup>	0.00 [0.00, 0.00]	0.00	-1.07	.285	0.00 [0.00, 0.00]	0.00	1.55	.122
<b>Sleep efficiency (z)</b>								
(Intercept)	3.74 [3.67, 3.81]	0.04	103.99	< .001	1.08 [0.96, 1.20]	0.06	17.28	< .001
Sleep efficiency	0.00 [-0.01, 0.01]	0.01	0.16	.876	-0.03 [-0.05, 0.00]	0.01	-1.83	.072
Age	-0.01 [-0.02, -0.01]	0.00	-5.20	.011	-0.02 [-0.03, -0.02]	0.00	-6.21	.008
Sleep efficiency <sup>2</sup>	0.00 [0.00, 0.00]	0.00	0.48	.633	0.00 [-0.01, 0.00]	0.00	-1.07	.286
Sleep efficiency × age	0.00 [0.00, 0.00]	0.00	-0.15	.881	0.00 [0.00, 0.00]	0.00	0.58	.563
Age × Sleep efficiency <sup>2</sup>	0.00 [0.00, 0.00]	0.00	-1.20	.231	0.00 [0.00, 0.00]	0.00	-1.07	.285
<b>Sleep onset (z)</b>								
(Intercept)	3.75 [3.68, 3.83]	0.04	103.48	< .001	1.11 [0.99, 1.23]	0.06	17.76	< .001
Sleep onset	0.01 [0.00, 0.03]	0.01	1.88	.067	0.05 [0.02, 0.08]	0.01	3.32	.002
Age	-0.01 [-0.02, -0.01]	0.00	-5.19	.012	-0.02 [-0.03, -0.02]	0.00	-6.12	.008
Sleep onset <sup>2</sup>	-0.01 [-0.02, 0.00]	0.01	-1.41	.164	0.01 [-0.01, 0.03]	0.01	1.20	.235
Sleep onset × age	0.00 [0.00, 0.00]	0.00	-1.99	.047	0.00 [0.00, 0.00]	0.00	-1.90	.062
Age × Sleep onset <sup>2</sup>	0.00 [0.00, 0.00]	0.00	0.41	.681	0.00 [0.00, 0.00]	0.00	-1.48	.140
Sleep regularity (z)								

Table 3 continued

Term	Physical activity volume (ln)				Physical activity intensity (z)			
	$\beta$ [95% CI]	SE	t	p	$\beta$ [95% CI]	SE	t	p
(Intercept)	3.75 [3.68, 3.82]	0.03	107.07	< .001	1.11 [0.99, 1.24]	0.06	17.52	< .001
Sleep regularity	0.08 [0.07, 0.09]	0.01	14.41	< .001	0.10 [0.08, 0.12]	0.01	8.58	< .001
Age	-0.01 [-0.02, -0.01]	0.00	-5.19	.012	-0.02 [-0.03, -0.02]	0.00	-6.24	.008
Sleep regularity <sup>2</sup>	-0.01 [-0.02, -0.01]	0.00	-4.07	< .001	-0.03 [-0.04, -0.01]	0.01	-4.05	< .001
Sleep regularity × age	0.00 [0.00, 0.00]	0.00	-4.65	< .001	0.00 [0.00, 0.00]	0.00	-4.50	< .001
Age × Sleep regularity <sup>2</sup>	0.00 [0.00, 0.00]	0.00	0.44	.661	0.00 [0.00, 0.00]	0.00	3.09	.002

*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, sex, and BMI.*

Term	Physical activity volume (z)				Physical activity intensity (z)			
	$\beta$ [95% CI]	SE	t	p	$\beta$ [95% CI]	SE	t	p
<b>Sleep duration (z)</b>								
(Intercept)	0.21 [-0.04, 0.47]	0.13	1.63	.103	0.25 [0.01, 0.50]	0.12	2.02	.043
Physical activity	0.12 [0.08, 0.16]	0.02	5.51	< .001	0.09 [0.04, 0.13]	0.02	3.65	< .001
Age	0.00 [-0.01, 0.00]	0.00	-0.93	.351	0.00 [-0.01, 0.00]	0.00	-1.16	.247
Physical activity <sup>2</sup>	-0.01 [-0.02, 0.00]	0.00	-1.97	.049	0.00 [-0.02, 0.03]	0.01	0.30	.761
Physical activity × age	0.00 [0.00, 0.00]	0.00	-0.86	.392	0.00 [0.00, 0.00]	0.00	-1.24	.214
Age × Physical activity <sup>2</sup>	0.00 [0.00, 0.00]	0.00	-0.05	.959	0.00 [0.00, 0.00]	0.00	-0.58	.563
<b>Sleep efficiency (z)</b>								
(Intercept)	0.22 [-0.02, 0.46]	0.12	1.78	.075	0.27 [0.01, 0.52]	0.13	2.04	.042
Physical activity	0.15 [0.10, 0.19]	0.02	6.90	< .001	0.06 [0.02, 0.11]	0.02	2.75	.006
Age	0.00 [0.00, 0.01]	0.00	0.87	.386	0.00 [0.00, 0.00]	0.00	0.31	.754
Physical activity <sup>2</sup>	-0.02 [-0.03, -0.01]	0.00	-4.92	< .001	-0.01 [-0.04, 0.01]	0.01	-0.94	.346
Physical activity × age	0.00 [0.00, 0.00]	0.00	-5.08	< .001	0.00 [0.00, 0.00]	0.00	-2.03	.043
Age × Physical activity <sup>2</sup>	0.00 [0.00, 0.00]	0.00	2.08	.038	0.00 [0.00, 0.00]	0.00	1.32	.186
<b>Sleep onset (z)</b>								
(Intercept)	0.03 [-0.30, 0.36]	0.17	0.20	.845	0.03 [-0.29, 0.34]	0.16	0.15	.877
Physical activity	-0.03 [-0.06, 0.00]	0.02	-2.27	.023	-0.05 [-0.09, -0.02]	0.02	-3.24	.001
Age	0.00 [-0.01, 0.00]	0.00	-1.11	.272	0.00 [-0.01, 0.00]	0.00	-1.22	.222
Physical activity <sup>2</sup>	0.00 [-0.01, 0.00]	0.00	-0.74	.459	-0.04 [-0.06, -0.02]	0.01	-3.64	< .001
Physical activity × age	0.00 [0.00, 0.00]	0.00	-5.36	< .001	0.00 [0.00, 0.00]	0.00	-0.25	.802
Age × Physical activity <sup>2</sup>	0.00 [0.00, 0.00]	0.00	2.18	.029	0.00 [0.00, 0.00]	0.00	3.65	< .001
<b>Sleep regularity (z)</b>								

Term	Physical activity volume (z)				Physical activity intensity (z)			
	$\beta$ [95% CI]	SE	t	p	$\beta$ [95% CI]	SE	t	p
(Intercept)	0.47 [0.26, 0.68]	0.11	4.34	< .001	0.62 [0.37, 0.86]	0.12	4.96	< .001
Physical activity	0.25 [0.21, 0.29]	0.02	12.28	< .001	0.28 [0.23, 0.32]	0.02	12.62	< .001
Age	0.00 [0.00, 0.01]	0.00	0.82	.413	0.00 [-0.01, 0.00]	0.00	-0.81	.416
Physical activity <sup>2</sup>	-0.03 [-0.04, -0.02]	0.00	-6.55	< .001	-0.08 [-0.11, -0.06]	0.01	-6.34	< .001
Physical activity × age	0.00 [0.00, 0.00]	0.00	-1.67	.094	0.00 [-0.01, 0.00]	0.00	-9.30	< .001
Age × Physical activity <sup>2</sup>	0.00 [0.00, 0.00]	0.00	-1.61	.135	0.00 [0.00, 0.00]	0.00	2.35	.019

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

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

Term	Physical activity volume (z)			Physical activity intensity (z)				
	$\beta$ [95% CI]	SE	t	p	$\beta$ [95% CI]	SE	t	p
Sleep duration (z)								
(Intercept)	1.70 [1.29, 2.10]	0.21	8.16	< .001	1.48 [1.25, 1.71]	0.12	12.64	< .001
Sleep duration	-0.01 [-0.03, 0.01]	0.01	-1.15	.251	-0.04 [-0.06, -0.02]	0.01	-3.78	< .001
Age	-0.02 [-0.03, -0.02]	0.00	-5.97	.005	-0.02 [-0.03, -0.02]	0.00	-8.87	.001
Sleep duration <sup>2</sup>	-0.01 [-0.02, 0.00]	0.01	-1.71	.096	-0.01 [-0.02, -0.01]	0.00	-2.99	.003
Sleep duration × age	0.00 [0.00, 0.00]	0.00	0.50	.616	0.00 [0.00, 0.00]	0.00	5.03	< .001
Age × Sleep duration <sup>2</sup>	0.00 [0.00, 0.00]	0.00	-0.53	.599	0.00 [0.00, 0.00]	0.00	1.56	.118
Sleep efficiency (z)								
(Intercept)	1.69 [1.28, 2.10]	0.21	8.07	< .001	1.47 [1.24, 1.71]	0.12	12.47	< .001
Sleep efficiency	-0.01 [-0.03, 0.02]	0.01	-0.59	.556	-0.02 [-0.05, 0.00]	0.01	-1.77	.082
Age	-0.02 [-0.03, -0.02]	0.00	-5.93	.005	-0.02 [-0.03, -0.02]	0.00	-8.69	.001
Sleep efficiency <sup>2</sup>	0.00 [-0.01, 0.01]	0.00	0.21	.834	0.00 [-0.01, 0.00]	0.00	-1.04	.296
Sleep efficiency × age	0.00 [0.00, 0.00]	0.00	0.53	.593	0.00 [0.00, 0.00]	0.00	0.54	.591
Age × Sleep efficiency <sup>2</sup>	0.00 [0.00, 0.00]	0.00	-0.61	.545	0.00 [0.00, 0.00]	0.00	-1.08	.281
Sleep onset (z)								
(Intercept)	1.69 [1.28, 2.10]	0.21	8.06	< .001	1.47 [1.24, 1.70]	0.12	12.48	< .001
Sleep onset	0.01 [-0.02, 0.04]	0.01	0.86	.396	0.05 [0.02, 0.08]	0.01	3.37	.002
Age	-0.02 [-0.03, -0.02]	0.00	-5.86	.005	-0.02 [-0.03, -0.02]	0.00	-8.66	.001
Sleep onset <sup>2</sup>	0.00 [-0.02, 0.02]	0.01	0.02	.981	0.01 [-0.01, 0.03]	0.01	1.17	.245
Sleep onset × age	0.00 [0.00, 0.00]	0.00	-0.99	.322	0.00 [0.00, 0.00]	0.00	-1.93	.059
Age × Sleep onset <sup>2</sup>	0.00 [0.00, 0.00]	0.00	-0.47	.636	0.00 [0.00, 0.00]	0.00	-1.46	.146
Sleep regularity (z)								

Table 5 continued

Term	Physical activity volume (z)				Physical activity intensity (z)					
	$\beta$	[95% CI]	SE	t	p	$\beta$	[95% CI]	SE	t	p
(Intercept)	1.64	[1.24, 2.04]	0.21	8.00	< .001	1.46	[1.23, 1.69]	0.12	12.64	< .001
Sleep regularity	0.13	[0.11, 0.15]	0.01	10.38	< .001	0.10	[0.08, 0.12]	0.01	8.61	< .001
Age	-0.02	[-0.03, -0.01]	0.00	-5.89	.005	-0.02	[-0.03, -0.02]	0.00	-9.04	.001
Sleep regularity <sup>2</sup>	-0.01	[-0.02, 0.00]	0.01	-1.76	.079	-0.03	[-0.04, -0.01]	0.01	-3.99	< .001
Sleep regularity × age	0.00	[0.00, 0.00]	0.00	-3.81	< .001	0.00	[0.00, 0.00]	0.00	-4.52	< .001
Age × Sleep regularity <sup>2</sup>	0.00	[0.00, 0.00]	0.00	0.51	.610	0.00	[0.00, 0.00]	0.00	3.06	.002

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

Table 6

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

Term	Physical activity volume (ln)				Physical activity intensity (z)					
	$\beta$	[95% CI]	SE	t	p	$\beta$	[95% CI]	SE	t	p
<i>Sleep duration (z)</i>										
(Intercept)	-0.51	[-2.95, 1.93]	1.25	-0.41	.690	0.25	[0.01, 0.50]	0.13	2.01	.045
Log pa volume	0.13	[-1.38, 1.65]	0.77	0.17	.866	0.11	[0.02, 0.20]	0.05	2.30	.039
Log pa volume <sup>2</sup>	0.02	[-0.21, 0.25]	0.12	0.17	.869	0.02	[-0.03, 0.06]	0.02	0.77	.439
Age	0.00	[-0.01, 0.00]	0.00	-0.95	.343	0.00	[-0.01, 0.00]	0.00	-1.20	.231
Log pa volume × bmi	-0.01	[-0.08, 0.07]	0.04	-0.15	.883	0.00	[-0.01, 0.00]	0.00	-0.93	.376
<i>Sleep efficiency (z)</i>										
(Intercept)	-3.66	[-5.68, -1.65]	1.03	-3.56	< .001	0.31	[0.03, 0.60]	0.15	2.14	.036
Log pa volume	1.89	[0.72, 3.06]	0.60	3.16	.002	0.06	[-0.04, 0.17]	0.05	1.14	.291
Log pa volume <sup>2</sup>	-0.22	[-0.39, -0.05]	0.09	-2.49	.014	-0.03	[-0.13, 0.08]	0.05	-0.52	.639
Age	0.00	[0.00, 0.01]	0.00	0.96	.339	0.00	[0.00, 0.01]	0.00	0.68	.495
Log pa volume × bmi	-0.05	[-0.10, 0.01]	0.03	-1.56	.120	0.00	[-0.01, 0.00]	0.00	-0.82	.430
<i>Sleep onset (z)</i>										
(Intercept)	-2.29	[-3.81, -0.77]	0.78	-2.95	.004	0.05	[-0.27, 0.36]	0.16	0.29	.773
Log pa volume	1.35	[0.42, 2.29]	0.48	2.85	.009	-0.05	[-0.12, 0.02]	0.04	-1.41	.192
Log pa volume <sup>2</sup>	-0.19	[-0.34, -0.04]	0.08	-2.55	.025	-0.05	[-0.08, -0.02]	0.02	-3.14	.002
Age	0.00	[-0.01, 0.00]	0.00	-0.88	.390	0.00	[0.00, 0.00]	0.00	-0.67	.504
Log pa volume × bmi	-0.05	[-0.10, 0.00]	0.03	-1.93	.073	0.00	[0.00, 0.00]	0.00	-0.47	.643
<i>Sleep regularity (z)</i>										
(Intercept)	-1.89	[-5.25, 1.46]	1.71	-1.11	.333	0.64	[0.39, 0.89]	0.13	5.07	< .001
Log pa volume	1.21	[-0.13, 2.55]	0.68	1.77	.103	0.17	[0.02, 0.31]	0.08	2.18	.112
Log pa volume <sup>2</sup>	-0.15	[-0.31, 0.00]	0.08	-2.02	.044	-0.03	[-0.11, 0.06]	0.04	-0.58	.595

Term	Physical activity volume (ln)				Physical activity intensity (z)			
	$\beta$ [95% CI]	SE	t	p	$\beta$ [95% CI]	SE	t	p
Age	0.00 [0.00, 0.00]	0.00	0.27	.785	0.00 [0.00, 0.00]	0.00	-0.10	.922
Log pa volume $\times$ bmi	0.01 [-0.05, 0.07]	0.03	0.29	.774	0.00 [-0.01, 0.00]	0.00	-1.11	.316

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

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

Term	Physical activity volume (ln)				Physical activity intensity (z)					
	$\beta$	[95% CI]	SE	t	p	$\beta$	[95% CI]	SE	t	p
Sleep duration (z)										
(Intercept)	4.42	[4.23, 4.60]	0.09	46.86	< .001	1.48	[1.26, 1.69]	0.11	13.52	< .001
Sleep duration	-0.01	[-0.04, 0.01]	0.01	-1.38	.168	-0.03	[-0.10, 0.04]	0.03	-0.90	.409
Sleep duration <sup>2</sup>	0.00	[-0.01, 0.01]	0.01	-0.67	.506	-0.01	[-0.05, 0.02]	0.02	-0.90	.410
Age	-0.01	[-0.02, -0.01]	0.00	-5.57	.008	-0.02	[-0.03, -0.02]	0.00	-8.76	.001
Sleep duration × bmi	0.00	[0.00, 0.00]	0.00	0.42	.671	0.00	[0.00, 0.00]	0.00	1.10	.295
Sleep efficiency (z)										
(Intercept)	4.42	[4.23, 4.60]	0.10	46.38	< .001	1.47	[1.24, 1.70]	0.12	12.63	< .001
Sleep efficiency	0.01	[-0.03, 0.04]	0.02	0.33	.756	-0.01	[-0.07, 0.05]	0.03	-0.41	.693
Sleep efficiency <sup>2</sup>	0.00	[-0.01, 0.01]	0.01	0.76	.460	0.00	[0.02, 0.02]	0.01	0.02	.985
Age	-0.01	[-0.02, -0.01]	0.00	-5.54	.008	-0.02	[-0.03, -0.02]	0.00	-8.85	.001
Sleep efficiency × bmi	0.00	[0.00, 0.00]	0.00	-0.38	.724	0.00	[0.00, 0.00]	0.00	-0.26	.800
Sleep onset (z)										
(Intercept)	4.43	[4.24, 4.61]	0.10	46.45	< .001	1.45	[1.20, 1.71]	0.13	11.03	< .001
Sleep onset	0.01	[-0.01, 0.04]	0.01	0.97	.333	0.04	[-0.03, 0.11]	0.04	1.21	.258
Sleep onset <sup>2</sup>	-0.01	[-0.03, 0.00]	0.01	-1.68	.094	0.01	[-0.04, 0.06]	0.02	0.50	.638
Age	-0.01	[-0.02, -0.01]	0.00	-5.43	.009	-0.02	[-0.03, -0.02]	0.00	-9.00	.001
Sleep onset × bmi	0.00	[0.00, 0.00]	0.00	-0.70	.487	0.00	[0.00, 0.00]	0.00	-0.61	.555
Sleep regularity (z)										
(Intercept)	4.40	[4.22, 4.59]	0.09	47.03	< .001	1.49	[1.26, 1.71]	0.11	13.19	< .001
Sleep regularity	0.08	[0.01, 0.15]	0.04	2.18	.130	0.11	[0.05, 0.17]	0.03	3.59	.002
Sleep regularity <sup>2</sup>	-0.03	[-0.05, -0.01]	0.01	-3.60	< .001	-0.05	[-0.09, -0.02]	0.02	-2.96	.005

Table 7 continued

Term	Physical activity volume (ln)				Physical activity intensity (z)					
	$\beta$	[95% CI]	SE	t	p	$\beta$	[95% CI]	SE	t	p
Age	-0.01	[-0.02, -0.01]	0.00	-5.58	.008	-0.02	[-0.03, -0.02]	0.00	-9.01	.001
Sleep regularity $\times$ bmi	0.00	[0.00, 0.00]	0.00	-0.39	.726	0.00	[0.00, 0.00]	0.00	-1.75	.086

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

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

Term	Physical activity volume (ln)			Physical activity intensity (z)				
	$\beta$ [95% CI]	SE	t	p	$\beta$ [95% CI]	SE	t	p
Sleep duration (z)								
(Intercept)	0.15 [-0.91, 1.20]	0.54	0.27	.784	0.27 [0.02, 0.51]	0.13	2.13	.033
Log pa volume	-0.11 [-0.69, 0.47]	0.29	-0.38	.705	0.06 [0.02, 0.10]	0.02	3.19	.001
Log pa volume <sup>2</sup>	0.04 [-0.04, 0.12]	0.04	0.88	.378	0.00 [-0.02, 0.03]	0.01	0.14	.893
Age	0.00 [-0.01, 0.00]	0.00	-0.99	.321	0.00 [-0.01, 0.00]	0.00	-1.24	.216
Log pa volume $\times$ sesmedium	-0.24 [-1.08, 0.60]	0.43	-0.56	.579	0.01 [-0.04, 0.06]	0.02	0.40	.690
Log pa volume $\times$ seshigh	0.26 [-0.45, 0.97]	0.36	0.73	.466	0.01 [-0.04, 0.05]	0.02	0.27	.789
Sleep efficiency (z)								
(Intercept)	-0.89 [-1.95, 0.17]	0.54	-1.65	.100	0.27 [0.01, 0.52]	0.13	2.07	.038
Log pa volume	0.58 [0.01, 1.15]	0.29	1.98	.049	0.00 [-0.03, 0.04]	0.02	0.10	.919
Log pa volume <sup>2</sup>	-0.07 [-0.15, 0.01]	0.04	-1.82	.070	0.01 [-0.01, 0.03]	0.01	1.13	.258
Age	0.00 [0.00, 0.01]	0.00	0.98	.328	0.00 [0.00, 0.01]	0.00	0.56	.576
Log pa volume $\times$ sesmedium	-0.16 [-1.00, 0.67]	0.43	-0.38	.704	0.00 [-0.05, 0.04]	0.02	-0.10	.921
Log pa volume $\times$ seshigh	0.74 [0.00, 1.48]	0.38	1.96	.052	0.04 [-0.01, 0.08]	0.02	1.63	.103
Sleep onset (z)								
(Intercept)	-0.14 [-0.94, 0.66]	0.41	-0.34	.735	0.00 [-0.32, 0.32]	0.16	0.01	.994
Log pa volume	0.29 [-0.11, 0.69]	0.20	1.42	.157	-0.08 [-0.10, -0.05]	0.01	-5.66	< .001
Log pa volume <sup>2</sup>	-0.07 [-0.12, -0.01]	0.03	-2.36	.018	-0.01 [-0.02, 0.01]	0.01	-0.79	.435
Age	0.00 [0.00, 0.00]	0.00	-0.89	.374	0.00 [0.00, 0.00]	0.00	-0.68	.496
Log pa volume $\times$ sesmedium	-0.16 [-0.77, 0.44]	0.31	-0.52	.603	-0.02 [-0.06, 0.01]	0.02	-1.22	.223
Log pa volume $\times$ seshigh	0.22 [-0.28, 0.73]	0.26	0.86	.391	0.02 [-0.02, 0.05]	0.02	1.07	.286
Sleep regularity (z)								

Table 8 continued

Term	Physical activity volume (ln)				Physical activity intensity (z)			
	$\beta$ [95% CI]	SE	t	p	$\beta$ [95% CI]	SE	t	p
(Intercept)	-1.67 [-2.68, -0.65]	0.52	-3.23	.002	0.64 [0.40, 0.88]	0.12	5.25	< .001
Log pa volume	0.90 [0.32, 1.47]	0.29	3.04	.004	0.07 [0.04, 0.11]	0.02	3.93	< .001
Log pa volume <sup>2</sup>	-0.08 [-0.16, 0.00]	0.04	-1.91	.066	-0.01 [-0.03, 0.01]	0.01	-0.80	.428
Age	0.00 [0.00, 0.00]	0.00	0.35	.727	0.00 [0.00, 0.00]	0.00	-0.19	.848
Log pa volume × sesmedium	1.08 [0.23, 1.94]	0.44	2.48	.021	0.02 [-0.03, 0.06]	0.02	0.69	.488
Log pa volume × seshigh	0.74 [-0.17, 1.64]	0.46	1.59	.148	0.05 [0.00, 0.10]	0.02	2.14	.038

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

Table 9

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

Term	Physical activity volume (ln)			Physical activity intensity (z)				
	$\beta$ [95% CI]	SE	t	p	$\beta$ [95% CI]	SE	t	p
Sleep duration (z)								
(Intercept)	4.43 [4.24, 4.61]	0.09	46.86	< .001	1.48 [1.25, 1.71]	0.12	12.68	< .001
Sleep duration	-0.01 [-0.02, 0.00]	0.01	-1.48	.140	0.01 [-0.01, 0.04]	0.01	1.21	.226
Sleep duration <sup>2</sup>	-0.01 [-0.01, 0.00]	0.00	-2.83	.006	-0.01 [-0.02, 0.00]	0.01	-1.57	.116
Age	-0.01 [-0.02, -0.01]	0.00	-5.52	.008	-0.02 [-0.03, -0.02]	0.00	-8.80	.001
Sleep duration × sesmedium	0.01 [-0.01, 0.02]	0.01	0.70	.487	-0.01 [-0.04, 0.02]	0.02	-0.59	.558
Sleep duration × seshigh	-0.01 [-0.02, 0.01]	0.01	-1.08	.281	-0.02 [-0.06, 0.01]	0.02	-1.55	.123
Sleep efficiency (z)								
(Intercept)	4.42 [4.23, 4.61]	0.10	46.39	< .001	1.48 [1.25, 1.71]	0.12	12.59	< .001
Sleep efficiency	0.01 [-0.01, 0.02]	0.01	1.22	.226	-0.01 [-0.04, 0.01]	0.01	-0.94	.352
Sleep efficiency <sup>2</sup>	0.00 [0.00, 0.00]	0.00	0.65	.519	0.00 [-0.01, 0.00]	0.00	-0.97	.344
Age	-0.01 [-0.02, -0.01]	0.00	-5.52	.008	-0.02 [-0.03, -0.02]	0.00	-8.83	.001
Sleep efficiency × sesmedium	0.00 [-0.02, 0.01]	0.01	-0.47	.640	0.00 [-0.03, 0.04]	0.02	0.02	.984
Sleep efficiency × seshigh	-0.02 [-0.04, 0.00]	0.01	-1.85	.068	-0.01 [-0.05, 0.02]	0.02	-0.74	.459
Sleep onset (z)								
(Intercept)	4.42 [4.24, 4.61]	0.10	46.43	< .001	1.48 [1.25, 1.71]	0.12	12.59	< .001
Sleep onset	0.00 [-0.01, 0.01]	0.01	0.02	.988	0.02 [0.00, 0.05]	0.01	1.70	.089
Sleep onset <sup>2</sup>	-0.01 [-0.02, 0.00]	0.00	-2.24	.026	-0.01 [-0.02, 0.01]	0.01	-0.84	.401
Age	-0.01 [-0.02, -0.01]	0.00	-5.53	.008	-0.02 [-0.03, -0.02]	0.00	-8.92	.001
Sleep onset × sesmedium	-0.01 [-0.03, 0.01]	0.01	-0.66	.517	-0.01 [-0.05, 0.03]	0.02	-0.45	.652
Sleep onset × seshigh	0.02 [0.00, 0.04]	0.01	1.83	.070	0.00 [-0.03, 0.04]	0.02	0.08	.937
Sleep regularity (z)								

Term	Physical activity volume (ln)				Physical activity intensity (z)			
	$\beta$ [95% CI]	SE	t	p	$\beta$ [95% CI]	SE	t	p
(Intercept)	4.39 [4.21, 4.57]	0.09	47.73	< .001	1.44 [1.22, 1.67]	0.11	12.57	< .001
Sleep regularity	0.06 [0.04, 0.07]	0.01	8.05	< .001	0.06 [0.03, 0.09]	0.01	4.00	< .001
Sleep regularity <sup>2</sup>	-0.01 [-0.02, 0.00]	0.00	-2.51	.013	-0.01 [-0.03, 0.01]	0.01	-0.98	.328
Age	-0.01 [-0.02, -0.01]	0.00	-5.58	.008	-0.02 [-0.03, -0.02]	0.00	-9.06	.001
Sleep regularity × sesmedium	0.00 [-0.02, 0.02]	0.01	-0.10	.922	-0.01 [-0.05, 0.02]	0.02	-0.66	.508
Sleep regularity × seshigh	0.01 [-0.01, 0.03]	0.01	1.15	.257	0.02 [-0.02, 0.06]	0.02	0.98	.327

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

Table 10

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

Term	Physical activity volume (ln)				Physical activity intensity (z)			
	$\beta$ [95% CI]	SE	t	p	$\beta$ [95% CI]	SE	t	p
<b>Sleep duration (z)</b>								
(Intercept)	-0.02 [-0.85, 0.81]	0.42	-0.05	.959	0.26 [0.02, 0.50]	0.12	2.09	.037
Log pa volume	-0.07 [-0.53, 0.38]	0.23	-0.32	.748	0.07 [0.04, 0.10]	0.02	4.31	< .001
Log pa volume <sup>2</sup>	0.04 [-0.03, 0.10]	0.03	1.16	.246	0.01 [-0.01, 0.03]	0.01	1.24	.213
Age	0.00 [-0.01, 0.00]	0.00	-0.94	.345	0.00 [-0.01, 0.00]	0.00	-1.24	.215
Log pa volume × sexmale	0.01 [-0.59, 0.61]	0.31	0.04	.971	0.00 [-0.03, 0.04]	0.02	0.15	.883
<b>Sleep efficiency (z)</b>								
(Intercept)	-2.14 [-2.96, -1.31]	0.42	-5.09	< .001	0.26 [0.00, 0.51]	0.13	1.98	.048
Log pa volume	1.19 [0.74, 1.64]	0.23	5.19	< .001	0.02 [-0.01, 0.05]	0.02	1.09	.274
Log pa volume <sup>2</sup>	-0.15 [-0.21, -0.08]	0.03	-4.48	< .001	0.02 [0.00, 0.04]	0.01	2.10	.036
Age	0.00 [0.00, 0.01]	0.00	1.03	.303	0.00 [0.00, 0.01]	0.00	0.61	.545
Log pa volume × sexmale	-0.59 [-1.19, 0.01]	0.31	-1.92	.055	0.00 [-0.04, 0.04]	0.02	-0.03	.972
<b>Sleep onset (z)</b>								
(Intercept)	-0.56 [-1.21, 0.09]	0.33	-1.68	.093	0.00 [-0.32, 0.31]	0.16	-0.03	.976
Log pa volume	0.53 [0.21, 0.85]	0.16	3.23	.001	-0.08 [-0.10, -0.06]	0.01	-7.06	< .001
Log pa volume <sup>2</sup>	-0.10 [-0.15, -0.06]	0.02	-4.30	< .001	-0.01 [-0.02, 0.01]	0.01	-1.09	.275
Age	0.00 [0.00, 0.00]	0.00	-0.84	.401	0.00 [0.00, 0.00]	0.00	-0.68	.499
Log pa volume × sexmale	-0.26 [-0.68, 0.17]	0.22	-1.18	.238	0.00 [-0.03, 0.03]	0.01	0.00	.998
<b>Sleep regularity (z)</b>								
(Intercept)	-2.44 [-3.28, -1.60]	0.43	-5.68	< .001	0.64 [0.40, 0.87]	0.12	5.26	< .001
Log pa volume	1.33 [0.87, 1.79]	0.23	5.68	< .001	0.09 [0.06, 0.12]	0.02	5.72	< .001
Log pa volume <sup>2</sup>	-0.14 [-0.21, -0.08]	0.03	-4.22	< .001	-0.01 [-0.03, 0.00]	0.01	-1.55	.122

Term	Physical activity volume (ln)				Physical activity intensity (z)					
	$\beta$	[95% CI]	SE	t	p	$\beta$	[95% CI]	SE	t	p
Age	0.00	[0.00, 0.00]	0.00	0.35	.732	0.00	[0.00, 0.00]	0.00	-0.10	.919
Log pa volume $\times$ sexmale	0.35	[-0.22, 0.92]	0.29	1.20	.229	0.02	[-0.02, 0.05]	0.02	0.88	.378

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

Table 11

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

Term	Physical activity volume (ln)				Physical activity intensity (z)			
	$\beta$ [95% CI]	SE	t	p	$\beta$ [95% CI]	SE	t	p
<b>Sleep duration (z)</b>								
(Intercept)	4.43 [4.24, 4.61]	0.09	46.68	< .001	1.48 [1.25, 1.70]	0.12	12.66	< .001
Sleep duration	-0.01 [-0.02, -0.01]	0.00	-3.21	.001	0.01 [-0.01, 0.02]	0.01	0.72	.473
Sleep duration <sup>2</sup>	-0.01 [-0.01, 0.00]	0.00	-3.92	< .001	-0.01 [-0.02, 0.00]	0.00	-1.65	.100
Age	-0.01 [-0.02, -0.01]	0.00	-5.51	.008	-0.02 [-0.03, -0.02]	0.00	-8.84	.001
Sleep duration × sexmale	0.01 [0.00, 0.02]	0.01	1.42	.157	-0.01 [-0.04, 0.02]	0.01	-0.78	.438
<b>Sleep efficiency (z)</b>								
(Intercept)	4.42 [4.23, 4.61]	0.10	46.35	< .001	1.48 [1.24, 1.71]	0.12	12.50	< .001
Sleep efficiency	0.01 [0.00, 0.02]	0.01	1.99	.046	-0.01 [-0.03, 0.01]	0.01	-0.64	.525
Sleep efficiency <sup>2</sup>	0.00 [0.00, 0.00]	0.00	0.56	.573	0.00 [-0.01, 0.00]	0.00	-0.91	.361
Age	-0.01 [-0.02, -0.01]	0.00	-5.48	.009	-0.02 [-0.03, -0.02]	0.00	-8.80	.001
Sleep efficiency × sexmale	-0.02 [-0.03, 0.00]	0.01	-2.60	.010	-0.02 [-0.05, 0.00]	0.01	-1.64	.101
<b>Sleep onset (z)</b>								
(Intercept)	4.43 [4.24, 4.61]	0.10	46.57	< .001	1.48 [1.25, 1.71]	0.12	12.62	< .001
Sleep onset	0.02 [0.01, 0.03]	0.01	3.06	.002	0.02 [0.00, 0.04]	0.01	2.10	.036
Sleep onset <sup>2</sup>	-0.01 [-0.02, 0.00]	0.00	-3.21	.001	0.00 [-0.02, 0.01]	0.01	-0.50	.617
Age	-0.01 [-0.02, -0.01]	0.00	-5.50	.009	-0.02 [-0.03, -0.02]	0.00	-8.90	.001
Sleep onset × sexmale	-0.03 [-0.04, -0.01]	0.01	-3.50	< .001	0.00 [-0.03, 0.03]	0.01	-0.11	.915
<b>Sleep regularity (z)</b>								
(Intercept)	4.39 [4.21, 4.57]	0.09	47.48	< .001	1.45 [1.22, 1.67]	0.12	12.55	< .001
Sleep regularity	0.06 [0.05, 0.07]	0.01	10.88	< .001	0.06 [0.04, 0.08]	0.01	6.31	< .001
Sleep regularity <sup>2</sup>	-0.01 [-0.02, -0.01]	0.00	-4.44	< .001	-0.02 [-0.03, -0.01]	0.01	-3.08	.002

Term	Physical activity volume (ln)				Physical activity intensity (z)					
	$\beta$	[95% CI]	SE	t	p	$\beta$	[95% CI]	SE	t	p
Age	-0.01	[-0.02, -0.01]	0.00	-5.54	.008	-0.02	[-0.03, -0.02]	0.00	-9.02	.001
Sleep regularity $\times$ sexmale	0.00	[0.01, 0.02]	0.01	0.36	.721	-0.01	[-0.04, 0.02]	0.01	-0.65	.515

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

Table 12

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

Term	Physical activity volume (ln)					Physical activity intensity (z)				
	$\beta$	[95% CI]	SE	t	p	$\beta$	[95% CI]	SE	t	p
<b>Sleep duration (z)</b>										
(Intercept)	0.00	[ -1.45, 1.44]	0.74	-0.01	.995	0.29	[ 0.04, 0.54]	0.13	2.31	.021
Log pa volume	-0.03	[ 0.80, 0.75]	0.40	-0.07	.948	0.12	[ 0.08, 0.15]	0.02	6.10	< .001
Weekdaymonday	0.51	[ -1.24, 2.26]	0.89	0.57	.568	-0.06	[ -0.12, 0.00]	0.03	-2.00	.046
Weekdaysaturday	-0.41	[ -2.15, 1.33]	0.89	-0.47	.641	0.08	[ 0.02, 0.14]	0.03	2.76	.006
Weekdaysunday	-0.51	[ -2.17, 1.16]	0.85	-0.60	.551	-0.01	[ -0.07, 0.05]	0.03	-0.33	.743
Weekdaythursday	1.20	[ -0.62, 3.02]	0.93	1.29	.197	-0.06	[ -0.12, 0.00]	0.03	-1.90	.057
Weekdaytuesday	-0.12	[ -1.98, 1.73]	0.95	-0.13	.897	-0.08	[ -0.14, -0.02]	0.03	-2.61	.009
Weekdaywednesday	-0.17	[ -1.96, 1.62]	0.91	-0.18	.855	-0.11	[ -0.17, -0.05]	0.03	-3.71	< .001
Log pa volume <sup>2</sup>	0.03	[ -0.08, 0.13]	0.05	0.47	.637	-0.01	[ -0.03, 0.02]	0.01	-0.39	.699
Age	0.00	[ -0.01, 0.00]	0.00	-0.91	.365	0.00	[ -0.01, 0.00]	0.00	-1.15	.251
Log pa volume × weekdaymonday	-0.31	[ -1.27, 0.66]	0.49	-0.62	.534	-0.05	[ -0.10, -0.01]	0.02	-2.25	.024
Log pa volume × weekdaysaturday	0.22	[ -0.74, 1.17]	0.49	0.44	.656	-0.09	[ -0.14, -0.05]	0.02	-3.92	< .001
Log pa volume × weekdaysunday	0.22	[ -0.70, 1.14]	0.47	0.47	.636	-0.07	[ -0.12, -0.03]	0.02	-3.03	.002
Log pa volume × weekdaythursday	-0.69	[ -1.68, 0.31]	0.51	-1.35	.177	-0.03	[ -0.07, 0.02]	0.02	-1.20	.232
Log pa volume × weekdaytuesday	-0.01	[ -1.02, 1.01]	0.52	-0.01	.990	-0.03	[ -0.07, 0.02]	0.02	-1.19	.235
Log pa volume × weekdaywednesday	0.05	[ -0.93, 1.03]	0.50	0.09	.926	-0.05	[ -0.10, -0.01]	0.02	-2.22	.026
Weekdaymonday × log pa volume <sup>2</sup>	0.04	[ -0.09, 0.17]	0.07	0.62	.534	0.01	[ -0.02, 0.05]	0.02	0.72	.471
Weekdaysaturday × log pa volume <sup>2</sup>	-0.02	[ -0.15, 0.11]	0.07	-0.34	.734	-0.02	[ -0.06, 0.02]	0.02	-0.98	.325
Weekdaysunday × log pa volume <sup>2</sup>	-0.02	[ -0.15, 0.10]	0.06	-0.33	.741	0.01	[ -0.03, 0.04]	0.02	0.32	.750
Weekdaythursday × log pa volume <sup>2</sup>	0.09	[ -0.04, 0.23]	0.07	1.37	.172	0.03	[ -0.01, 0.06]	0.02	1.41	.159
Weekdaytuesday × log pa volume <sup>2</sup>	0.01	[ -0.13, 0.14]	0.07	0.09	.930	0.01	[ -0.02, 0.05]	0.02	0.64	.525

Table 12 continued

Term	Physical activity volume (ln)					Physical activity intensity (z)				
	$\beta$	[95% CI]	SE	t	p	$\beta$	[95% CI]	SE	t	p
Weekdaywednesday $\times$ log pa volume <sup>2</sup>	-0.01	[-0.14, 0.13]	0.07	-0.10	.919	0.02	[-0.02, 0.06]	0.02	1.15	.249
Sleep efficiency (z)										
(Intercept)	-1.56	[-2.99, -0.13]	0.73	-2.14	.032	0.33	[0.08, 0.59]	0.13	2.55	.011
Log pa volume	0.95	[0.18, 1.71]	0.39	2.42	.015	0.02	[-0.02, 0.06]	0.02	1.12	.264
Weekdaymonday	0.08	[-1.64, 1.80]	0.88	0.09	.929	-0.05	[-0.11, 0.01]	0.03	-1.63	.102
Weekdaysaturday	-0.32	[-2.04, 1.40]	0.88	-0.36	.716	-0.11	[-0.16, -0.05]	0.03	-3.63	< .001
Weekdaysunday	0.49	[-1.16, 2.14]	0.84	0.59	.557	-0.15	[-0.20, -0.09]	0.03	-5.01	< .001
Weekdaythursday	-0.45	[-2.25, 1.35]	0.92	-0.49	.622	0.00	[-0.06, 0.06]	0.03	-0.11	.914
Weekdaytuesday	0.69	[-1.14, 2.52]	0.93	0.74	.458	-0.04	[-0.10, 0.02]	0.03	-1.30	.192
Weekdaywednesday	0.06	[-1.75, 1.88]	0.93	0.07	.946	-0.04	[-0.10, 0.02]	0.03	-1.26	.207
Log pa volume <sup>2</sup>	-0.12	[-0.22, -0.02]	0.05	-2.27	.023	0.00	[-0.03, 0.03]	0.01	0.08	.939
Age	0.00	[0.00, 0.01]	0.00	0.96	.336	0.00	[0.00, 0.00]	0.00	0.51	.613
Log pa volume $\times$ weekdaymonday	-0.03	[-0.98, 0.92]	0.48	-0.06	.951	-0.02	[-0.06, 0.03]	0.02	-0.85	.397
Log pa volume $\times$ weekdaysaturday	0.06	[-0.88, 1.01]	0.48	0.13	.893	-0.04	[-0.09, 0.00]	0.02	-1.80	.072
Log pa volume $\times$ weekdaysunday	-0.35	[-1.26, 0.56]	0.46	-0.75	.453	-0.03	[-0.07, 0.02]	0.02	-1.13	.259
Log pa volume $\times$ weekdaythursday	0.27	[-0.72, 1.25]	0.50	0.53	.593	0.00	[-0.04, 0.05]	0.02	0.07	.946
Log pa volume $\times$ weekdaytuesday	-0.41	[-1.41, 0.59]	0.51	-0.81	.418	0.01	[-0.04, 0.05]	0.02	0.29	.768
Log pa volume $\times$ weekdaywednesday	-0.03	[-1.02, 0.96]	0.51	-0.07	.947	-0.01	[-0.06, 0.03]	0.02	-0.63	.528
Weekdaymonday $\times$ log pa volume <sup>2</sup>	0.00	[-0.13, 0.13]	0.07	0.00	.999	0.01	[-0.02, 0.05]	0.02	0.63	.527
Weekdaysaturday $\times$ log pa volume <sup>2</sup>	0.00	[-0.13, 0.13]	0.07	0.00	.997	0.01	[-0.03, 0.05]	0.02	0.52	.600
Weekdaysunday $\times$ log pa volume <sup>2</sup>	0.05	[-0.08, 0.17]	0.06	0.78	.437	0.03	[-0.01, 0.06]	0.02	1.40	.160
Weekdaythursday $\times$ log pa volume <sup>2</sup>	-0.04	[-0.17, 0.09]	0.07	-0.58	.564	0.00	[-0.04, 0.03]	0.02	-0.25	.801
Weekdaytuesday $\times$ log pa volume <sup>2</sup>	0.06	[-0.08, 0.19]	0.07	0.84	.401	0.00	[-0.03, 0.04]	0.02	0.27	.790

Table 12 continued

Term	Physical activity volume (ln)					Physical activity intensity (z)				
	$\beta$	[95% CI]	SE	t	p	$\beta$	[95% CI]	SE	t	p
Weekdaywednesday $\times$ log pa volume <sup>2</sup>	0.00	[0.13, 0.14]	0.07	0.03	.977	0.00	[-0.03, 0.04]	0.02	0.21	.830
Sleep onset (z)										
(Intercept)	-0.18	[-1.22, 0.86]	0.53	-0.34	.737	-0.02	[-0.34, 0.30]	0.16	-0.12	.902
Log pa volume	0.24	[0.30, 0.78]	0.28	0.86	.389	-0.05	[-0.07, -0.02]	0.01	-3.55	< .001
Weekdaymonday	-0.14	[-1.34, 1.07]	0.62	-0.22	.825	-0.06	[-0.10, -0.02]	0.02	-2.73	.006
Weekdaysaturday	-0.81	[-2.01, 0.40]	0.62	-1.31	.190	0.08	[0.04, 0.12]	0.02	3.80	< .001
Weekdaysunday	-0.12	[-1.27, 1.04]	0.59	-0.20	.840	0.06	[0.02, 0.10]	0.02	3.15	.002
Weekdaythursday	-0.78	[-2.04, 0.48]	0.64	-1.21	.226	-0.04	[-0.08, 0.00]	0.02	-1.82	.069
Weekdaytuesday	0.87	[-0.41, 2.16]	0.66	1.33	.183	-0.04	[-0.08, 0.00]	0.02	-1.83	.067
Weekdaywednesday	0.04	[-1.20, 1.28]	0.63	0.07	.946	-0.01	[-0.05, 0.03]	0.02	-0.38	.706
Log pa volume <sup>2</sup>	-0.05	[-0.12, 0.02]	0.04	-1.34	.179	0.00	[-0.02, 0.02]	0.01	-0.27	.790
Age	0.00	[0.00, 0.00]	0.00	-0.74	.460	0.00	[0.00, 0.00]	0.00	-0.58	.561
Log pa volume $\times$ weekdaymonday	0.12	[-0.54, 0.79]	0.34	0.37	.715	-0.03	[-0.06, 0.00]	0.02	-1.84	.066
Log pa volume $\times$ weekdaysaturday	0.40	[-0.27, 1.06]	0.34	1.17	.242	0.01	[-0.03, 0.04]	0.02	0.36	.718
Log pa volume $\times$ weekdaysunday	0.11	[-0.52, 0.75]	0.33	0.35	.725	-0.07	[-0.10, -0.04]	0.02	-4.29	< .001
Log pa volume $\times$ weekdaythursday	0.50	[-0.19, 1.19]	0.35	1.42	.155	-0.03	[-0.06, 0.00]	0.02	-1.92	.055
Log pa volume $\times$ weekdaytuesday	-0.40	[-1.10, 0.30]	0.36	-1.12	.263	-0.02	[-0.05, 0.01]	0.02	-1.05	.292
Log pa volume $\times$ weekdaywednesday	0.05	[-0.63, 0.72]	0.35	0.13	.896	0.00	[-0.04, 0.03]	0.02	-0.30	.762
Weekdaymonday $\times$ log pa volume <sup>2</sup>	-0.03	[-0.12, 0.06]	0.05	-0.62	.536	0.00	[-0.02, 0.03]	0.01	0.14	.887
Weekdaysaturday $\times$ log pa volume <sup>2</sup>	-0.04	[-0.13, 0.05]	0.05	-0.86	.388	0.01	[-0.02, 0.04]	0.01	0.77	.443
Weekdaysunday $\times$ log pa volume <sup>2</sup>	-0.02	[-0.10, 0.07]	0.04	-0.38	.702	-0.01	[-0.03, 0.02]	0.01	-0.40	.692
Weekdaythursday $\times$ log pa volume <sup>2</sup>	-0.08	[-0.18, 0.01]	0.05	-1.71	.088	-0.01	[-0.03, 0.02]	0.01	-0.57	.567
Weekdaytuesday $\times$ log pa volume <sup>2</sup>	0.04	[-0.06, 0.14]	0.05	0.82	.412	0.00	[-0.02, 0.03]	0.01	0.13	.899

Table 12 continued

Term	Physical activity volume (ln)					Physical activity intensity (z)				
	$\beta$	[95% CI]	SE	t	p	$\beta$	[95% CI]	SE	t	p
Weekdaywednesday $\times$ log pa volume <sup>2</sup>	-0.02	[-0.11, 0.07]	0.05	-0.38	.705	-0.01	[-0.04, 0.01]	0.01	-1.08	.282
Sleep regularity (z)										
(Intercept)	-2.81	[-4.13, -1.48]	0.68	-4.14	< .001	0.65	[0.41, 0.90]	0.12	5.28	< .001
Log pa volume	1.55	[0.83, 2.27]	0.37	4.22	< .001	0.02	[-0.02, 0.05]	0.02	1.03	.305
Weekdaymonday	-0.09	[-1.75, 1.58]	0.85	-0.10	.918	0.02	[-0.03, 0.07]	0.03	0.73	.468
Weekdaysaturday	1.03	[-0.61, 2.67]	0.84	1.23	.220	-0.13	[-0.18, -0.08]	0.03	-4.90	< .001
Weekdaysunday	0.33	[1.30, 1.96]	0.83	0.40	.691	-0.20	[-0.25, -0.14]	0.03	-7.15	< .001
Weekdaythursday	-0.08	[-1.71, 1.54]	0.83	-0.10	.921	0.20	[0.15, 0.26]	0.03	6.93	< .001
Weekdaytuesday	1.12	[-0.63, 2.87]	0.89	1.26	.210	0.19	[0.14, 0.25]	0.03	6.98	< .001
Weekdaywednesday	0.08	[-1.74, 1.90]	0.93	0.08	.934	0.22	[0.16, 0.28]	0.03	7.28	< .001
Log pa volume <sup>2</sup>	-0.17	[-0.27, -0.08]	0.05	-3.46	.001	0.00	[-0.03, 0.02]	0.01	-0.34	.734
Age	0.00	[0.00, 0.00]	0.00	0.11	.913	0.00	[-0.01, 0.00]	0.00	-0.46	.651
Log pa volume $\times$ weekdaymonday	0.03	[-0.90, 0.96]	0.47	0.07	.946	0.10	[0.05, 0.14]	0.02	4.10	< .001
Log pa volume $\times$ weekdaysaturday	-0.62	[-1.52, 0.29]	0.46	-1.34	.183	-0.04	[-0.08, 0.00]	0.02	-1.88	.060
Log pa volume $\times$ weekdaysunday	-0.28	[-1.19, 0.63]	0.46	-0.61	.545	-0.01	[-0.05, 0.04]	0.02	-0.27	.789
Log pa volume $\times$ weekdaythursday	0.15	[-0.73, 1.04]	0.45	0.34	.734	0.08	[0.04, 0.12]	0.02	3.79	< .001
Log pa volume $\times$ weekdaytuesday	-0.51	[-1.48, 0.45]	0.49	-1.04	.302	0.13	[0.08, 0.17]	0.02	5.80	< .001
Log pa volume $\times$ weekdaywednesday	0.08	[-0.92, 1.08]	0.51	0.15	.880	0.10	[0.06, 0.15]	0.02	4.95	< .001
Weekdaymonday $\times$ log pa volume <sup>2</sup>	0.00	[-0.13, 0.13]	0.07	-0.02	.982	-0.04	[-0.08, -0.01]	0.02	-2.65	.008
Weekdaysaturday $\times$ log pa volume <sup>2</sup>	0.08	[-0.04, 0.21]	0.06	1.29	.199	0.00	[-0.04, 0.03]	0.02	-0.22	.823
Weekdaysunday $\times$ log pa volume <sup>2</sup>	0.04	[-0.09, 0.17]	0.06	0.61	.543	-0.01	[-0.05, 0.02]	0.02	-0.86	.389
Weekdaythursday $\times$ log pa volume <sup>2</sup>	-0.02	[-0.14, 0.10]	0.06	-0.36	.717	-0.04	[-0.07, 0.00]	0.02	-2.17	.031
Weekdaytuesday $\times$ log pa volume <sup>2</sup>	0.07	[-0.06, 0.20]	0.07	1.03	.305	-0.01	[-0.04, 0.03]	0.02	-0.32	.746

Term	Physical activity volume (ln)				Physical activity intensity (z)					
	$\beta$	[95% CI]	SE	t	p	$\beta$	[95% CI]	SE	t	p
Weekdaywednesday $\times$ log pa volume <sup>2</sup>	-0.01 [-0.15, 0.12]	0.07	-0.17	.863	.04 [-0.07, 0.00]	-0.04 [-0.07, 0.00]	0.02	0.02	-2.02	.045

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

Table 13

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

TITLE

Term	Physical activity volume (ln)				Physical activity intensity (z)			
	$\beta$ [95% CI]	SE	t	p	$\beta$ [95% CI]	SE	t	p
Sleep duration (z)								
(Intercept)	4.47 [4.28, 4.66]	0.10	47.00	< .001	1.52 [1.29, 1.75]	0.12	12.98	< .001
Sleep duration	0.02 [0.01, 0.04]	0.01	3.06	.002	0.07 [0.04, 0.10]	0.02	4.65	< .001
Weekdaymonday	-0.09 [-0.11, -0.07]	0.01	-9.66	< .001	-0.06 [-0.10, -0.02]	0.02	-2.98	.003
Weekdaysaturday	-0.04 [-0.06, -0.02]	0.01	-4.46	< .001	-0.07 [-0.11, -0.03]	0.02	-3.62	< .001
Weekdaysunday	-0.11 [-0.13, -0.09]	0.01	-11.14	< .001	-0.17 [-0.21, -0.13]	0.02	-8.72	< .001
Weekdaythursday	-0.02 [-0.04, 0.00]	0.01	-1.65	.104	0.03 [-0.01, 0.07]	0.02	1.37	.173
Weekdaytuesday	-0.03 [-0.05, -0.02]	0.01	-3.52	< .001	-0.02 [-0.06, 0.02]	0.02	-0.91	.362
Weekdaywednesday	-0.03 [-0.05, -0.01]	0.01	-3.05	.002	0.01 [-0.03, 0.05]	0.02	0.60	.550
Sleep duration <sup>2</sup>	0.00 [-0.01, 0.01]	0.00	0.26	.793	0.02 [0.00, 0.03]	0.01	2.04	.042
Age	-0.01 [-0.02, -0.01]	0.00	-5.50	.008	-0.02 [-0.03, -0.02]	0.00	-8.81	.001
Sleep duration × weekdaymonday	-0.02 [-0.04, 0.00]	0.01	-2.34	.019	-0.09 [-0.13, -0.05]	0.02	-4.69	< .001
Sleep duration × weekdaysaturday	-0.05 [-0.07, -0.03]	0.01	-4.73	< .001	-0.11 [-0.15, -0.07]	0.02	-5.38	< .001
Sleep duration × weekdaysunday	-0.05 [-0.07, -0.03]	0.01	-5.08	< .001	-0.11 [-0.15, -0.07]	0.02	-5.39	< .001
Sleep duration × weekdaythursday	-0.04 [-0.06, -0.02]	0.01	-3.34	.001	-0.02 [-0.06, 0.02]	0.02	-0.98	.330
Sleep duration × weekdaytuesday	-0.02 [-0.04, 0.00]	0.01	-1.81	.070	-0.04 [-0.08, 0.00]	0.02	-1.83	.067
Sleep duration × weekdaywednesday	-0.01 [-0.03, 0.01]	0.01	-1.33	.184	-0.02 [-0.07, 0.02]	0.02	-1.18	.237
Weekdaymonday × Sleep duration <sup>2</sup>	-0.01 [-0.02, 0.00]	0.01	-1.35	.178	-0.03 [0.05, -0.01]	0.01	-2.86	.005
Weekdaysaturday × Sleep duration <sup>2</sup>	-0.02 [-0.03, -0.01]	0.01	-3.11	.002	-0.04 [-0.06, -0.02]	0.01	-3.46	.001
Weekdaysunday × Sleep duration <sup>2</sup>	-0.01 [-0.02, 0.00]	0.01	-2.40	.017	-0.03 [-0.05, -0.01]	0.01	-2.59	.013
Weekdaythursday × Sleep duration <sup>2</sup>	-0.01 [-0.02, 0.01]	0.01	-1.19	.258	-0.01 [-0.03, 0.02]	0.01	-0.72	.477
Weekdaytuesday × Sleep duration <sup>2</sup>	-0.01 [-0.02, 0.01]	0.01	-0.85	.394	-0.02 [-0.04, 0.00]	0.01	-1.68	.092

Table 13 continued

TITLE

Term	Physical activity volume (ln)				Physical activity intensity (z)					
	$\beta$	[95% CI]	SE	t	p	$\beta$	[95% CI]	SE	t	p
Weekdaywednesday × Sleep duration <sup>2</sup>	0.00	[0.01, 0.01]	0.01	-0.64	.521	-0.02	[-0.04, 0.00]	0.01	-1.93	.053
Sleep efficiency (z)										
(Intercept)	4.47	[4.28, 4.65]	0.10	46.98	< .001	1.53	[1.29, 1.76]	0.12	12.94	< .001
Sleep efficiency	-0.01	[-0.02, 0.01]	0.01	-0.70	.486	-0.03	[-0.06, 0.01]	0.02	-1.61	.114
Weekdaymonday	-0.10	[-0.11, -0.08]	0.01	-10.83	< .001	-0.07	[-0.10, -0.03]	0.02	-3.76	< .001
Weekdaysaturday	-0.05	[-0.07, -0.03]	0.01	-5.62	< .001	-0.09	[-0.12, -0.05]	0.02	-5.04	< .001
Weekdaysunday	-0.11	[-0.13, -0.09]	0.01	-12.35	< .001	-0.18	[-0.21, -0.14]	0.02	-10.07	< .001
Weekdaythursday	-0.02	[-0.04, 0.00]	0.01	-2.44	.015	0.02	[-0.01, 0.06]	0.02	1.23	.219
Weekdaytuesday	-0.03	[-0.05, -0.02]	0.01	-3.86	< .001	-0.03	[-0.06, 0.01]	0.02	-1.63	.103
Weekdaywednesday	-0.03	[-0.05, -0.01]	0.01	-3.53	< .001	0.00	[-0.04, 0.04]	0.02	0.02	.984
Sleep efficiency <sup>2</sup>	0.00	[0.00, 0.01]	0.00	0.41	.678	0.00	[-0.01, 0.01]	0.01	0.08	.934
Age	-0.01	[-0.02, -0.01]	0.00	-5.50	.008	-0.02	[-0.03, -0.02]	0.00	-8.77	.001
Sleep efficiency × weekdaymonday	0.01	[-0.01, 0.03]	0.01	0.76	.450	0.03	[-0.02, 0.08]	0.03	1.29	.205
Sleep efficiency × weekdaysaturday	0.00	[-0.02, 0.02]	0.01	-0.28	.781	0.01	[-0.04, 0.05]	0.02	0.28	.776
Sleep efficiency × weekdaysunday	0.04	[0.02, 0.06]	0.01	3.34	.001	0.06	[0.02, 0.11]	0.02	2.84	.005
Sleep efficiency × weekdaythursday	0.00	[-0.02, 0.02]	0.01	0.16	.877	-0.01	[-0.05, 0.04]	0.02	-0.22	.823
Sleep efficiency × weekdaytuesday	0.00	[-0.03, 0.02]	0.01	-0.39	.698	-0.02	[-0.06, 0.03]	0.02	-0.77	.443
Sleep efficiency × weekdaywednesday	0.00	[-0.02, 0.02]	0.01	-0.12	.906	-0.01	[-0.06, 0.04]	0.02	-0.36	.724
Weekdaymonday × Sleep efficiency <sup>2</sup>	0.00	[-0.01, 0.01]	0.00	-0.08	.936	-0.01	[-0.02, 0.01]	0.01	-0.94	.349
Weekdaysaturday × Sleep efficiency <sup>2</sup>	0.00	[-0.01, 0.00]	0.00	-1.21	.226	0.00	[-0.02, 0.01]	0.01	-0.43	.670
Weekdaysunday × Sleep efficiency <sup>2</sup>	0.00	[-0.01, 0.00]	0.00	-0.71	.479	0.00	[-0.02, 0.01]	0.01	-0.50	.619
Weekdaythursday × Sleep efficiency <sup>2</sup>	0.00	[-0.01, 0.01]	0.00	0.05	.964	-0.01	[-0.02, 0.00]	0.01	-1.27	.205
Weekdaytuesday × Sleep efficiency <sup>2</sup>	0.00	[-0.01, 0.00]	0.00	-0.92	.358	0.00	[-0.02, 0.01]	0.01	-0.70	.482

Table 13 continued

TITLE

Term	Physical activity volume (ln)				Physical activity intensity (z)					
	$\beta$	[95% CI]	SE	t	p	$\beta$	[95% CI]	SE	t	p
Weekdaywednesday × Sleep efficiency <sup>2</sup>	0.00	[0.01, 0.01]	0.00	-0.26	.792	-0.01	[-0.02, 0.00]	0.01	-1.37	.171
Sleep onset (z)										
(Intercept)	4.47	[4.28, 4.66]	0.10	46.97	< .001	1.52	[1.29, 1.75]	0.12	13.00	< .001
Sleep onset	-0.01	[-0.03, 0.00]	0.01	-1.90	.058	-0.03	[-0.06, 0.00]	0.02	-1.78	.075
Weekdaymonday	-0.10	[-0.12, -0.08]	0.01	-9.27	< .001	-0.06	[-0.10, -0.02]	0.02	-2.71	.007
Weekdaysaturday	-0.05	[-0.07, -0.03]	0.01	-5.02	< .001	-0.08	[-0.12, -0.04]	0.02	-4.05	< .001
Weekdaysunday	-0.11	[-0.13, -0.09]	0.01	-10.41	< .001	-0.19	[-0.23, -0.15]	0.02	-8.95	< .001
Weekdaythursday	-0.02	[-0.04, 0.00]	0.01	-1.61	.107	0.03	[-0.01, 0.07]	0.02	1.55	.122
Weekdaytuesday	-0.03	[-0.05, -0.01]	0.01	-3.00	.003	-0.02	[-0.06, 0.02]	0.02	-0.96	.337
Weekdaywednesday	-0.04	[-0.06, -0.01]	0.01	-3.32	.001	0.00	[-0.04, 0.05]	0.02	0.22	.827
Sleep onset <sup>2</sup>	0.00	[-0.01, 0.01]	0.01	-0.53	.595	0.01	[-0.01, 0.03]	0.01	0.95	.340
Age	-0.01	[-0.02, -0.01]	0.00	-5.52	.008	-0.02	[-0.03, -0.02]	0.00	-8.92	.001
Sleep onset × weekdaymonday	0.02	[0.00, 0.03]	0.01	1.74	.081	0.09	[0.06, 0.13]	0.02	5.08	< .001
Sleep onset × weekdaysaturday	0.04	[0.02, 0.05]	0.01	3.79	< .001	0.09	[0.05, 0.13]	0.02	4.85	< .001
Sleep onset × weekdaysunday	0.07	[0.05, 0.09]	0.01	7.80	< .001	0.14	[0.10, 0.18]	0.02	7.46	< .001
Sleep onset × weekdaythursday	0.02	[0.00, 0.04]	0.01	2.37	.018	0.00	[-0.04, 0.04]	0.02	-0.12	.908
Sleep onset × weekdaytuesday	0.01	[-0.01, 0.03]	0.01	0.75	.451	0.01	[-0.02, 0.05]	0.02	0.74	.460
Sleep onset × weekdaywednesday	0.00	[-0.02, 0.02]	0.01	-0.31	.755	0.01	[-0.03, 0.05]	0.02	0.41	.682
Weekdaymonday × Sleep onset <sup>2</sup>	0.00	[-0.01, 0.01]	0.01	0.05	.960	-0.03	[-0.06, 0.00]	0.01	-2.22	.027
Weekdaysaturday × Sleep onset <sup>2</sup>	0.00	[-0.02, 0.01]	0.01	-0.60	.548	-0.02	[-0.05, 0.01]	0.02	-1.36	.172
Weekdaysunday × Sleep onset <sup>2</sup>	-0.02	[-0.03, 0.00]	0.01	-2.32	.021	-0.02	[-0.05, 0.01]	0.01	-1.62	.105
Weekdaythursday × Sleep onset <sup>2</sup>	-0.01	[-0.02, 0.01]	0.01	-0.88	.379	-0.02	[-0.05, 0.01]	0.02	-1.21	.227
Weekdaytuesday × Sleep onset <sup>2</sup>	-0.01	[-0.02, 0.01]	0.01	-0.79	.432	-0.02	[-0.05, 0.01]	0.02	-1.05	.292

Table 13 continued

TITLE

Term	Physical activity volume (ln)					Physical activity intensity (z)				
	$\beta$	[95% CI]	SE	t	p	$\beta$	[95% CI]	SE	t	p
Weekdaywednesday × Sleep onset <sup>2</sup>	0.00	[ -0.01, 0.02]	0.01	0.48	.629	-0.01	[ -0.05, 0.02]	0.02	-0.96	.339
Sleep regularity (z)										
(Intercept)	4.43	[4.25, 4.61]	0.09	47.96	< .001	1.50	[1.27, 1.72]	0.12	12.89	< .001
Sleep regularity	0.05	[0.04, 0.07]	0.01	6.55	< .001	0.04	[0.01, 0.07]	0.02	2.50	.013
Weekdaymonday	-0.08	[ -0.10, -0.06]	0.01	-7.90	< .001	-0.06	[ -0.10, -0.02]	0.02	-2.98	.003
Weekdaysaturday	-0.02	[ -0.04, -0.01]	0.01	-2.48	.013	-0.05	[ -0.09, -0.01]	0.02	-2.57	.010
Weekdaysunday	-0.08	[ -0.10, -0.06]	0.01	-8.11	< .001	-0.16	[ -0.20, -0.12]	0.02	-8.14	< .001
Weekdaythursday	-0.01	[ -0.03, 0.01]	0.01	-0.57	.570	0.03	[ -0.01, 0.07]	0.02	1.24	.215
Weekdaytuesday	-0.03	[ -0.05, -0.01]	0.01	-2.66	.008	-0.03	[ -0.07, 0.01]	0.02	-1.31	.190
Weekdaywednesday	-0.02	[ -0.04, 0.00]	0.01	-2.16	.031	-0.01	[ -0.05, 0.04]	0.02	-0.28	.780
Sleep regularity <sup>2</sup>	0.00	[ -0.01, 0.01]	0.01	0.23	.815	0.00	[ -0.02, 0.02]	0.01	-0.09	.929
Age	-0.01	[ -0.02, -0.01]	0.00	-5.54	.008	-0.02	[ -0.03, -0.02]	0.00	-8.98	.001
Sleep regularity × weekdaymonday	0.00	[ -0.02, 0.03]	0.01	0.18	.855	0.00	[ -0.05, 0.05]	0.02	0.00	.998
Sleep regularity × weekdaysaturday	0.00	[ -0.02, 0.02]	0.01	0.12	.906	0.01	[ -0.03, 0.05]	0.02	0.36	.720
Sleep regularity × weekend sunday	0.03	[0.01, 0.05]	0.01	2.75	.006	0.03	[ -0.02, 0.08]	0.02	1.23	.221
Sleep regularity × weekend thursday	0.00	[ -0.02, 0.02]	0.01	-0.12	.902	0.00	[ -0.04, 0.04]	0.02	-0.08	.939
Sleep regularity × weekend tuesday	-0.02	[ -0.04, 0.00]	0.01	-1.63	.106	0.00	[ -0.04, 0.05]	0.02	0.09	.932
Sleep regularity × weekend wednesday	0.00	[ -0.02, 0.02]	0.01	-0.25	.800	0.01	[ -0.04, 0.05]	0.02	0.23	.815
Weekdaymonday × Sleep regularity <sup>2</sup>	0.00	[ -0.02, 0.01]	0.01	-0.39	.694	-0.01	[ -0.03, 0.02]	0.01	-0.40	.690
Weekdaysaturday × Sleep regularity <sup>2</sup>	-0.03	[ -0.05, -0.01]	0.01	-3.80	< .001	-0.05	[ -0.08, -0.02]	0.02	-3.18	.001
Weekdaysunday × Sleep regularity <sup>2</sup>	-0.02	[ -0.04, -0.01]	0.01	-2.74	.006	-0.02	[ -0.05, 0.02]	0.02	-1.03	.306
Weekdaythursday × Sleep regularity <sup>2</sup>	-0.02	[ -0.04, -0.01]	0.01	-2.88	.004	-0.01	[ -0.05, 0.02]	0.02	-0.86	.388
Weekdaytuesday × Sleep regularity <sup>2</sup>	-0.01	[ -0.02, 0.01]	0.01	-0.78	.436	0.00	[ -0.03, 0.03]	0.02	-0.16	.872

Term	Physical activity volume (ln)			Physical activity intensity (z)				
	$\beta$ [95% CI]	SE	t	p	$\beta$ [95% CI]	SE	t	p
Weekdaywednesday $\times$ Sleep regularity <sup>2</sup>	-0.02 [-0.04, 0.00]	0.01	-1.95	.053	-0.01 [-0.04, 0.03]	0.02	-0.32	.750

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

Table 14

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

Term	Physical activity volume (ln)				Physical activity intensity (z)			
	$\beta$ [95% CI]	SE	t	p	$\beta$ [95% CI]	SE	t	p
Sleep duration (z)								
(Intercept)	0.05 [-0.91, 1.01]	0.49	0.10	.918	0.29 [0.04, 0.53]	0.13	2.28	.023
Log pa volume	-0.09 [-0.62, 0.44]	0.27	-0.33	.739	0.06 [0.02, 0.09]	0.02	3.18	.001
Seasonspring	0.97 [-0.44, 2.39]	0.72	1.35	.177	-0.07 [-0.14, 0.01]	0.04	-1.80	.072
Seasonsummer	-1.42 [-3.23, 0.40]	0.93	-1.53	.125	-0.13 [-0.21, -0.05]	0.04	-3.11	.002
Seasonwinter	-0.51 [-1.81, 0.79]	0.66	-0.77	.439	0.04 [-0.04, 0.11]	0.04	0.97	.330
Log pa volume <sup>2</sup>	0.04 [-0.04, 0.12]	0.04	1.04	.299	0.01 [-0.01, 0.04]	0.01	1.08	.278
Age	0.00 [-0.01, 0.00]	0.00	-0.69	.492	0.00 [-0.01, 0.00]	0.00	-0.98	.327
Log pa volume × seasonspring	-0.54 [-1.34, 0.26]	0.41	-1.33	.185	0.00 [-0.05, 0.05]	0.02	0.05	.957
Log pa volume × seasonsummer	0.70 [-0.31, 1.71]	0.52	1.36	.175	-0.02 [-0.07, 0.04]	0.03	-0.53	.598
Log pa volume × seasonwinter	0.31 [-0.42, 1.04]	0.37	0.84	.404	0.03 [-0.02, 0.07]	0.03	1.02	.307
Seasonspring × log pa volume <sup>2</sup>	0.07 [-0.05, 0.18]	0.06	1.16	.247	-0.01 [-0.05, 0.02]	0.02	-0.86	.388
Seasonsummer × log pa volume <sup>2</sup>	-0.10 [-0.24, 0.04]	0.07	-1.34	.181	-0.02 [-0.06, 0.02]	0.02	-1.15	.249
Seasonwinter × log pa volume <sup>2</sup>	-0.04 [-0.15, 0.06]	0.05	-0.85	.396	-0.01 [-0.05, 0.02]	0.02	-0.69	.491
Sleep efficiency (z)								
(Intercept)	-2.28 [-3.24, -1.33]	0.49	-4.69	< .001	0.28 [0.02, 0.54]	0.13	2.15	.032
Log pa volume	1.31 [0.79, 1.84]	0.27	4.90	< .001	0.01 [-0.03, 0.04]	0.02	0.36	.718
Seasonspring	1.49 [0.08, 2.90]	0.72	2.08	.038	-0.07 [-0.15, 0.00]	0.04	-1.87	.062
Seasonsummer	-0.11 [-1.90, 1.68]	0.91	-0.12	.905	-0.05 [-0.13, 0.04]	0.04	-1.07	.285
Seasonwinter	1.13 [-0.16, 2.42]	0.66	1.72	.085	0.01 [-0.06, 0.08]	0.04	0.28	.776
Log pa volume <sup>2</sup>	-0.17 [-0.24, -0.09]	0.04	-4.42	< .001	0.00 [-0.02, 0.02]	0.01	0.02	.986
Age	0.00 [0.00, 0.01]	0.00	1.18	.240	0.00 [0.00, 0.01]	0.00	0.75	.453

Table 14 continued

Term	Physical activity volume (ln)				Physical activity intensity (z)					
	$\beta$	[95% CI]	SE	t	p	$\beta$	[95% CI]	SE	t	p
Log pa volume × seasonspring	-0.82	[-1.61, -0.03]	0.40	-2.03	.042	0.01	[-0.04, 0.06]	0.02	0.45	.654
Log pa volume × seasonsummer	-0.01	[-1.01, 0.99]	0.51	-0.02	.983	0.03	[-0.03, 0.09]	0.03	0.96	.339
Log pa volume × seasonwinter	-0.64	[-1.36, 0.09]	0.37	-1.72	.086	0.01	[-0.04, 0.06]	0.03	0.33	.738
Seasonspring × log pa volume <sup>2</sup>	0.11	[0.00, 0.22]	0.06	1.89	.059	0.03	[0.00, 0.06]	0.02	1.84	.066
Seasonsummer × log pa volume <sup>2</sup>	0.01	[-0.13, 0.15]	0.07	0.10	.919	0.01	[-0.03, 0.04]	0.02	0.25	.804
Seasonwinter × log pa volume <sup>2</sup>	0.09	[0.01, 0.19]	0.05	1.71	.087	0.01	[-0.02, 0.04]	0.02	0.54	.591
Sleep onset (z)										
(Intercept)	-0.42	[-1.15, 0.31]	0.37	-1.12	.263	-0.02	[-0.34, 0.29]	0.16	-0.15	.882
Log pa volume	0.39	[0.02, 0.76]	0.19	2.05	.040	-0.08	[-0.11, -0.06]	0.01	-6.28	< .001
Seasonspring	0.03	[-0.98, 1.04]	0.51	0.06	.953	0.03	[-0.03, 0.08]	0.03	1.01	.313
Seasonsummer	0.38	[-0.89, 1.66]	0.65	0.59	.557	0.04	[-0.02, 0.10]	0.03	1.21	.225
Seasonwinter	0.16	[-0.75, 1.08]	0.47	0.35	.726	0.04	[-0.02, 0.09]	0.03	1.40	.162
Log pa volume <sup>2</sup>	-0.08	[-0.13, -0.02]	0.03	-2.78	.005	0.00	[-0.02, 0.01]	0.01	-0.27	.790
Age	0.00	[0.00, 0.00]	0.00	-0.87	.383	0.00	[0.00, 0.00]	0.00	-0.73	.465
Log pa volume × seasonspring	0.03	[-0.54, 0.60]	0.29	0.11	.913	0.01	[-0.03, 0.04]	0.02	0.32	.747
Log pa volume × seasonsummer	-0.20	[-0.91, 0.51]	0.36	-0.55	.585	0.04	[0.00, 0.08]	0.02	1.99	.047
Log pa volume × seasonwinter	-0.05	[-0.57, 0.46]	0.26	-0.20	.843	0.00	[-0.04, 0.03]	0.02	-0.15	.880
Seasonspring × log pa volume <sup>2</sup>	-0.01	[-0.09, 0.07]	0.04	-0.20	.840	0.00	[-0.02, 0.02]	0.01	-0.09	.925
Seasonsummer × log pa volume <sup>2</sup>	0.03	[-0.07, 0.13]	0.05	0.57	.567	0.01	[-0.02, 0.03]	0.01	0.46	.647
Seasonwinter × log pa volume <sup>2</sup>	0.00	[-0.07, 0.08]	0.04	0.11	.911	-0.01	[-0.03, 0.01]	0.01	-0.74	.462
Sleep regularity (z)										
(Intercept)	-3.03	[-4.01, -2.04]	0.50	-5.99	< .001	0.65	[0.41, 0.88]	0.12	5.35	< .001
Log pa volume	1.68	[1.14, 2.23]	0.28	6.07	< .001	0.10	[0.06, 0.13]	0.02	5.29	< .001

Table 14 continued

Term	Physical activity volume (ln)				Physical activity intensity (z)			
	$\beta$ [95% CI]	SE	t	p	$\beta$ [95% CI]	SE	t	p
Seasonspring	0.08 [-1.22, 1.38]	0.66	0.12	.901	-0.09 [-0.16, -0.01]	0.04	-2.27	.023
Seasonsummer	2.23 [0.50, 3.95]	0.88	2.53	.012	-0.01 [-0.09, 0.07]	0.04	-0.15	.883
Seasonwinter	-0.16 [-1.42, 1.10]	0.64	-0.25	.801	-0.05 [-0.12, 0.03]	0.04	-1.24	.214
Log pa volume <sup>2</sup>	-0.19 [-0.27, -0.11]	0.04	-4.86	< .001	-0.04 [-0.06, -0.01]	0.01	-3.09	.002
Age	0.00 [0.00, 0.01]	0.00	0.56	.579	0.00 [0.00, 0.00]	0.00	0.13	.900
Log pa volume × seasonspring	-0.14 [-0.87, 0.59]	0.37	-0.38	.704	-0.03 [-0.08, 0.02]	0.02	-1.32	.187
Log pa volume × seasonsummer	-1.21 [-2.18, -0.24]	0.49	-2.46	.015	0.01 [-0.05, 0.07]	0.03	0.33	.744
Log pa volume × seasonwinter	-0.02 [-0.73, 0.69]	0.36	-0.04	.965	0.05 [0.00, 0.10]	0.02	2.02	.044
Seasonspring × log pa volume <sup>2</sup>	0.03 [-0.08, 0.13]	0.05	0.50	.619	0.01 [-0.02, 0.04]	0.02	0.73	.465
Seasonsummer × log pa volume <sup>2</sup>	0.16 [0.03, 0.30]	0.07	2.36	.019	0.04 [0.00, 0.08]	0.02	2.07	.039
Seasonwinter × log pa volume <sup>2</sup>	0.02 [-0.08, 0.12]	0.05	0.33	.739	0.04 [0.01, 0.07]	0.02	2.48	.013

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

Table 15

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

Term	Physical activity volume (ln)				Physical activity intensity (z)					
	$\beta$	[95% CI]	SE	t	p	$\beta$	[95% CI]	SE	t	p
Sleep duration (z)										
(Intercept)	4.41	[4.22, 4.60]	0.10	46.33	< .001	1.49	[1.26, 1.73]	0.12	12.50	< .001
Sleep duration	0.00	[-0.01, 0.01]	0.01	-0.16	.871	0.02	[-0.01, 0.04]	0.01	1.35	.177
Seasonspring	0.01	[-0.02, 0.04]	0.02	0.78	.437	-0.07	[-0.13, -0.02]	0.03	-2.58	.010
Seasonsummer	0.04	[0.00, 0.07]	0.02	2.18	.030	-0.05	[-0.11, 0.01]	0.03	-1.58	.115
Seasonwinter	0.01	[-0.02, 0.05]	0.02	0.97	.333	0.00	[-0.05, 0.05]	0.03	0.04	.970
Sleep duration <sup>2</sup>	0.00	[-0.01, 0.00]	0.00	-1.02	.309	0.00	[-0.01, 0.01]	0.01	0.13	.895
Age	-0.01	[-0.02, -0.01]	0.00	-5.57	.008	-0.02	[-0.03, -0.02]	0.00	-8.79	.001
Sleep duration × seasonspring	-0.02	[-0.04, 0.00]	0.01	-2.37	.018	-0.03	[-0.06, 0.00]	0.02	-1.90	.058
Sleep duration × seasonsummer	-0.03	[-0.05, -0.01]	0.01	-2.54	.011	-0.03	[-0.07, 0.01]	0.02	-1.27	.204
Sleep duration × seasonwinter	0.00	[-0.01, 0.02]	0.01	0.25	.804	-0.01	[-0.04, 0.03]	0.02	-0.46	.648
Seasonspring × Sleep duration <sup>2</sup>	-0.01	[-0.01, 0.00]	0.00	-1.38	.167	-0.01	[-0.03, 0.01]	0.01	-1.34	.181
Seasonsummer × Sleep duration <sup>2</sup>	-0.02	[-0.03, -0.01]	0.01	-3.09	.002	-0.02	[-0.04, 0.00]	0.01	-2.17	.030
Seasonwinter × Sleep duration <sup>2</sup>	-0.01	[-0.02, 0.00]	0.00	-1.80	.072	-0.02	[-0.03, 0.00]	0.01	-1.73	.087
Sleep efficiency (z)										
(Intercept)	4.41	[4.22, 4.60]	0.10	46.13	< .001	1.50	[1.27, 1.74]	0.12	12.59	< .001
Sleep efficiency	0.00	[-0.01, 0.02]	0.01	0.66	.510	-0.01	[-0.04, 0.02]	0.01	-0.81	.418
Seasonspring	0.01	[-0.02, 0.04]	0.02	0.67	.503	-0.08	[-0.13, -0.02]	0.03	-2.86	.004
Seasonsummer	0.03	[0.00, 0.07]	0.02	2.06	.040	-0.06	[-0.12, 0.00]	0.03	-2.02	.043
Seasonwinter	0.01	[-0.02, 0.04]	0.02	0.63	.526	-0.01	[-0.07, 0.04]	0.03	-0.57	.568
Sleep efficiency <sup>2</sup>	0.00	[0.00, 0.00]	0.00	0.72	.472	0.00	[-0.01, 0.00]	0.00	-0.65	.515
Age	-0.01	[-0.02, -0.01]	0.00	-5.57	.008	-0.02	[-0.03, -0.02]	0.00	-8.80	.001

Table 15 continued

## TITLE

Term	Physical activity volume (ln)					Physical activity intensity (z)				
	$\beta$	[95% CI]	SE	t	p	$\beta$	[95% CI]	SE	t	p
Sleep efficiency $\times$ seasonspring	-0.01	[-0.03, 0.01]	0.01	-0.78	.438	-0.02	[-0.06, 0.01]	0.02	-1.19	.235
Sleep efficiency $\times$ seasonsummer	0.00	[-0.02, 0.02]	0.01	0.02	.983	0.01	[-0.03, 0.05]	0.02	0.36	.718
Sleep efficiency $\times$ seasonwinter	-0.01	[-0.03, 0.01]	0.01	-0.68	.495	-0.01	[-0.04, 0.03]	0.02	-0.42	.672
Seasonspring $\times$ Sleep efficiency <sup>2</sup>	0.00	[-0.01, 0.00]	0.00	-0.19	.847	0.00	[-0.01, 0.01]	0.01	-0.83	.406
Seasonsummer $\times$ Sleep efficiency <sup>2</sup>	-0.01	[-0.01, 0.00]	0.00	-1.77	.077	-0.01	[-0.02, 0.01]	0.01	-1.08	.282
Seasonwinter $\times$ Sleep efficiency <sup>2</sup>	0.00	[-0.01, 0.00]	0.00	-1.05	.292	0.00	[-0.01, 0.01]	0.01	0.10	.919
Sleep onset (z)										
(Intercept)	4.41	[4.23, 4.60]	0.10	46.29	< .001	1.51	[1.27, 1.74]	0.12	12.71	< .001
Sleep onset	0.00	[-0.01, 0.01]	0.01	0.14	.888	0.02	[-0.01, 0.04]	0.01	1.20	.230
Seasonspring	0.01	[-0.02, 0.04]	0.02	0.66	.509	-0.09	[-0.14, -0.03]	0.03	-3.00	.003
Seasonsummer	0.03	[0.00, 0.07]	0.02	1.90	.058	-0.08	[-0.14, -0.02]	0.03	-2.46	.014
Seasonwinter	0.01	[-0.02, 0.04]	0.02	0.51	.613	-0.02	[-0.07, 0.04]	0.03	-0.58	.564
Sleep onset <sup>2</sup>	-0.01	[-0.02, 0.00]	0.00	-1.73	.083	-0.01	[-0.03, 0.00]	0.01	-1.43	.152
Age	-0.01	[-0.02, -0.01]	0.00	-5.57	.008	-0.02	[-0.03, -0.02]	0.00	-8.84	.001
Sleep onset $\times$ seasonspring	0.01	[-0.01, 0.03]	0.01	0.93	.351	0.01	[-0.03, 0.05]	0.02	0.44	.658
Sleep onset $\times$ seasonsummer	0.01	[-0.01, 0.03]	0.01	0.67	.501	0.02	[-0.02, 0.06]	0.02	0.87	.386
Sleep onset $\times$ seasonwinter	0.00	[-0.02, 0.02]	0.01	-0.20	.845	0.00	[-0.04, 0.03]	0.02	-0.10	.920
Seasonspring $\times$ Sleep onset <sup>2</sup>	0.00	[-0.01, 0.01]	0.01	-0.12	.906	0.01	[-0.02, 0.03]	0.01	0.72	.472
Seasonsummer $\times$ Sleep onset <sup>2</sup>	-0.01	[-0.02, 0.01]	0.01	-0.99	.322	0.01	[-0.02, 0.03]	0.01	0.44	.663
Seasonwinter $\times$ Sleep onset <sup>2</sup>	0.00	[-0.01, 0.01]	0.01	0.01	.993	0.01	[-0.02, 0.03]	0.01	0.42	.673
Sleep regularity (z)										
(Intercept)	4.38	[4.20, 4.56]	0.09	47.24	< .001	1.47	[1.24, 1.70]	0.12	12.57	< .001
Sleep regularity	0.06	[0.05, 0.08]	0.01	8.55	< .001	0.05	[0.03, 0.08]	0.01	3.88	< .001

Table 15 continued

Term	Physical activity volume (ln)				Physical activity intensity (z)					
	$\beta$	[95% CI]	SE	t	p	$\beta$	[95% CI]	SE	t	p
Seasonspring	0.01	[0.02, 0.04]	0.02	0.41	.680	-0.09	[-0.15, -0.04]	0.03	-3.32	.001
Seasonsummer	0.02	[-0.01, 0.06]	0.02	1.27	.203	-0.07	[-0.13, -0.01]	0.03	-2.33	.020
Seasonwinter	0.01	[-0.02, 0.03]	0.02	0.34	.731	-0.01	[-0.06, 0.04]	0.03	-0.32	.745
Sleep regularity <sup>2</sup>	-0.02	[-0.03, -0.01]	0.00	-5.36	< .001	-0.03	[-0.04, -0.01]	0.01	-3.05	.002
Age	-0.01	[-0.02, -0.01]	0.00	-5.54	.008	-0.02	[-0.03, -0.02]	0.00	-8.93	.001
Sleep regularity $\times$ seasonspring	-0.01	[-0.03, 0.01]	0.01	-0.67	.505	-0.01	[-0.04, 0.03]	0.02	-0.27	.789
Sleep regularity $\times$ seasonsummer	-0.02	[-0.05, 0.00]	0.01	-1.66	.115	-0.02	[-0.07, 0.02]	0.02	-0.93	.356
Sleep regularity $\times$ seasonwinter	0.01	[-0.01, 0.04]	0.01	1.20	.244	0.04	[0.00, 0.08]	0.02	1.99	.053
Seasonspring $\times$ Sleep regularity <sup>2</sup>	0.02	[0.00, 0.03]	0.01	2.80	.005	0.03	[0.01, 0.05]	0.01	2.40	.017
Seasonsummer $\times$ Sleep regularity <sup>2</sup>	0.01	[0.00, 0.02]	0.01	1.43	.156	0.01	[-0.02, 0.04]	0.01	0.56	.572
Seasonwinter $\times$ Sleep regularity <sup>2</sup>	0.01	[0.00, 0.02]	0.01	1.86	.066	0.00	[-0.02, 0.03]	0.01	0.38	.701

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

Table 16

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

Term	Physical activity volume (ln)				Physical activity intensity (z)			
	$\beta$ [95% CI]	SE	t	p	$\beta$ [95% CI]	SE	t	p
Sleep duration (z)								
(Intercept)	2.79 [1.04, 4.53]	0.89	3.13	.002	0.52 [0.22, 0.82]	0.15	3.43	.001
Log pa volume	-1.28 [-2.15, -0.41]	0.44	-2.87	.004	-0.01 [-0.11, 0.09]	0.05	-0.20	.839
Regioneurope	-2.18 [-4.09, -0.28]	0.97	-2.25	.024	-0.28 [-0.48, -0.08]	0.10	-2.74	.006
Regionafrica	-5.83 [-9.07, -2.60]	1.65	-3.53	< .001	-0.26 [-0.48, -0.03]	0.11	-2.24	.025
Regionasia	-4.68 [-8.08, -1.29]	1.73	-2.70	.007	-0.42 [-0.66, -0.18]	0.12	-3.46	.001
Regionnorth america	-2.61 [-5.46, 0.23]	1.45	-1.80	.072	-0.18 [-0.40, 0.05]	0.12	-1.53	.126
Regionsouth america	-4.23 [-6.52, -1.94]	1.17	-3.61	< .001	-0.48 [-0.69, -0.27]	0.11	-4.53	< .001
Log pa volume <sup>2</sup>	0.17 [0.06, 0.28]	0.06	3.09	.002	0.04 [0.00, 0.09]	0.02	1.89	.059
Age	0.00 [-0.01, 0.00]	0.00	-1.09	.278	0.00 [-0.01, 0.00]	0.00	-1.30	.194
Log pa volume × regioneurope	0.87 [-0.11, 1.85]	0.50	1.73	.083	0.08 [-0.03, 0.18]	0.05	1.41	.159
Log pa volume × regionafrica	3.02 [1.15, 4.88]	0.95	3.17	.002	0.17 [0.00, 0.34]	0.09	1.96	.050
Log pa volume × regionasia	2.21 [0.20, 4.23]	1.03	2.15	.032	0.14 [-0.03, 0.31]	0.09	1.56	.118
Log pa volume × regionnorth america	1.21 [-0.41, 2.84]	0.83	1.47	.143	-0.02 [-0.17, 0.13]	0.08	-0.29	.770
Log pa volume × regionsouth america	1.88 [0.62, 3.13]	0.64	2.94	.003	0.08 [-0.04, 0.20]	0.06	1.25	.211
Regioneurope × log pa volume <sup>2</sup>	-0.09 [-0.22, 0.04]	0.06	-1.41	.158	-0.04 [-0.09, 0.01]	0.02	-1.72	.086
Regionafrica × log pa volume <sup>2</sup>	-0.40 [-0.67, -0.13]	0.14	-2.88	.004	-0.07 [-0.18, 0.03]	0.05	-1.44	.151
Regionasia × log pa volume <sup>2</sup>	-0.28 [-0.58, 0.02]	0.15	-1.81	.071	-0.11 [-0.24, 0.03]	0.07	-1.58	.115
Regionnorth america × log pa volume <sup>2</sup>	-0.15 [-0.38, 0.09]	0.12	-1.24	.215	-0.02 [-0.12, 0.07]	0.05	-0.49	.627
Regionsouth america × log pa volume <sup>2</sup>	-0.23 [-0.40, -0.05]	0.09	-2.57	.010	-0.07 [-0.14, 0.01]	0.04	-1.78	.075
Sleep efficiency (z)								
(Intercept)	0.93 [-0.80, 2.65]	0.88	1.05	.293	0.48 [0.18, 0.77]	0.15	3.16	.002

Table 16 continued

## TITLE

Term	Physical activity volume (ln)				Physical activity intensity (z)			
	$\beta$ [95% CI]	SE	t	p	$\beta$ [95% CI]	SE	t	p
Log pa volume	-0.23 [-1.09, 0.63]	0.44	-0.53	.599	-0.07 [-0.17, 0.03]	0.05	-1.32	.186
Regioneurope	-1.44 [-3.32, 0.44]	0.96	-1.50	.133	-0.24 [-0.44, -0.04]	0.10	-2.30	.021
Regionafrica	-4.73 [-7.92, -1.53]	1.63	-2.90	.004	-0.19 [-0.42, 0.04]	0.12	-1.61	.108
Regionasia	-6.51 [-9.86, -3.17]	1.71	-3.81	< .001	-0.37 [-0.61, -0.12]	0.12	-2.96	.003
Regionnorth america	-1.92 [-4.75, 0.90]	1.44	-1.33	.183	-0.11 [-0.34, 0.12]	0.12	-0.91	.361
Regionsouth america	-4.18 [-6.46, -1.89]	1.17	-3.58	< .001	-0.38 [-0.59, -0.17]	0.11	-3.50	< .001
Log pa volume <sup>2</sup>	0.02 [-0.09, 0.13]	0.06	0.40	.686	0.03 [-0.02, 0.07]	0.02	1.11	.266
Age	0.00 [0.00, 0.01]	0.00	0.71	.478	0.00 [0.00, 0.00]	0.00	0.33	.740
Log pa volume × regioneurope	0.60 [-0.37, 1.57]	0.49	1.22	.223	0.07 [-0.04, 0.17]	0.05	1.29	.196
Log pa volume × regionafrica	2.47 [0.63, 4.31]	0.94	2.63	.009	0.16 [0.00, 0.33]	0.08	1.94	.053
Log pa volume × regionasia	3.56 [1.57, 5.55]	1.01	3.51	< .001	0.15 [-0.02, 0.32]	0.09	1.78	.075
Log pa volume × regionnorth america	0.77 [-0.85, 2.38]	0.82	0.93	.353	0.04 [-0.11, 0.19]	0.08	0.52	.603
Log pa volume × regionsouth america	1.79 [0.53, 3.04]	0.64	2.80	.005	0.18 [0.05, 0.30]	0.06	2.80	.005
Regioneurope × log pa volume <sup>2</sup>	-0.07 [-0.20, 0.05]	0.06	-1.11	.266	-0.02 [-0.06, 0.03]	0.02	-0.63	.529
Regionafrica × log pa volume <sup>2</sup>	-0.32 [-0.59, -0.05]	0.14	-2.36	.018	-0.01 [-0.11, 0.09]	0.05	-0.25	.806
Regionasia × log pa volume <sup>2</sup>	-0.50 [-0.80, -0.20]	0.15	-3.30	.001	-0.02 [-0.16, 0.11]	0.07	-0.34	.733
Regionnorth america × log pa volume <sup>2</sup>	-0.06 [-0.30, 0.17]	0.12	-0.53	.599	0.03 [-0.06, 0.12]	0.05	0.57	.566
Regionsouth america × log pa volume <sup>2</sup>	-0.19 [-0.36, -0.01]	0.09	-2.13	.034	-0.05 [-0.12, 0.02]	0.04	-1.41	.159
Sleep onset (z)								
(Intercept)	-0.73 [-1.99, 0.53]	0.64	-1.13	.258	-0.08 [-0.42, 0.26]	0.17	-0.44	.663
Log pa volume	0.51 [-0.10, 1.12]	0.31	1.63	.104	-0.08 [-0.15, 0.00]	0.04	-2.05	.041
Regioneurope	0.74 [-0.61, 2.08]	0.68	1.08	.282	0.12 [-0.04, 0.28]	0.08	1.45	.148
Regionafrica	-0.03 [-2.31, 2.25]	1.16	-0.02	.981	-0.04 [-0.22, 0.13]	0.09	-0.46	.646

Table 16 continued

## TITLE

Term	Physical activity volume (ln)				Physical activity intensity (z)			
	$\beta$ [95% CI]	SE	t	p	$\beta$ [95% CI]	SE	t	p
Regionasia	-0.42 [-2.80, 1.97]	1.22	-0.34	.732	0.10 [-0.09, 0.28]	0.10	1.02	.310
Regionnorth america	0.98 [-1.03, 3.00]	1.03	0.96	.339	0.06 [-0.12, 0.24]	0.09	0.69	.490
Regionsouth america	0.37 [-1.23, 1.98]	0.82	0.46	.648	0.13 [-0.04, 0.29]	0.08	1.50	.133
Log pa volume <sup>2</sup>	-0.09 [-0.17, -0.01]	0.04	-2.29	.022	-0.03 [-0.06, 0.00]	0.02	-2.02	.043
Age	0.00 [-0.01, 0.00]	0.00	-1.03	.305	0.00 [0.00, 0.00]	0.00	-0.88	.377
Log pa volume × regioneurope	-0.27 [-0.96, 0.42]	0.35	-0.77	.443	0.00 [-0.08, 0.07]	0.04	-0.03	.977
Log pa volume × regionafrica	-0.03 [-1.35, 1.28]	0.67	-0.05	.962	0.06 [-0.06, 0.18]	0.06	0.96	.339
Log pa volume × regionasia	0.40 [-1.02, 1.81]	0.72	0.55	.581	-0.03 [-0.15, 0.09]	0.06	-0.49	.623
Log pa volume × regionnorth america	-0.67 [-1.83, 0.48]	0.59	-1.14	.255	0.08 [-0.02, 0.19]	0.05	1.53	.126
Log pa volume × regionsouth america	-0.18 [-1.05, 0.70]	0.45	-0.39	.693	0.03 [-0.06, 0.12]	0.04	0.65	.515
Regioneurope × log pa volume <sup>2</sup>	0.03 [-0.06, 0.12]	0.05	0.62	.536	0.03 [0.00, 0.07]	0.02	1.99	.047
Regionafrica × log pa volume <sup>2</sup>	0.01 [-0.18, 0.21]	0.10	0.14	.885	0.04 [-0.03, 0.11]	0.04	1.04	.298
Regionasia × log pa volume <sup>2</sup>	-0.07 [-0.28, 0.14]	0.11	-0.63	.530	0.07 [-0.03, 0.16]	0.05	1.38	.169
Regionnorth america × log pa volume <sup>2</sup>	0.12 [-0.05, 0.29]	0.09	1.41	.159	0.00 [-0.07, 0.06]	0.03	-0.07	.946
Regionsouth america × log pa volume <sup>2</sup>	0.03 [-0.09, 0.16]	0.06	0.55	.582	0.01 [-0.04, 0.06]	0.03	0.44	.657
Sleep regularity (z)								
(Intercept)	-2.46 [-4.32, -0.61]	0.94	-2.61	.014	0.53 [0.25, 0.82]	0.15	3.65	< .001
Log pa volume	1.14 [0.22, 2.06]	0.47	2.44	.021	0.19 [0.09, 0.29]	0.05	3.77	< .001
Regioneurope	-0.76 [-2.65, 1.12]	0.96	-0.80	.429	0.16 [-0.03, 0.36]	0.10	1.62	.104
Regionafrica	-7.19 [-10.39, -4.00]	1.63	-4.41	< .001	0.28 [0.06, 0.51]	0.11	2.51	.012
Regionasia	3.26 [-0.11, 6.63]	1.72	1.90	.061	0.28 [0.04, 0.52]	0.12	2.30	.021
Regionnorth america	-2.77 [-5.35, -0.18]	1.32	-2.10	.036	0.09 [-0.13, 0.31]	0.11	0.78	.436
Regionsouth america	0.06 [-2.25, 2.37]	1.18	0.05	.959	-0.06 [-0.26, 0.15]	0.10	-0.55	.582

Table 16 continued

Term	Physical activity volume (ln)				Physical activity intensity (z)			
	$\beta$ [95% CI]	SE	t	p	$\beta$ [95% CI]	SE	t	p
Log pa volume <sup>2</sup>	-0.10 [-0.21, 0.02]	0.06	-1.66	.106	-0.07 [-0.11, -0.02]	0.02	-3.02	.003
Age	0.00 [0.00, 0.00]	0.00	0.24	.813	0.00 [-0.01, 0.00]	0.00	-0.44	.663
Log pa volume × regioneurope	0.66 [-0.31, 1.62]	0.49	1.34	.183	-0.12 [-0.22, -0.02]	0.05	-2.32	.021
Log pa volume × regionafrica	4.81 [2.99, 6.63]	0.93	5.18	< .001	0.21 [0.05, 0.37]	0.08	2.56	.011
Log pa volume × regionasia	-1.35 [-3.32, 0.63]	1.01	-1.34	.184	-0.06 [-0.23, 0.12]	0.09	-0.62	.538
Log pa volume × regionnorth america	1.79 [0.32, 3.26]	0.75	2.39	.017	0.09 [-0.06, 0.23]	0.07	1.18	.238
Log pa volume × regionsouth america	0.08 [-1.17, 1.32]	0.63	0.12	.905	-0.01 [-0.13, 0.11]	0.06	-0.13	.897
Regioneurope × log pa volume <sup>2</sup>	-0.11 [-0.23, 0.02]	0.06	-1.69	.092	0.06 [0.01, 0.10]	0.02	2.57	.010
Regionafrica × log pa volume <sup>2</sup>	-0.75 [-1.01, -0.49]	0.13	-5.62	< .001	-0.13 [-0.22, -0.03]	0.05	-2.64	.008
Regionasia × log pa volume <sup>2</sup>	0.14 [-0.15, 0.44]	0.15	0.97	.336	0.15 [0.01, 0.29]	0.07	2.04	.049
Regionnorth america × log pa volume <sup>2</sup>	-0.27 [-0.48, -0.06]	0.11	-2.48	.013	-0.07 [-0.15, 0.02]	0.04	-1.56	.120
Regionsouth america × log pa volume <sup>2</sup>	-0.03 [-0.20, 0.14]	0.09	-0.31	.755	-0.01 [-0.08, 0.06]	0.04	-0.20	.844

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

Table 17

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

TITLE

Term	Physical activity volume (ln)			Physical activity intensity (z)				
	$\beta$ [95% CI]	SE	t	p	$\beta$ [95% CI]	SE	t	p
Sleep duration (z)								
(Intercept)	4.61 [4.41, 4.80]	0.10	45.67	< .001	1.72 [1.51, 1.93]	0.11	16.19	< .001
Sleep duration	0.00 [-0.02, 0.02]	0.01	-0.25	.803	-0.03 [-0.07, 0.01]	0.02	-1.37	.179
Regioneurope	-0.22 [-0.32, -0.12]	0.05	-4.38	< .001	-0.27 [-0.42, -0.12]	0.08	-3.46	.001
Regionafrica	-0.16 [-0.27, -0.05]	0.05	-2.89	.004	-0.23 [-0.40, -0.06]	0.09	-2.63	.009
Regionasia	-0.37 [-0.48, -0.25]	0.06	-6.25	< .001	-0.58 [-0.77, -0.40]	0.09	-6.27	< .001
Regionnorth america	-0.30 [-0.40, -0.19]	0.06	-5.30	< .001	-0.33 [-0.50, -0.16]	0.09	-3.77	< .001
Regionsouth america	-0.25 [-0.35, -0.14]	0.05	-4.73	< .001	-0.45 [-0.60, -0.29]	0.08	-5.56	< .001
Sleep duration <sup>2</sup>	-0.01 [-0.02, 0.00]	0.00	-1.28	.200	-0.02 [-0.04, 0.00]	0.01	-1.70	.095
Age	-0.01 [-0.02, -0.01]	0.00	-5.45	.009	-0.02 [-0.03, -0.02]	0.00	-10.19	< .001
Sleep duration × regioneurope	0.00 [-0.02, 0.02]	0.01	-0.15	.877	0.06 [0.01, 0.11]	0.02	2.56	.014
Sleep duration × regionafrica	-0.02 [-0.06, 0.01]	0.02	-1.40	.165	-0.02 [-0.09, 0.05]	0.04	-0.57	.573
Sleep duration × regionasia	0.00 [-0.04, 0.05]	0.02	0.05	.960	0.07 [-0.02, 0.16]	0.05	1.44	.150
Sleep duration × regionnorth america	0.01 [-0.03, 0.04]	0.02	0.35	.731	-0.03 [-0.09, 0.04]	0.03	-0.74	.458
Sleep duration × regionsouth america	-0.04 [-0.06, -0.01]	0.01	-2.77	.006	-0.03 [-0.09, 0.03]	0.03	-0.97	.340
Regioneurope × Sleep duration <sup>2</sup>	0.00 [-0.01, 0.01]	0.01	-0.76	.446	0.01 [-0.01, 0.03]	0.01	1.07	.291
Regionafrica × Sleep duration <sup>2</sup>	-0.01 [-0.03, 0.01]	0.01	-1.00	.319	0.00 [-0.04, 0.03]	0.02	-0.29	.774
Regionasia × Sleep duration <sup>2</sup>	-0.01 [-0.03, 0.01]	0.01	-0.74	.459	0.02 [-0.02, 0.06]	0.02	1.02	.307
Regionnorth america × Sleep duration <sup>2</sup>	0.01 [-0.01, 0.03]	0.01	0.99	.327	0.02 [-0.01, 0.05]	0.02	1.14	.254
Regionsouth america × Sleep duration <sup>2</sup>	0.00 [-0.01, 0.01]	0.01	-0.32	.752	0.00 [-0.03, 0.02]	0.01	-0.32	.750
Sleep efficiency (z)								
(Intercept)	4.60 [4.40, 4.79]	0.10	45.53	< .001	1.69 [1.49, 1.90]	0.11	16.10	< .001

Table 17 continued

TITLE

Term	Physical activity volume (ln)			Physical activity intensity (z)				
	$\beta$ [95% CI]	SE	t	p	$\beta$ [95% CI]	SE	t	p
Sleep efficiency	-0.01 [-0.03, 0.01]	0.01	-0.83	.410	-0.09 [-0.14, -0.04]	0.03	-3.49	.001
Regioneurope	-0.21 [-0.31, -0.11]	0.05	-4.21	< .001	-0.21 [-0.36, -0.05]	0.08	-2.67	.008
Regionafrica	-0.17 [-0.28, -0.06]	0.05	-3.13	.002	-0.23 [-0.39, -0.06]	0.09	-2.62	.009
Regionasia	-0.33 [-0.44, -0.21]	0.06	-5.58	< .001	-0.46 [-0.65, -0.28]	0.09	-4.87	< .001
Regionnorth america	-0.28 [-0.38, -0.17]	0.05	-5.04	< .001	-0.32 [-0.48, -0.15]	0.09	-3.68	< .001
Regionsouth america	-0.25 [-0.35, -0.15]	0.05	-4.82	< .001	-0.44 [-0.59, -0.28]	0.08	-5.43	< .001
Sleep efficiency <sup>2</sup>	0.00 [0.00, 0.01]	0.00	0.94	.345	-0.01 [-0.03, 0.00]	0.01	-1.40	.163
Age	-0.01 [-0.02, -0.01]	0.00	-5.46	.009	-0.02 [-0.03, -0.02]	0.00	-10.62	< .001
Sleep efficiency × regioneurope	0.01 [-0.01, 0.04]	0.01	0.94	.348	0.08 [0.03, 0.13]	0.03	3.03	.003
Sleep efficiency × regionafrica	0.00 [-0.05, 0.04]	0.02	-0.13	.898	0.06 [-0.04, 0.15]	0.05	1.20	.239
Sleep efficiency × regionasia	0.06 [0.01, 0.12]	0.03	2.20	.029	0.19 [0.09, 0.30]	0.05	3.52	< .001
Sleep efficiency × regionnorth america	0.01 [-0.03, 0.06]	0.02	0.52	.606	0.05 [-0.04, 0.13]	0.04	1.10	.271
Sleep efficiency × regionsouth america	0.00 [-0.03, 0.03]	0.02	0.22	.828	0.06 [-0.01, 0.12]	0.03	1.74	.082
Regioneurope × Sleep efficiency <sup>2</sup>	-0.01 [-0.01, 0.00]	0.00	-1.32	.186	0.00 [-0.01, 0.02]	0.01	0.25	.803
Regionafrica × Sleep efficiency <sup>2</sup>	-0.01 [-0.02, 0.00]	0.01	-1.21	.227	0.01 [-0.02, 0.03]	0.01	0.57	.568
Regionasia × Sleep efficiency <sup>2</sup>	0.00 [-0.01, 0.01]	0.01	0.09	.927	0.02 [0.00, 0.05]	0.01	1.95	.052
Regionnorth america × Sleep efficiency <sup>2</sup>	0.00 [-0.01, 0.01]	0.01	-0.23	.820	0.01 [-0.01, 0.03]	0.01	0.90	.370
Regionsouth america × Sleep efficiency <sup>2</sup>	0.00 [-0.01, 0.00]	0.00	-0.94	.347	0.00 [-0.01, 0.02]	0.01	0.49	.624
Sleep onset (z)								
(Intercept)	4.61 [4.41, 4.80]	0.10	45.60	< .001	1.73 [1.53, 1.94]	0.10	16.59	< .001
Sleep onset	-0.02 [-0.05, 0.01]	0.01	-1.46	.148	0.01 [-0.04, 0.06]	0.03	0.28	.780
Regioneurope	-0.23 [-0.33, -0.13]	0.05	-4.46	< .001	-0.28 [-0.43, -0.12]	0.08	-3.44	.001
Regionafrica	-0.12 [-0.24, -0.01]	0.06	-2.13	.034	-0.26 [-0.45, -0.07]	0.10	-2.74	.007

Table 17 continued

TITLE

Term	Physical activity volume (ln)			Physical activity intensity (z)				
	$\beta$ [95% CI]	SE	t	p	$\beta$ [95% CI]	SE	t	p
Regionasia	-0.36 [-0.48, -0.24]	0.06	-5.91	< .001	-0.56 [-0.75, -0.37]	0.10	-5.69	< .001
Regionnorth america	-0.29 [-0.40, -0.17]	0.06	-4.94	< .001	-0.36 [-0.54, -0.17]	0.09	-3.83	< .001
Regionsouth america	-0.22 [-0.33, -0.12]	0.05	-4.15	< .001	-0.46 [-0.62, -0.29]	0.08	-5.40	< .001
Sleep onset <sup>2</sup>	-0.02 [-0.03, 0.00]	0.01	-2.09	.037	-0.04 [-0.07, -0.01]	0.02	-2.37	.018
Age	-0.01 [-0.02, -0.01]	0.00	-5.47	.009	-0.02 [-0.03, -0.02]	0.00	-10.43	< .001
Sleep onset × regioneurope	0.01 [-0.02, 0.04]	0.01	0.87	.383	0.00 [-0.06, 0.05]	0.03	-0.15	.879
Sleep onset × regionafrica	0.03 [-0.04, 0.10]	0.04	0.77	.442	0.09 [-0.07, 0.25]	0.08	1.13	.274
Sleep onset × regionasia	0.06 [-0.03, 0.15]	0.05	1.37	.178	0.02 [-0.19, 0.22]	0.11	0.16	.877
Sleep onset × regionnorth america	0.04 [-0.01, 0.08]	0.02	1.44	.153	0.08 [-0.02, 0.17]	0.05	1.61	.108
Sleep onset × regionsouth america	0.05 [0.02, 0.08]	0.02	3.00	.003	0.05 [-0.02, 0.11]	0.03	1.43	.154
Regioneurope × Sleep onset <sup>2</sup>	0.01 [0.00, 0.03]	0.01	1.54	.123	0.04 [0.00, 0.07]	0.02	2.17	.030
Regionafrica × Sleep onset <sup>2</sup>	-0.03 [-0.11, 0.05]	0.04	-0.79	.436	0.09 [-0.07, 0.25]	0.08	1.10	.291
Regionasia × Sleep onset <sup>2</sup>	0.03 [-0.05, 0.12]	0.04	0.76	.453	0.02 [-0.18, 0.22]	0.10	0.20	.843
Regionnorth america × Sleep onset <sup>2</sup>	0.03 [-0.01, 0.07]	0.02	1.29	.208	0.09 [0.01, 0.17]	0.04	2.16	.034
Regionsouth america × Sleep onset <sup>2</sup>	0.00 [-0.02, 0.03]	0.01	0.44	.657	0.04 [0.00, 0.09]	0.02	1.98	.048
Sleep regularity (z)								
(Intercept)	4.58 [4.39, 4.77]	0.10	47.16	< .001	1.73 [1.53, 1.93]	0.10	16.99	< .001
Sleep regularity	0.06 [0.03, 0.08]	0.01	5.25	< .001	0.03 [-0.01, 0.06]	0.02	1.40	.163
Regioneurope	-0.24 [-0.33, -0.14]	0.05	-4.80	< .001	-0.30 [-0.45, -0.15]	0.08	-3.87	< .001
Regionafrica	-0.17 [-0.28, -0.07]	0.05	-3.29	.001	-0.29 [-0.46, -0.12]	0.09	-3.41	.001
Regionasia	-0.41 [-0.52, -0.30]	0.06	-7.28	< .001	-0.62 [-0.80, -0.44]	0.09	-6.68	< .001
Regionnorth america	-0.29 [-0.40, -0.19]	0.05	-5.41	< .001	-0.32 [-0.49, -0.15]	0.09	-3.70	< .001
Regionsouth america	-0.25 [-0.35, -0.15]	0.05	-4.89	< .001	-0.47 [-0.63, -0.31]	0.08	-5.86	< .001

Table 17 continued

Term	Physical activity volume (ln)				Physical activity intensity (z)			
	$\beta$ [95% CI]	SE	t	p	$\beta$ [95% CI]	SE	t	p
Sleep regularity <sup>2</sup>	-0.02 [-0.03, -0.01]	0.01	-3.32	.001	-0.06 [-0.09, -0.04]	0.01	-5.89	< .001
Age	-0.01 [-0.02, -0.01]	0.00	-5.50	.009	-0.02 [-0.03, -0.02]	0.00	-10.86	< .001
Sleep regularity × regioneurope	0.00 [-0.02, 0.03]	0.01	0.31	.762	0.03 [-0.02, 0.07]	0.02	1.15	.253
Sleep regularity × regionafrica	0.00 [-0.03, 0.04]	0.02	0.10	.917	0.07 [0.00, 0.14]	0.04	1.89	.059
Sleep regularity × regionasia	0.00 [-0.05, 0.05]	0.02	0.04	.968	0.17 [0.08, 0.26]	0.05	3.54	< .001
Sleep regularity × regionnorth america	0.02 [-0.02, 0.07]	0.02	0.92	.368	0.05 [-0.03, 0.13]	0.04	1.20	.229
Sleep regularity × regionsouth america	0.03 [0.01, 0.06]	0.01	2.37	.018	0.06 [0.01, 0.12]	0.03	2.30	.024
Regioneurope × Sleep regularity <sup>2</sup>	0.00 [-0.01, 0.02]	0.01	0.72	.472	0.07 [0.05, 0.10]	0.01	5.53	< .001
Regionafrica × Sleep regularity <sup>2</sup>	-0.02 [-0.04, 0.00]	0.01	-1.81	.071	0.06 [0.01, 0.10]	0.02	2.58	.010
Regionasia × Sleep regularity <sup>2</sup>	0.03 [0.00, 0.05]	0.01	2.12	.034	0.10 [0.04, 0.15]	0.03	3.55	< .001
Regionnorth america × Sleep regularity <sup>2</sup>	0.01 [-0.01, 0.04]	0.01	1.18	.238	0.01 [-0.03, 0.06]	0.02	0.59	.555
Regionsouth america × Sleep regularity <sup>2</sup>	0.01 [0.00, 0.03]	0.01	1.78	.078	0.06 [0.03, 0.09]	0.02	3.60	< .001

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

Table 18

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

Term	Physical activity volume (ln)			Physical activity intensity (z)				
	$\beta$ [95% CI]	SE	t	p	$\beta$ [95% CI]	SE	t	p
Sleep duration (z)								
(Intercept)	0.77 [-2.43, 3.98]	1.63	0.47	.636	0.57 [0.29, 0.85]	0.14	3.96	< .001
Log pa volume	-0.39 [-2.20, 1.41]	0.92	-0.43	.669	0.13 [0.03, 0.24]	0.05	2.45	.014
Daylight hours	-0.07 [-0.35, 0.20]	0.14	-0.51	.609	-0.03 [-0.04, -0.01]	0.01	-4.07	< .001
Log pa volume <sup>2</sup>	0.09 [-0.16, 0.35]	0.13	0.72	.471	0.05 [-0.02, 0.12]	0.04	1.49	.137
Age	0.00 [0.00, 0.00]	0.00	-0.51	.608	0.00 [-0.01, 0.00]	0.00	-0.86	.392
Log pa volume $\times$ daylight hours	0.03 [-0.12, 0.19]	0.08	0.39	.695	-0.01 [-0.01, 0.00]	0.00	-1.26	.208
Daylight hours $\times$ log pa volume <sup>2</sup>	-0.01 [-0.03, 0.02]	0.01	-0.49	.624	0.00 [-0.01, 0.00]	0.00	-1.43	.153
Sleep efficiency (z)								
(Intercept)	-2.33 [-5.51, 0.85]	1.62	-1.44	.150	0.42 [0.12, 0.71]	0.15	2.76	.006
Log pa volume	1.33 [-0.46, 3.13]	0.92	1.46	.145	0.00 [-0.11, 0.10]	0.05	-0.05	.960
Daylight hours	0.07 [-0.21, 0.34]	0.14	0.48	.631	-0.01 [-0.03, 0.00]	0.01	-1.99	.047
Log pa volume <sup>2</sup>	-0.16 [-0.41, 0.10]	0.13	-1.21	.226	0.01 [-0.06, 0.08]	0.04	0.18	.855
Age	0.00 [0.00, 0.01]	0.00	1.26	.207	0.00 [0.00, 0.01]	0.00	0.78	.437
Log pa volume $\times$ daylight hours	-0.04 [-0.19, 0.12]	0.08	-0.48	.631	0.00 [-0.01, 0.01]	0.00	0.35	.724
Daylight hours $\times$ log pa volume <sup>2</sup>	0.00 [-0.02, 0.03]	0.01	0.36	.718	0.00 [-0.01, 0.01]	0.00	0.15	.877
Sleep onset (z)								
(Intercept)	-2.39 [-4.68, -0.09]	1.17	-2.04	.042	0.00 [-0.34, 0.33]	0.17	-0.02	.981
Log pa volume	1.57 [0.28, 2.85]	0.66	2.39	.017	-0.14 [-0.22, -0.07]	0.04	-3.72	< .001
Daylight hours	0.18 [-0.02, 0.37]	0.10	1.80	.072	0.00 [-0.01, 0.01]	0.00	0.07	.945
Log pa volume <sup>2</sup>	-0.25 [-0.43, -0.07]	0.09	-2.68	.007	-0.04 [-0.09, 0.01]	0.03	-1.48	.139
Age	0.00 [0.00, 0.00]	0.00	-0.96	.338	0.00 [0.00, 0.00]	0.00	-0.77	.443

Table 18 continued

Term	Physical activity volume (ln)			Physical activity intensity (z)						
	$\beta$	[95% CI]	SE	t	p	$\beta$ [95% CI]	SE	t	p	
Log pa volume $\times$ daylight hours	-0.10	[-0.21, 0.01]	0.06	-1.85	.064	0.01	[0.00, 0.01]	0.00	1.80	.072
Daylight hours $\times$ log pa volume <sup>2</sup>	0.02	[0.00, 0.03]	0.01	1.91	.056	0.00	[0.00, 0.01]	0.00	1.30	.192
Sleep regularity (z)										
(Intercept)	-3.22	[-6.31, -0.13]	1.58	-2.04	.042	0.65	[0.38, 0.93]	0.14	4.61	< .001
Log pa volume	1.49	[-0.26, 3.24]	0.89	1.67	.096	0.27	[0.17, 0.37]	0.05	5.31	< .001
Daylight hours	0.04	[-0.23, 0.31]	0.14	0.28	.779	0.00	[-0.02, 0.01]	0.01	-0.38	.704
Log pa volume <sup>2</sup>	-0.12	[-0.37, 0.13]	0.13	-0.95	.344	-0.01	[-0.08, 0.05]	0.03	-0.44	.662
Age	0.00	[0.00, 0.00]	0.00	0.48	.633	0.00	[0.00, 0.00]	0.00	-0.04	.971
Log pa volume $\times$ daylight hours	0.00	[-0.15, 0.15]	0.08	-0.01	.991	-0.01	[-0.02, -0.01]	0.00	-3.44	.001
Daylight hours $\times$ log pa volume <sup>2</sup>	0.00	[-0.02, 0.02]	0.01	-0.30	.768	0.00	[-0.01, 0.01]	0.00	-0.11	.916

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

Table 19

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

Term	Physical activity volume (ln)				Physical activity intensity (z)					
	$\beta$	[95% CI]	SE	t	p	$\beta$	[95% CI]	SE	t	p
Sleep duration (z)										
(Intercept)	4.26	[4.07, 4.46]	0.10	42.13	< .001	1.49	[1.23, 1.75]	0.13	11.41	< .001
Sleep duration	0.05	[0.01, 0.08]	0.02	2.58	.010	0.05	[-0.02, 0.12]	0.04	1.31	.190
Daylight hours	0.01	[0.01, 0.02]	0.00	4.88	< .001	0.00	[-0.01, 0.01]	0.00	-0.26	.793
Sleep duration <sup>2</sup>	0.00	[-0.01, 0.02]	0.01	0.37	.715	0.02	[-0.02, 0.05]	0.02	0.86	.391
Age	-0.01	[-0.02, -0.01]	0.00	-5.66	.008	-0.02	[-0.03, -0.02]	0.00	-8.88	.001
Sleep duration × daylight hours	0.00	[-0.01, 0.00]	0.00	-3.12	.002	0.00	[-0.01, 0.00]	0.00	-1.30	.194
Daylight hours × Sleep duration <sup>2</sup>	0.00	[0.00, 0.00]	0.00	-1.39	.166	0.00	[-0.01, 0.00]	0.00	-1.41	.159
Sleep efficiency (z)										
(Intercept)	4.26	[4.06, 4.46]	0.10	41.62	< .001	1.51	[1.25, 1.77]	0.13	11.34	< .001
Sleep efficiency	0.02	[-0.02, 0.05]	0.02	0.96	.339	-0.02	[-0.09, 0.05]	0.04	-0.50	.614
Daylight hours	0.01	[0.01, 0.02]	0.00	4.91	< .001	0.00	[-0.01, 0.01]	0.00	-0.51	.609
Sleep efficiency <sup>2</sup>	0.00	[-0.02, 0.01]	0.01	-0.46	.648	0.00	[-0.04, 0.03]	0.02	-0.18	.854
Age	-0.01	[-0.02, -0.01]	0.00	-5.65	.008	-0.02	[-0.03, -0.02]	0.00	-8.82	.001
Sleep efficiency × daylight hours	0.00	[0.00, 0.00]	0.00	-0.93	.351	0.00	[-0.01, 0.01]	0.00	0.03	.975
Daylight hours × Sleep efficiency <sup>2</sup>	0.00	[0.00, 0.00]	0.00	0.41	.681	0.00	[0.00, 0.00]	0.00	-0.09	.927
Sleep onset (z)										
(Intercept)	4.26	[4.06, 4.46]	0.10	41.66	< .001	1.52	[1.27, 1.78]	0.13	11.62	< .001
Sleep onset	0.02	[-0.02, 0.06]	0.02	0.96	.337	0.04	[-0.04, 0.12]	0.04	0.98	.329
Daylight hours	0.01	[0.01, 0.02]	0.00	4.93	< .001	0.00	[-0.01, 0.01]	0.00	-0.79	.432
Sleep onset <sup>2</sup>	-0.01	[-0.04, 0.01]	0.01	-0.91	.365	-0.03	[-0.08, 0.02]	0.02	-1.24	.214
Age	-0.01	[-0.02, -0.01]	0.00	-5.66	.008	-0.02	[-0.03, -0.02]	0.00	-8.92	.001

Table 19 continued

Term	Physical activity volume (ln)				Physical activity intensity (z)					
	$\beta$	[95% CI]	SE	t	p	$\beta$	[95% CI]	SE	t	p
Sleep onset × daylight hours	0.00	[0.00, 0.00]	0.00	-0.79	.429	0.00	[-0.01, 0.01]	0.00	-0.49	.625
Daylight hours × Sleep onset <sup>2</sup>	0.00	[0.00, 0.00]	0.00	0.23	.819	0.00	[0.00, 0.01]	0.00	0.99	.323
Sleep regularity (z)										
(Intercept)	4.24	[4.05, 4.44]	0.10	42.92	< .001	1.49	[1.24, 1.75]	0.13	11.51	< .001
Sleep regularity	0.11	[0.07, 0.15]	0.02	5.54	< .001	0.16	[0.08, 0.24]	0.04	4.08	< .001
Daylight hours	0.01	[0.01, 0.02]	0.00	4.51	< .001	0.00	[-0.01, 0.01]	0.00	-0.88	.380
Sleep regularity <sup>2</sup>	-0.04	[-0.06, -0.01]	0.01	-2.69	.007	-0.04	[-0.09, 0.01]	0.03	-1.58	.114
Age	-0.01	[-0.02, -0.01]	0.00	-5.67	.008	-0.02	[-0.03, -0.02]	0.00	-9.02	.001
Sleep regularity × daylight hours	0.00	[-0.01, 0.00]	0.00	-2.55	.011	-0.01	[-0.01, 0.00]	0.00	-2.60	.009
Daylight hours × Sleep regularity <sup>2</sup>	0.00	[0.00, 0.00]	0.00	1.74	.083	0.00	[0.00, 0.01]	0.00	1.03	.301

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

Table 20

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

Term	Physical activity volume (ln)				Physical activity intensity (z)			
	$\beta$ [95% CI]	SE	t	p	$\beta$ [95% CI]	SE	t	p
<i>Sleep duration (z)</i>								
(Intercept)	0.04 [-0.92, 1.00]	0.49	0.08	.936	0.72 [0.39, 1.06]	0.17	4.21	< .001
Log pa volume	0.22 [-0.34, 0.77]	0.28	0.76	.446	0.08 [0.04, 0.12]	0.02	3.54	< .001
Acc wear locwrist	0.64 [-0.63, 1.91]	0.65	0.99	.324	-0.58 [-0.94, -0.22]	0.18	-3.16	.002
Log pa volume <sup>2</sup>	0.00 [-0.09, 0.08]	0.04	-0.06	.950	0.01 [-0.03, 0.04]	0.02	0.32	.748
Age	0.00 [-0.01, 0.00]	0.00	-0.97	.334	0.00 [-0.01, 0.00]	0.00	-1.08	.280
Log pa volume × acc wear locwrist	-0.69 [-1.40, 0.02]	0.36	-1.91	.056	-0.02 [-0.07, 0.03]	0.03	-0.70	.482
Acc wear locwrist × log pa volume <sup>2</sup>	0.09 [-0.02, 0.19]	0.05	1.67	.095	0.00 [-0.04, 0.03]	0.02	-0.18	.858
<i>Sleep efficiency (z)</i>								
(Intercept)	-2.88 [-3.80, -1.96]	0.47	-6.16	< .001	-0.52 [-0.68, -0.35]	0.09	-6.01	< .001
Log pa volume	1.14 [0.60, 1.69]	0.28	4.09	< .001	0.08 [0.04, 0.13]	0.02	3.87	< .001
Acc wear locwrist	3.55 [2.34, 4.77]	0.62	5.76	< .001	0.92 [0.78, 1.07]	0.08	12.26	< .001
Log pa volume <sup>2</sup>	-0.13 [-0.21, -0.04]	0.04	-2.97	.003	-0.01 [-0.04, 0.02]	0.02	-0.79	.431
Age	0.00 [0.00, 0.00]	0.00	1.27	.204	0.00 [0.00, 0.00]	0.00	1.33	.183
Log pa volume × acc wear locwrist	-1.24 [-1.94, -0.54]	0.36	-3.47	.001	-0.10 [-0.15, -0.05]	0.03	-3.81	< .001
Acc wear locwrist × log pa volume <sup>2</sup>	0.13 [0.03, 0.24]	0.05	2.57	.010	0.02 [-0.01, 0.06]	0.02	1.17	.241
<i>Sleep onset (z)</i>								
(Intercept)	-1.73 [-2.49, -0.97]	0.39	-4.48	< .001	-1.03 [-1.44, -0.63]	0.21	-5.02	< .001
Log pa volume	0.46 [0.07, 0.85]	0.20	2.32	.021	-0.03 [-0.06, 0.00]	0.02	-1.82	.068
Acc wear locwrist	3.06 [2.10, 4.03]	0.49	6.20	< .001	1.28 [0.84, 1.71]	0.22	5.75	< .001
Log pa volume <sup>2</sup>	-0.07 [-0.13, -0.01]	0.03	-2.39	.017	-0.02 [-0.04, 0.00]	0.01	-1.53	.125
Age	0.00 [-0.01, 0.00]	0.00	-1.43	.155	0.00 [0.00, 0.00]	0.00	-1.01	.315

Table 20 continued

Term	Physical activity volume (ln)				Physical activity intensity (z)					
	$\beta$	[95% CI]	SE	t	p	$\beta$	[95% CI]	SE	t	p
Log pa volume × acc wear locwrist	-0.76	[-1.26, -0.26]	0.26	-2.98	.003	-0.07	[-0.11, -0.04]	0.02	-3.88	< .001
Acc wear locwrist × log pa volume <sup>2</sup>	0.08	[0.01, 0.15]	0.04	2.10	.036	0.01	[-0.02, 0.03]	0.01	0.65	.513
Sleep regularity (z)										
(Intercept)	-3.81	[-4.71, -2.90]	0.46	-8.25	< .001	0.16	[-0.16, 0.48]	0.16	0.99	.323
Log pa volume	2.01	[1.48, 2.53]	0.27	7.52	< .001	0.25	[0.21, 0.29]	0.02	12.24	< .001
Acc wear locwrist	1.03	[-0.22, 2.28]	0.64	1.61	.110	0.67	[0.33, 1.01]	0.17	3.88	< .001
Log pa volume <sup>2</sup>	-0.25	[-0.33, -0.17]	0.04	-6.07	< .001	-0.09	[-0.12, -0.06]	0.02	-6.06	< .001
Age	0.00	[0.00, 0.00]	0.00	0.24	.813	0.00	[-0.01, 0.00]	0.00	-1.12	.267
Log pa volume × acc wear locwrist	-0.50	[-1.20, 0.20]	0.36	-1.40	.164	-0.21	[-0.26, -0.16]	0.02	-8.65	< .001
Acc wear locwrist × log pa volume <sup>2</sup>	0.09	[-0.01, 0.19]	0.05	1.72	.088	0.08	[0.04, 0.11]	0.02	4.61	< .001

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

Table 21

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

Term	Physical activity volume (ln)				Physical activity intensity (z)					
	$\beta$	[95% CI]	SE	t	p	$\beta$	[95% CI]	SE	t	p
<b>Sleep duration (z)</b>										
(Intercept)	3.83	[3.65, 4.02]	0.09	40.63	< .001	1.17	[0.88, 1.45]	0.15	7.94	< .001
Sleep duration	-0.02	[-0.03, -0.01]	0.01	-3.08	.002	-0.03	[-0.05, -0.01]	0.01	-2.68	.007
Acc wear locwrst	0.73	[0.52, 0.94]	0.11	6.76	< .001	0.41	[0.07, 0.75]	0.17	2.39	.020
Sleep duration <sup>2</sup>	-0.01	[-0.01, 0.00]	0.00	-2.66	.009	-0.02	[-0.03, -0.01]	0.01	-3.27	.001
Age	-0.01	[-0.01, -0.01]	0.00	-6.80	.003	-0.03	[-0.03, -0.02]	0.00	-9.94	< .001
Sleep duration × acc wear locwrst	0.01	[0.00, 0.02]	0.01	1.70	.090	0.05	[0.02, 0.08]	0.01	3.66	< .001
Acc wear locwrst × Sleep duration <sup>2</sup>	0.00	[-0.01, 0.00]	0.00	-0.56	.578	0.01	[0.00, 0.03]	0.01	1.96	.050
<b>Sleep efficiency (z)</b>										
(Intercept)	3.82	[3.64, 4.01]	0.09	40.63	< .001	1.14	[0.85, 1.44]	0.15	7.70	< .001
Sleep efficiency	0.00	[-0.01, 0.01]	0.01	0.05	.960	-0.02	[-0.05, 0.01]	0.01	-1.47	.146
Acc wear locwrst	0.73	[0.52, 0.94]	0.11	6.77	< .001	0.44	[0.09, 0.78]	0.17	2.51	.015
Sleep efficiency <sup>2</sup>	0.00	[0.00, 0.00]	0.00	-0.56	.574	-0.01	[-0.01, 0.00]	0.00	-1.80	.073
Age	-0.01	[-0.01, -0.01]	0.00	-6.76	.003	-0.03	[-0.03, -0.02]	0.00	-9.96	< .001
Sleep efficiency × acc wear locwrst	0.00	[-0.02, 0.02]	0.01	0.10	.921	0.00	[-0.03, 0.04]	0.02	0.27	.785
Acc wear locwrst × Sleep efficiency <sup>2</sup>	0.00	[0.00, 0.01]	0.00	1.18	.236	0.00	[-0.01, 0.01]	0.01	0.57	.566
<b>Sleep onset (z)</b>										
(Intercept)	3.84	[3.66, 4.02]	0.09	41.34	< .001	1.16	[0.87, 1.46]	0.15	7.78	< .001
Sleep onset	0.03	[0.00, 0.05]	0.01	1.83	.097	0.07	[0.02, 0.12]	0.02	2.89	.008
Acc wear locwrst	0.72	[0.51, 0.93]	0.11	6.77	< .001	0.42	[0.07, 0.76]	0.17	2.39	.020
Sleep onset <sup>2</sup>	0.00	[-0.03, 0.02]	0.01	-0.16	.873	0.03	[-0.01, 0.08]	0.02	1.40	.175
Age	-0.01	[-0.01, -0.01]	0.00	-6.75	.003	-0.03	[-0.03, -0.02]	0.00	-9.88	< .001

Table 21 continued

Term	Physical activity volume (ln)				Physical activity intensity (z)					
	$\beta$	[95% CI]	SE	t	p	$\beta$	[95% CI]	SE	t	p
Sleep onset × acc wear locwrist	-0.04	[-0.07, -0.01]	0.01	-2.75	.013	-0.07	[-0.12, -0.01]	0.03	-2.48	.018
Acc wear locwrist × Sleep onset <sup>2</sup>	0.00	[-0.03, 0.03]	0.01	-0.01	.993	-0.04	[-0.09, 0.01]	0.02	-1.47	.156
Sleep regularity (z)										
(Intercept)	3.82	[3.64, 4.00]	0.09	42.40	< .001	1.15	[0.86, 1.44]	0.15	7.78	< .001
Sleep regularity	0.09	[0.08, 0.11]	0.01	14.30	< .001	0.14	[0.11, 0.16]	0.01	10.82	< .001
Acc wear locwrist	0.70	[0.50, 0.90]	0.10	6.76	< .001	0.40	[0.06, 0.74]	0.17	2.29	.026
Sleep regularity <sup>2</sup>	-0.01	[-0.02, 0.00]	0.00	-3.03	.002	0.00	[-0.02, 0.01]	0.01	-0.69	.491
Age	-0.01	[-0.01, -0.01]	0.00	-6.85	.003	-0.03	[-0.03, -0.02]	0.00	-9.86	< .001
Sleep regularity × acc wear locwrist	-0.05	[-0.06, -0.03]	0.01	-5.50	< .001	-0.12	[-0.15, -0.09]	0.02	-7.65	< .001
Acc wear locwrist × Sleep regularity <sup>2</sup>	0.00	[-0.01, 0.01]	0.00	0.29	.771	0.00	[-0.02, 0.02]	0.01	-0.30	.763

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

Table 22

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

Term	Physical activity volume (ln)				Physical activity intensity (z)			
	$\beta$ [95% CI]	SE	t	p	$\beta$ [95% CI]	SE	t	p
<i>Sleep duration (z)</i>								
(Intercept)	-0.31 [-1.42, 0.80]	0.57	-0.55	.585	0.27 [0.02, 0.52]	0.13	2.12	.034
Log pa volume	0.12 [-0.47, 0.72]	0.30	0.40	.688	0.04 [0.00, 0.08]	0.02	1.77	.076
Pa mostactivehr	0.02 [-0.05, 0.10]	0.04	0.60	.546	0.00 [0.00, 0.00]	0.00	-0.14	.887
Log pa volume <sup>2</sup>	0.01 [-0.07, 0.09]	0.04	0.19	.845	0.02 [-0.01, 0.04]	0.01	1.41	.159
Age	0.00 [-0.01, 0.00]	0.00	-0.96	.338	0.00 [-0.01, 0.00]	0.00	-1.24	.216
Log pa volume × pa mostactivehr	-0.01 [-0.06, 0.03]	0.02	-0.65	.516	0.00 [0.00, 0.01]	0.00	1.88	.060
Pa mostactivehr × log pa volume <sup>2</sup>	0.00 [0.00, 0.01]	0.00	0.65	.513	0.00 [0.00, 0.00]	0.00	-1.35	.176
<i>Sleep efficiency (z)</i>								
(Intercept)	-1.30 [-2.39, -0.21]	0.56	-2.33	.020	0.26 [0.01, 0.52]	0.13	2.01	.044
Log pa volume	0.80 [0.21, 1.38]	0.30	2.66	.008	0.00 [-0.04, 0.04]	0.02	0.11	.912
Pa mostactivehr	-0.02 [-0.10, 0.06]	0.04	-0.50	.617	0.00 [0.00, 0.00]	0.00	-0.12	.907
Log pa volume <sup>2</sup>	-0.10 [-0.18, -0.02]	0.04	-2.49	.013	0.01 [-0.01, 0.04]	0.01	0.89	.371
Age	0.00 [0.00, 0.01]	0.00	1.01	.314	0.00 [0.00, 0.01]	0.00	0.60	.548
Log pa volume × pa mostactivehr	0.01 [-0.03, 0.05]	0.02	0.36	.718	0.00 [0.00, 0.00]	0.00	0.82	.414
Pa mostactivehr × log pa volume <sup>2</sup>	0.00 [-0.01, 0.01]	0.00	-0.22	.824	0.00 [0.00, 0.00]	0.00	-0.02	.982
<i>Sleep onset (z)</i>								
(Intercept)	-0.62 [-1.45, 0.21]	0.42	-1.47	.141	-0.04 [-0.35, 0.28]	0.16	-0.22	.824
Log pa volume	0.50 [0.08, 0.91]	0.21	2.32	.020	-0.04 [-0.07, -0.01]	0.01	-2.83	.005
Pa mostactivehr	0.02 [-0.03, 0.08]	0.03	0.87	.384	0.00 [0.00, 0.00]	0.00	2.00	.045
Log pa volume <sup>2</sup>	-0.09 [-0.15, -0.03]	0.03	-3.07	.002	-0.02 [-0.04, 0.00]	0.01	-2.13	.033
Age	0.00 [0.00, 0.00]	0.00	-0.80	.422	0.00 [0.00, 0.00]	0.00	-0.64	.522

Table 22 continued

Term	Physical activity volume (ln)				Physical activity intensity (z)			
	$\beta$ [95% CI]	SE	t	p	$\beta$ [95% CI]	SE	t	p
Log pa volume × pa mostactivehr	-0.01 [-0.04, 0.02]	0.02	-0.71	.480	0.00 [-0.01, 0.00]	0.00	-3.16	.002
Pa mostactivehr × log pa volume <sup>2</sup>	0.00 [0.00, 0.01]	0.00	0.65	.516	0.00 [0.00, 0.00]	0.00	1.86	.063
Sleep regularity (z)								
(Intercept)	-2.54 [-3.62, -1.46]	0.55	-4.59	< .001	0.65 [0.41, 0.89]	0.12	5.31	< .001
Log pa volume	1.42 [0.83, 2.00]	0.30	4.75	< .001	0.09 [0.05, 0.12]	0.02	4.54	< .001
Pa mostactivehr	-0.02 [-0.09, 0.05]	0.04	-0.51	.611	0.00 [0.00, 0.00]	0.00	-0.65	.515
Log pa volume <sup>2</sup>	-0.15 [-0.23, -0.07]	0.04	-3.80	< .001	-0.01 [-0.04, 0.01]	0.01	-1.09	.278
Age	0.00 [0.00, 0.00]	0.00	0.30	.768	0.00 [0.00, 0.00]	0.00	-0.11	.911
Log pa volume × pa mostactivehr	0.01 [-0.03, 0.05]	0.02	0.32	.748	0.00 [0.00, 0.00]	0.00	0.74	.457
Pa mostactivehr × log pa volume <sup>2</sup>	0.00 [-0.01, 0.01]	0.00	-0.17	.862	0.00 [0.00, 0.00]	0.00	-0.23	.817

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

Table 23

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

Term	Physical activity volume (m)				Physical activity intensity (z)			
	$\beta$ [95% CI]	SE	t	p	$\beta$ [95% CI]	SE	t	p
<b>Sleep duration (z)</b>								
(Intercept)	4.40 [4.21, 4.59]	0.10	46.22	< .001	1.44 [1.21, 1.67]	0.12	12.33	< .001
Sleep duration	0.00 [-0.02, 0.01]	0.01	-0.53	.597	0.04 [0.01, 0.07]	0.01	2.46	.014
Pa mostactivehr	0.00 [0.00, 0.00]	0.00	3.64	< .001	0.00 [0.00, 0.00]	0.00	2.27	.023
Sleep duration <sup>2</sup>	-0.01 [-0.02, 0.00]	0.00	-2.07	.040	0.00 [-0.01, 0.02]	0.01	0.51	.607
Age	-0.01 [-0.02, -0.01]	0.00	-5.50	.008	-0.02 [-0.03, -0.02]	0.00	-8.78	.001
Sleep duration × pa mostactivehr	0.00 [0.00, 0.00]	0.00	-0.89	.377	0.00 [0.00, 0.00]	0.00	-2.58	.010
Pa mostactivehr × Sleep duration <sup>2</sup>	0.00 [0.00, 0.00]	0.00	-0.23	.820	0.00 [0.00, 0.00]	0.00	-1.93	.054
<b>Sleep efficiency (z)</b>								
(Intercept)	4.39 [4.20, 4.58]	0.10	45.67	< .001	1.45 [1.22, 1.68]	0.12	12.16	< .001
Sleep efficiency	-0.01 [-0.02, 0.01]	0.01	-0.93	.353	-0.04 [-0.08, -0.01]	0.02	-2.70	.007
Pa mostactivehr	0.00 [0.00, 0.00]	0.00	4.05	< .001	0.00 [0.00, 0.00]	0.00	1.96	.050
Sleep efficiency <sup>2</sup>	0.00 [0.00, 0.00]	0.00	0.04	.967	0.00 [-0.01, 0.00]	0.00	-0.99	.323
Age	-0.01 [-0.02, -0.01]	0.00	-5.48	.009	-0.02 [-0.03, -0.02]	0.00	-8.75	.001
Sleep efficiency × pa mostactivehr	0.00 [0.00, 0.00]	0.00	1.18	.236	0.00 [0.00, 0.00]	0.00	1.82	.069
Pa mostactivehr × Sleep efficiency <sup>2</sup>	0.00 [0.00, 0.00]	0.00	-0.09	.928	0.00 [0.00, 0.00]	0.00	0.18	.860
<b>Sleep onset (z)</b>								
(Intercept)	4.40 [4.21, 4.58]	0.10	45.83	< .001	1.46 [1.23, 1.69]	0.12	12.42	< .001
Sleep onset	0.00 [-0.02, 0.01]	0.01	-0.56	.577	-0.01 [-0.04, 0.02]	0.02	-0.37	.715
Pa mostactivehr	0.00 [0.00, 0.00]	0.00	3.67	< .001	0.00 [0.00, 0.00]	0.00	1.18	.238
Sleep onset <sup>2</sup>	-0.01 [-0.02, 0.00]	0.01	-1.25	.212	-0.01 [-0.04, 0.01]	0.01	-1.29	.195
Age	-0.01 [-0.02, -0.01]	0.00	-5.50	.008	-0.02 [-0.03, -0.02]	0.00	-8.87	.001

Table 23 continued

Term	Physical activity volume (ln)				Physical activity intensity (z)			
	$\beta$ [95% CI]	SE	t	p	$\beta$ [95% CI]	SE	t	p
Sleep onset × pa mostactivehr	0.00 [0.00, 0.00]	0.00	1.23	.218	0.00 [0.00, 0.00]	0.00	1.97	.049
Pa mostactivehr × Sleep onset <sup>2</sup>	0.00 [0.00, 0.00]	0.00	-0.40	.687	0.00 [0.00, 0.00]	0.00	0.71	.478
Sleep regularity (z)								
(Intercept)	4.37 [4.19, 4.55]	0.09	46.99	< .001	1.44 [1.21, 1.67]	0.12	12.35	< .001
Sleep regularity	0.05 [0.03, 0.06]	0.01	6.24	< .001	0.02 [-0.01, 0.05]	0.02	1.41	.158
Pa mostactivehr	0.00 [0.00, 0.00]	0.00	2.43	.015	0.00 [0.00, 0.00]	0.00	0.52	.605
Sleep regularity <sup>2</sup>	-0.03 [-0.04, -0.02]	0.00	-5.67	< .001	-0.04 [-0.06, -0.02]	0.01	-4.06	< .001
Age	-0.01 [-0.02, -0.01]	0.00	-5.54	.008	-0.02 [-0.03, -0.02]	0.00	-8.96	.001
Sleep regularity × pa mostactivehr	0.00 [0.00, 0.00]	0.00	2.29	.022	0.00 [0.00, 0.01]	0.00	2.98	.003
Pa mostactivehr × Sleep regularity <sup>2</sup>	0.00 [0.00, 0.00]	0.00	3.33	.001	0.00 [0.00, 0.00]	0.00	2.88	.004

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

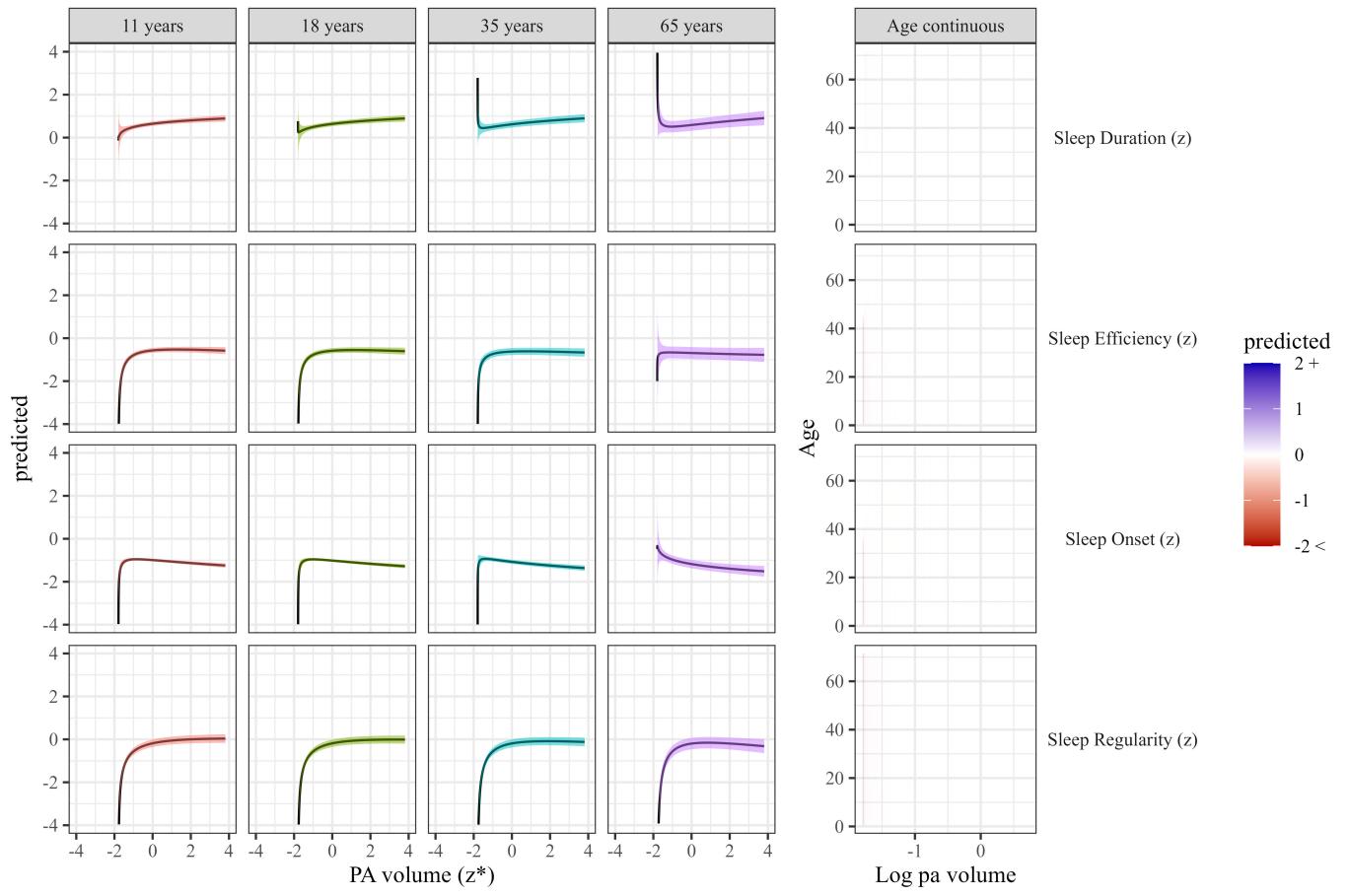


Figure 1. Sleep metrics on Physical activity volume

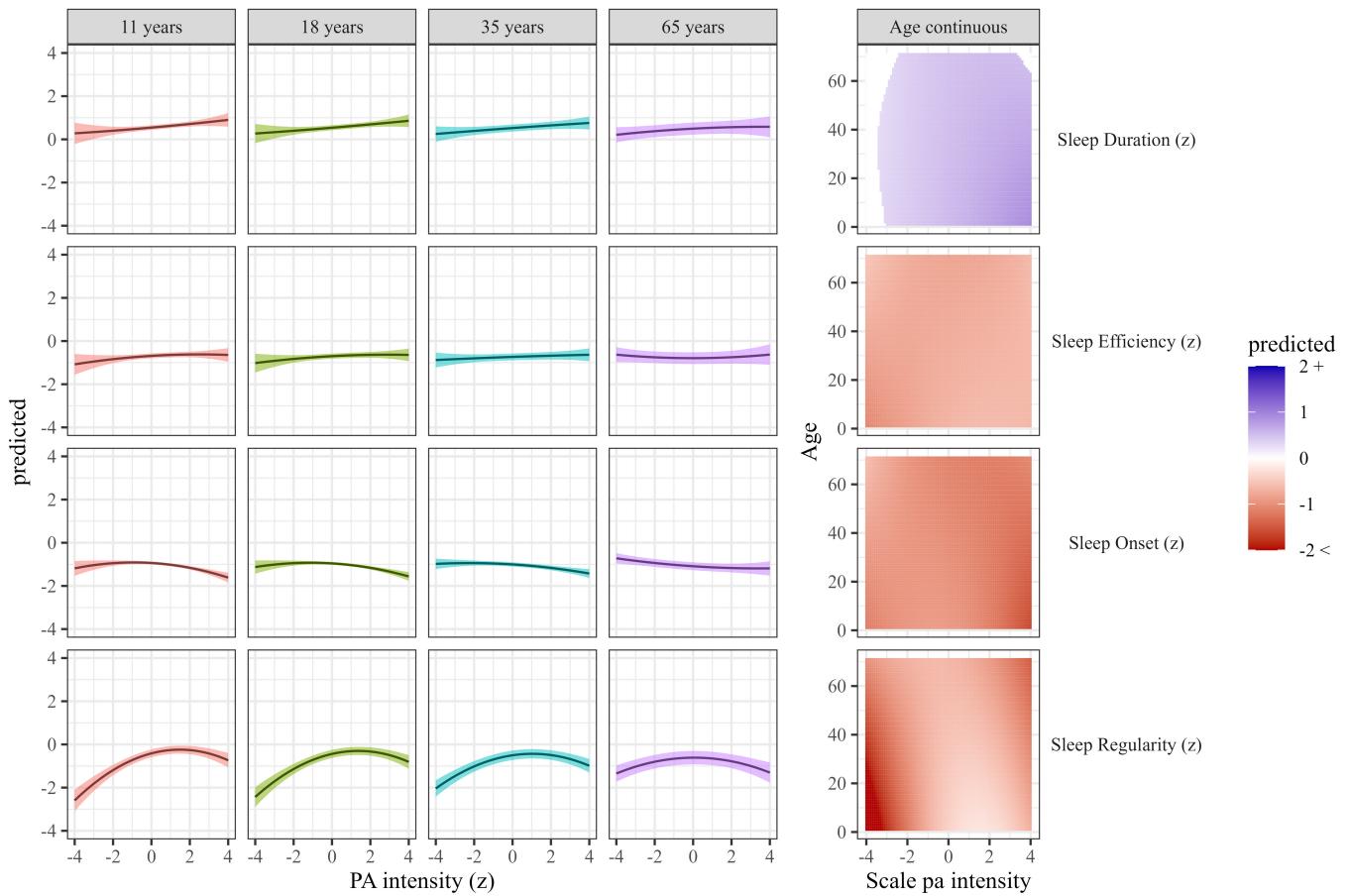


Figure 2. Sleep metrics on Physical activity intensity

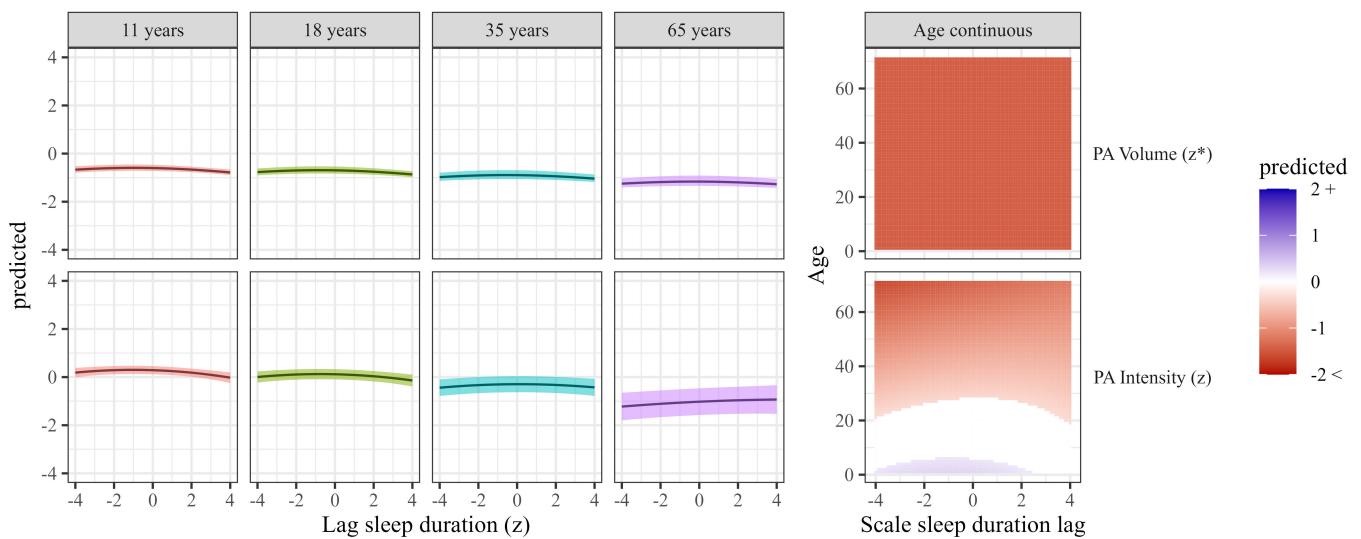
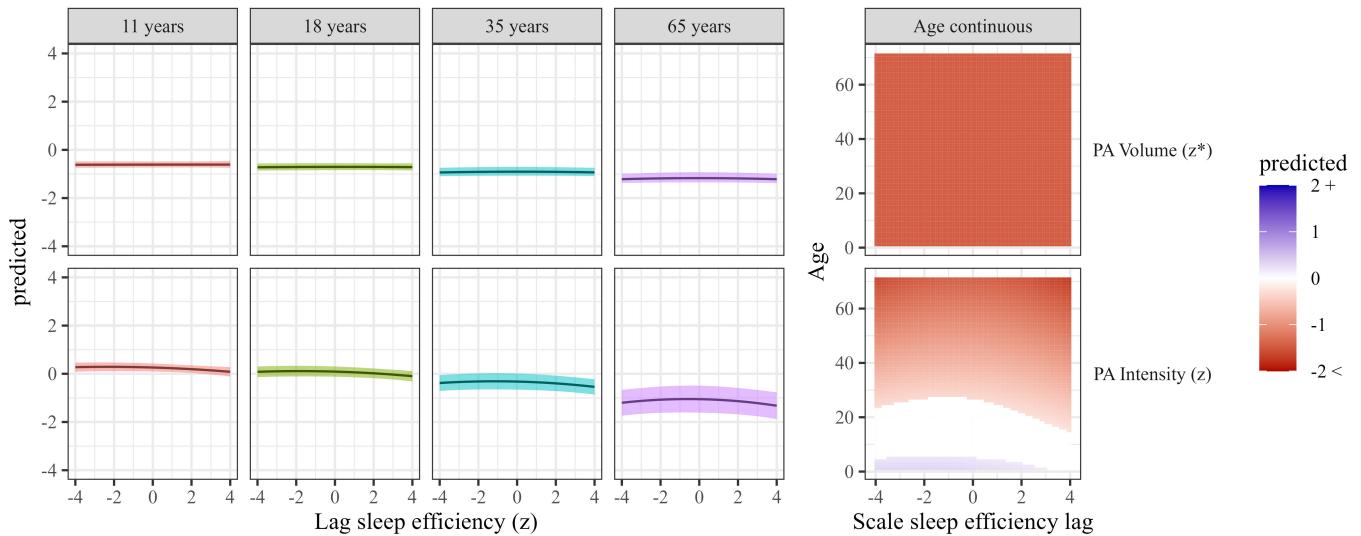
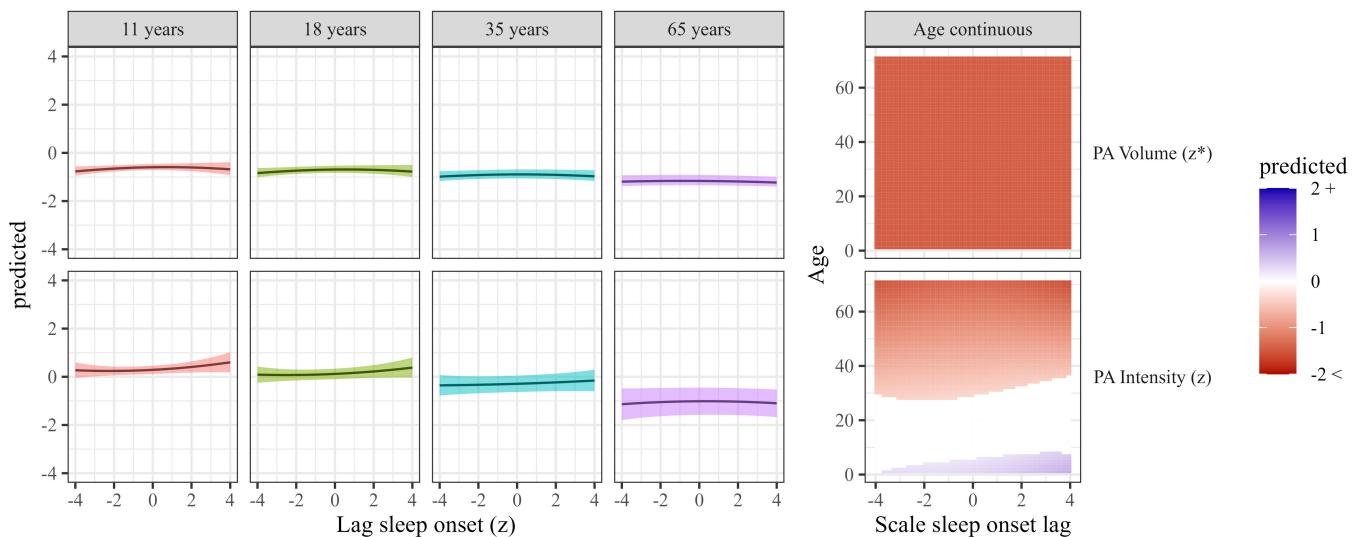


Figure 3. Physical activity by sleep duration



*Figure 4.* Physical activity by sleep efficiency



*Figure 5.* Physical activity by sleep onset

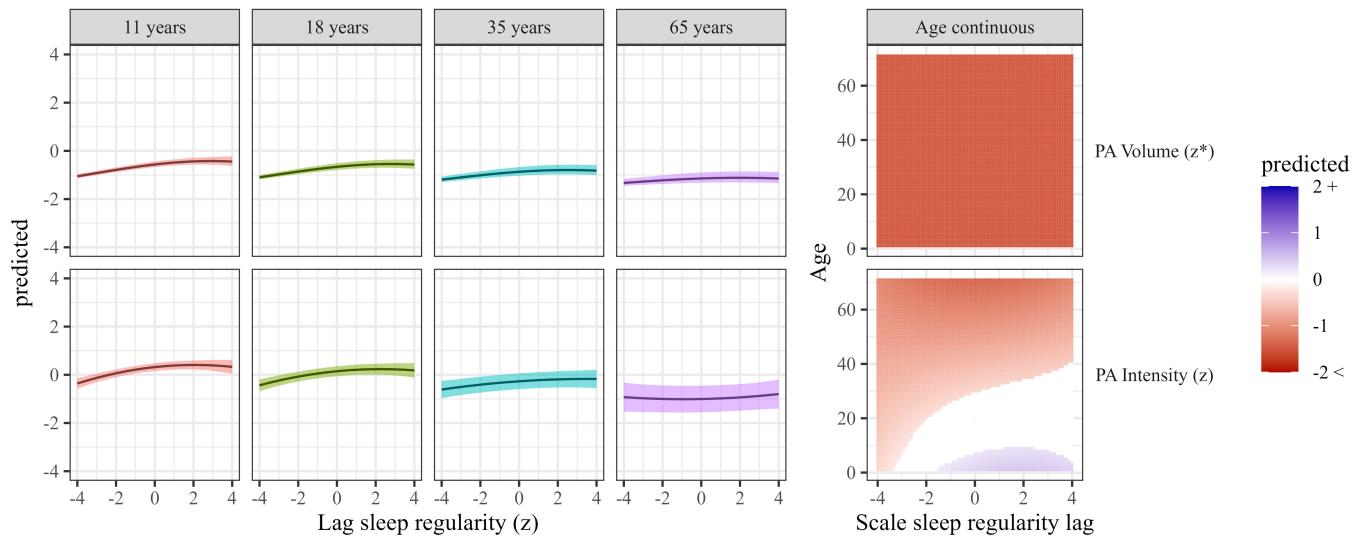


Figure 6. Physical activity by sleep regularity

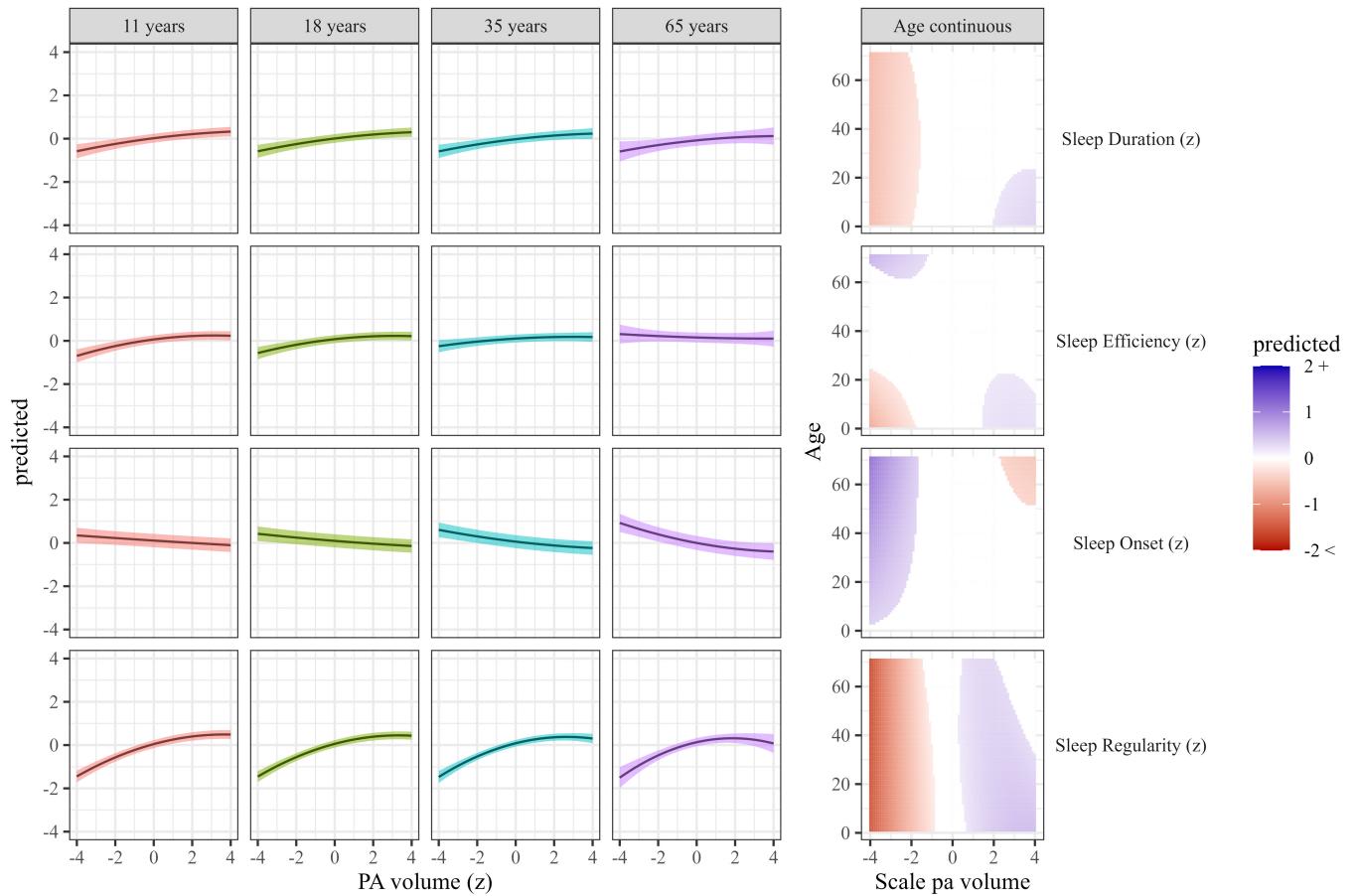


Figure 7. Sleep metrics on Physical activity volume

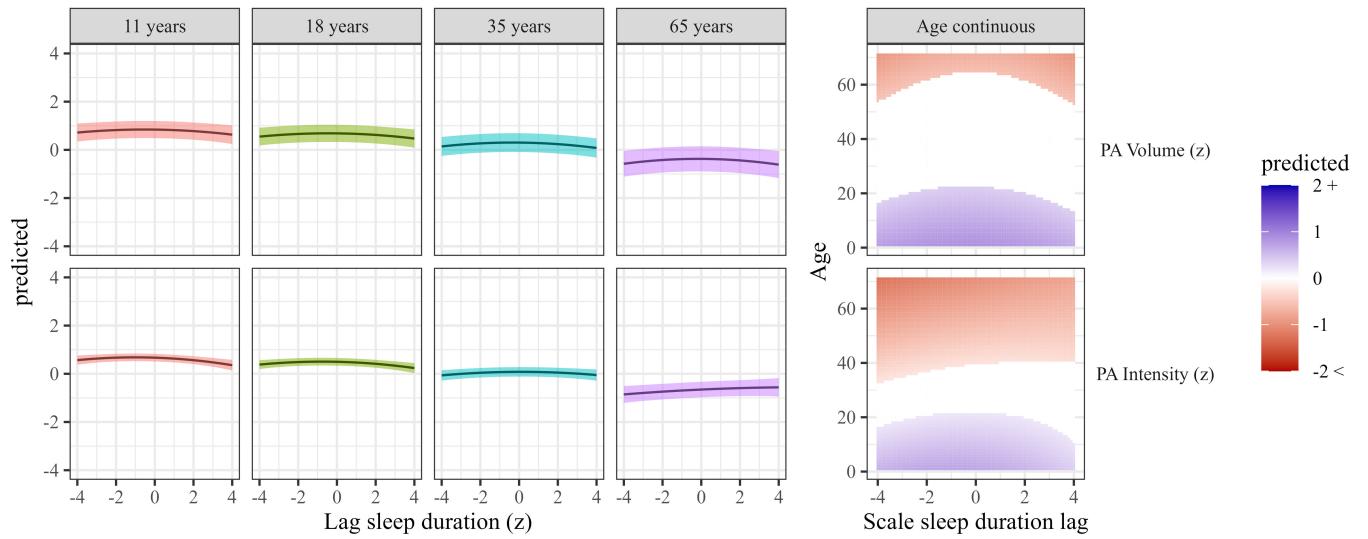


Figure 8. Physical activity by sleep duration

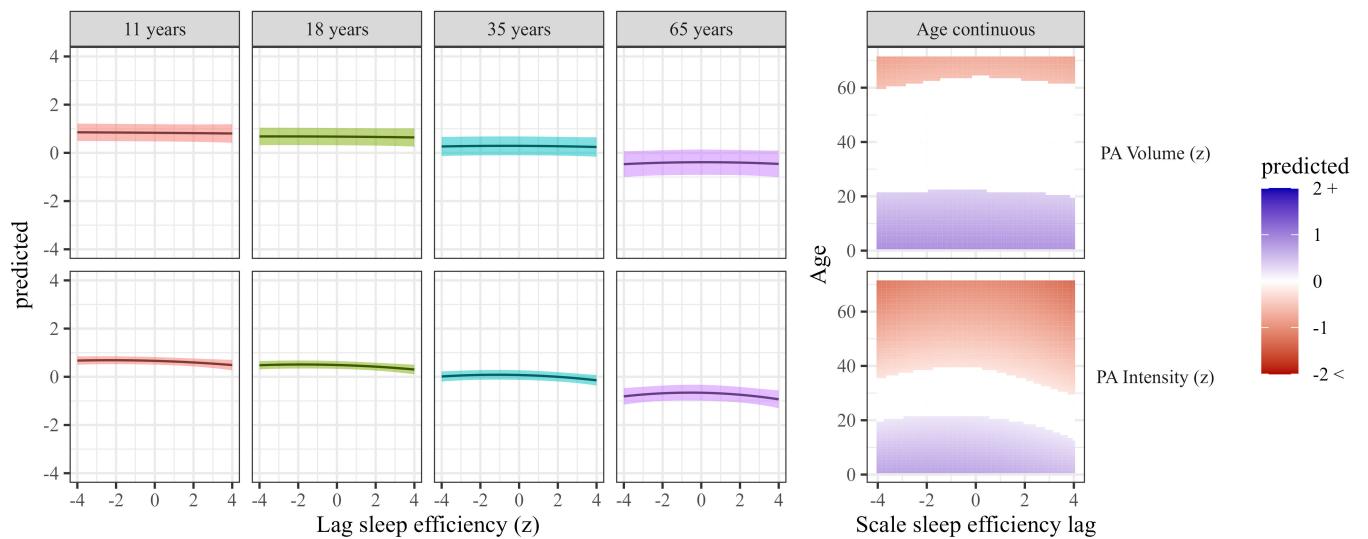


Figure 9. Physical activity by sleep efficiency

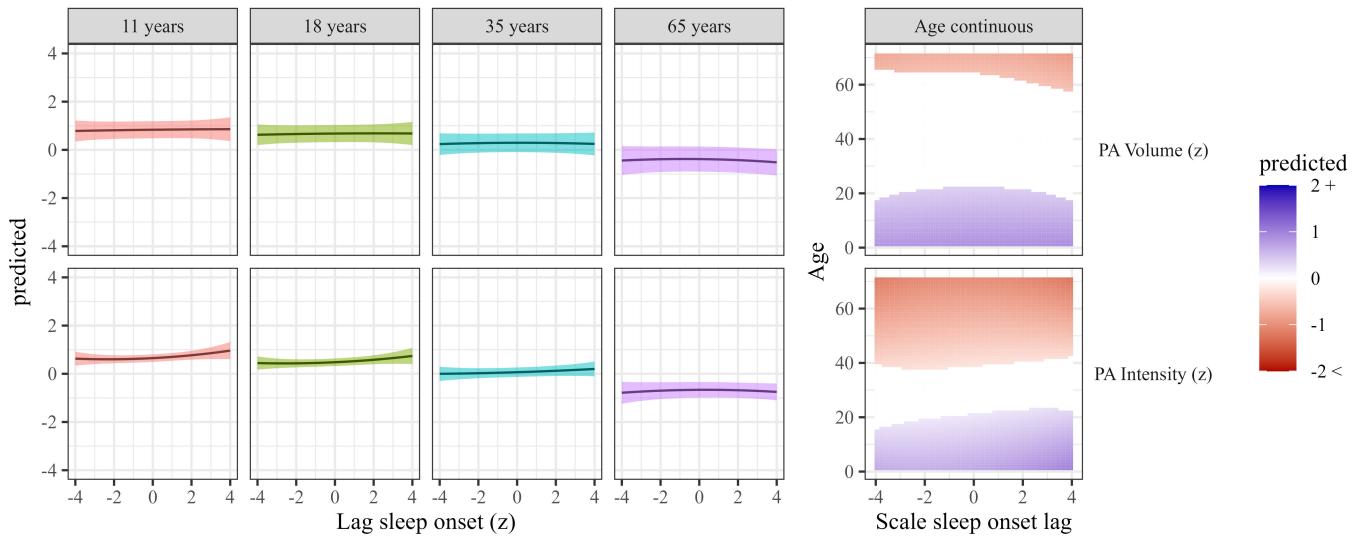


Figure 10. Physical activity by sleep onset

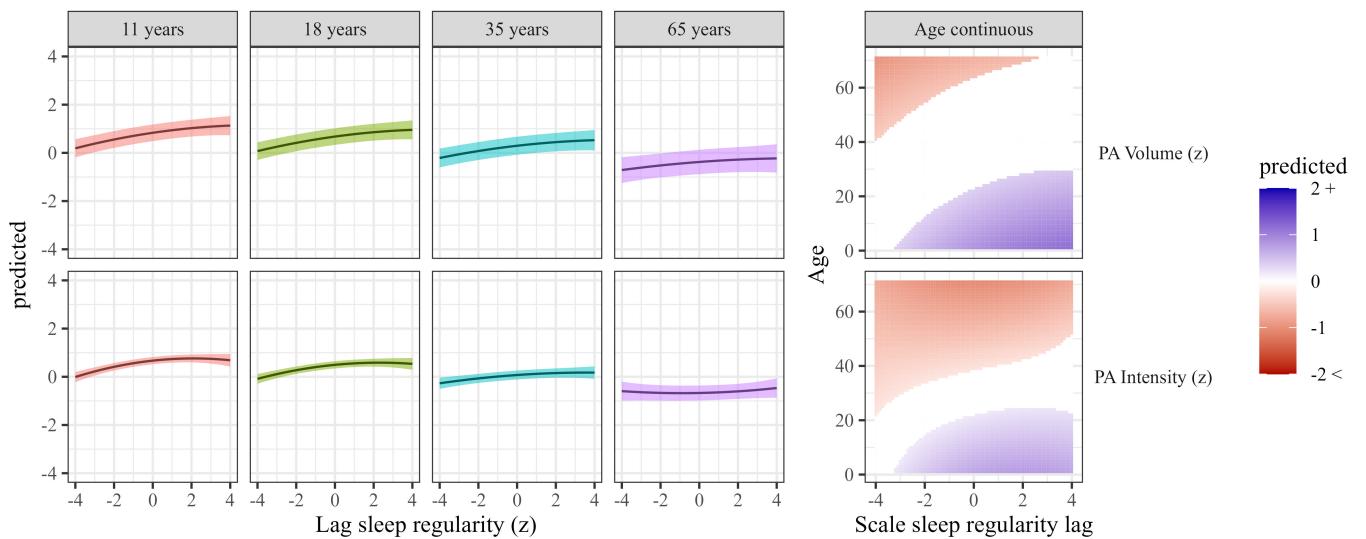


Figure 11. Physical activity by sleep regularity

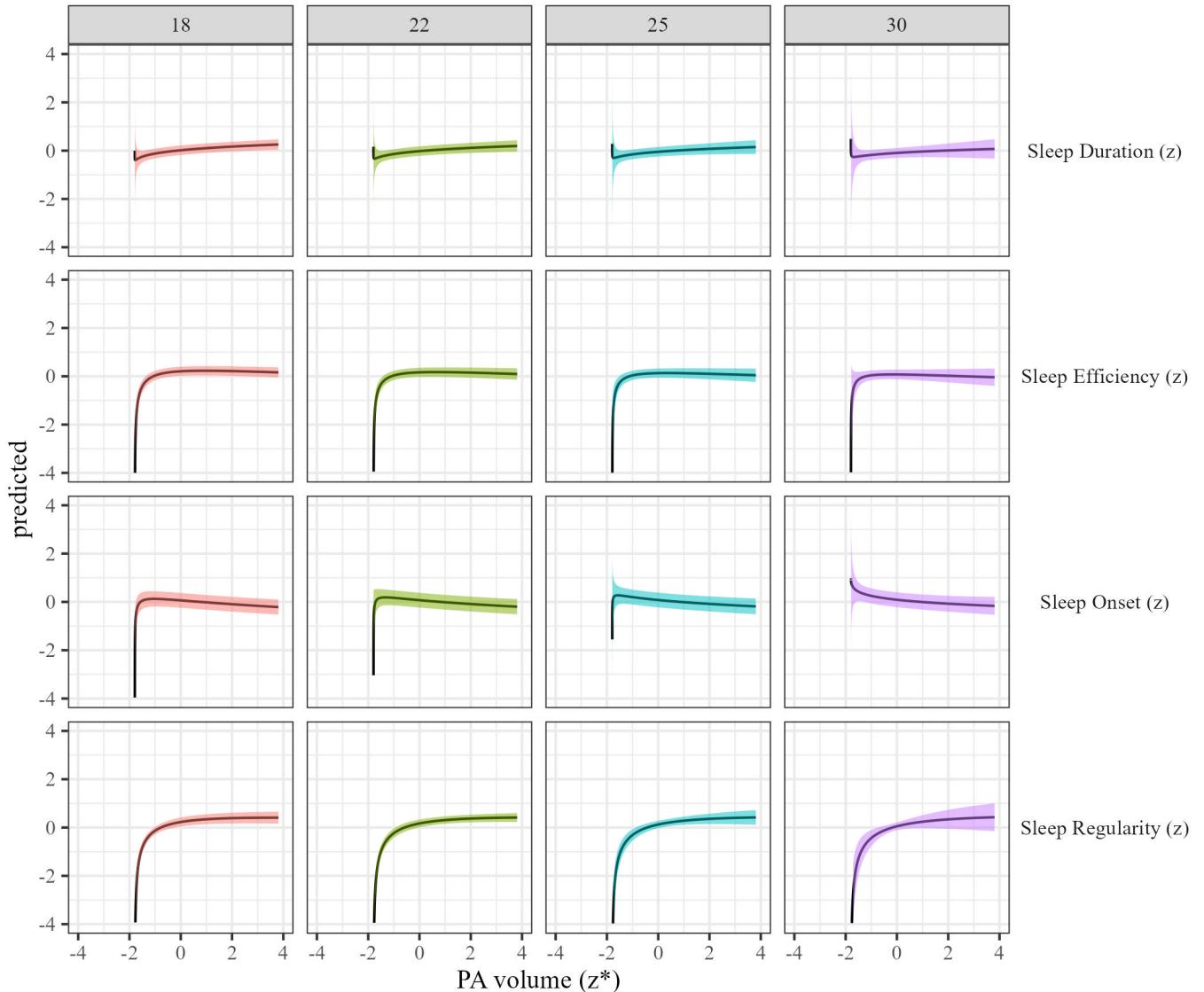


Figure 12. Sleep metrics on Physical activity volume by BMI

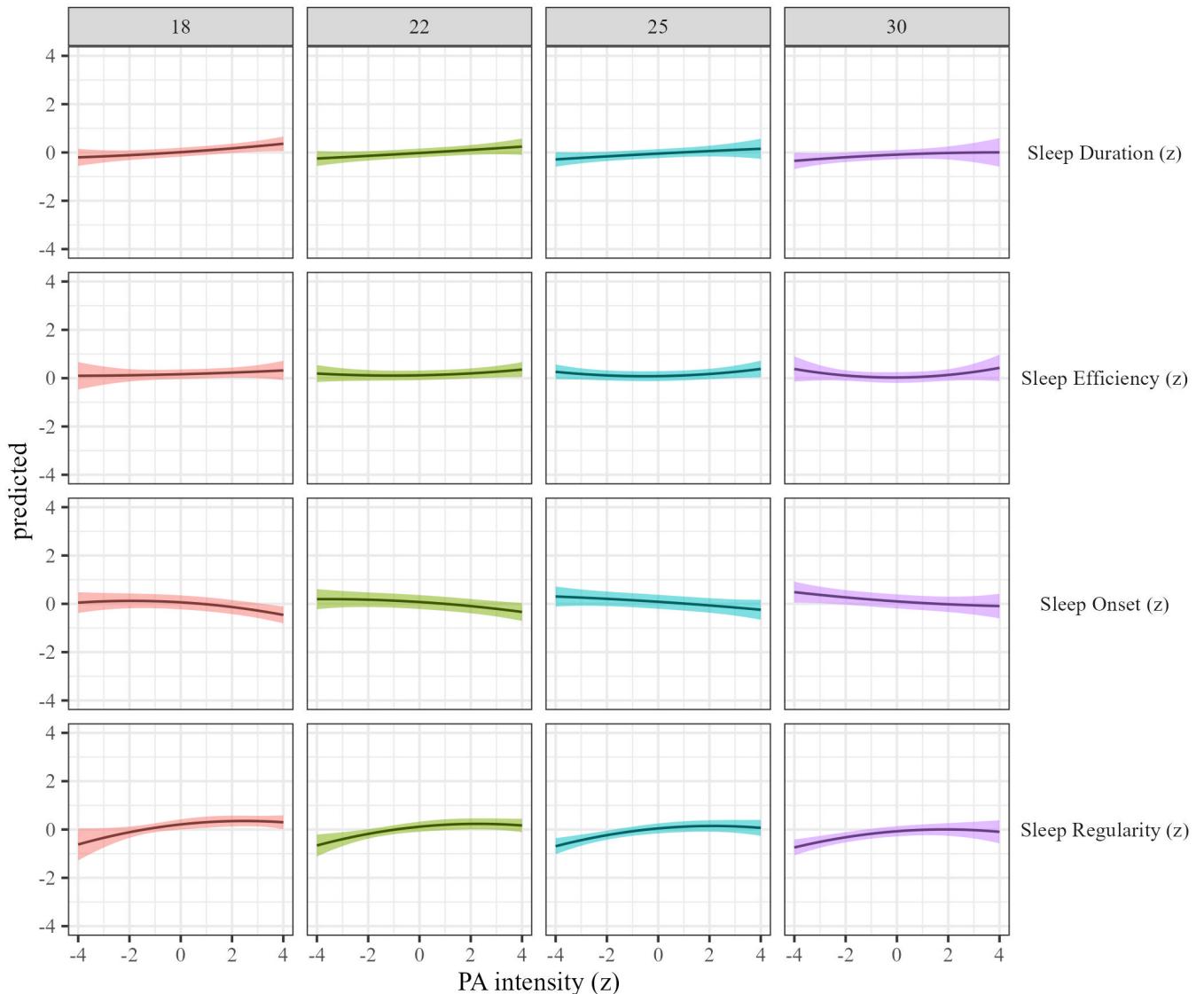


Figure 13. Sleep metrics on Physical activity intensity moderated by BMI

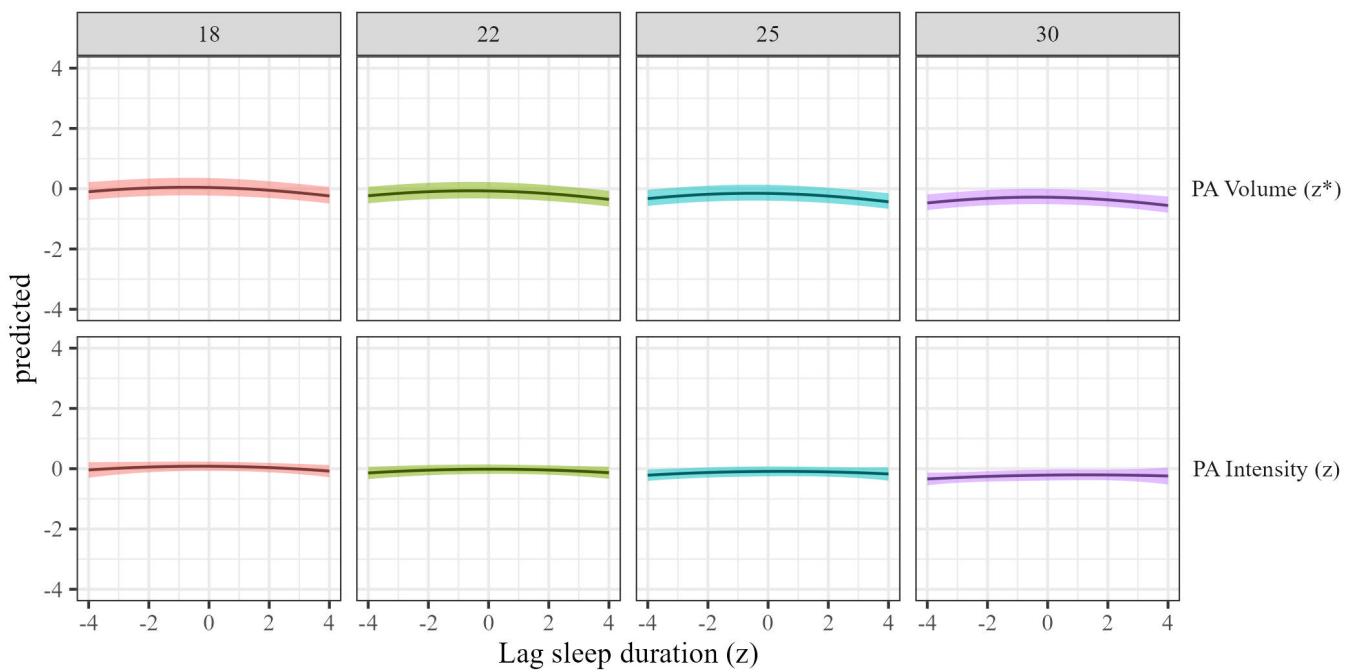


Figure 14. Physical activity by sleep duration moderated by BMI

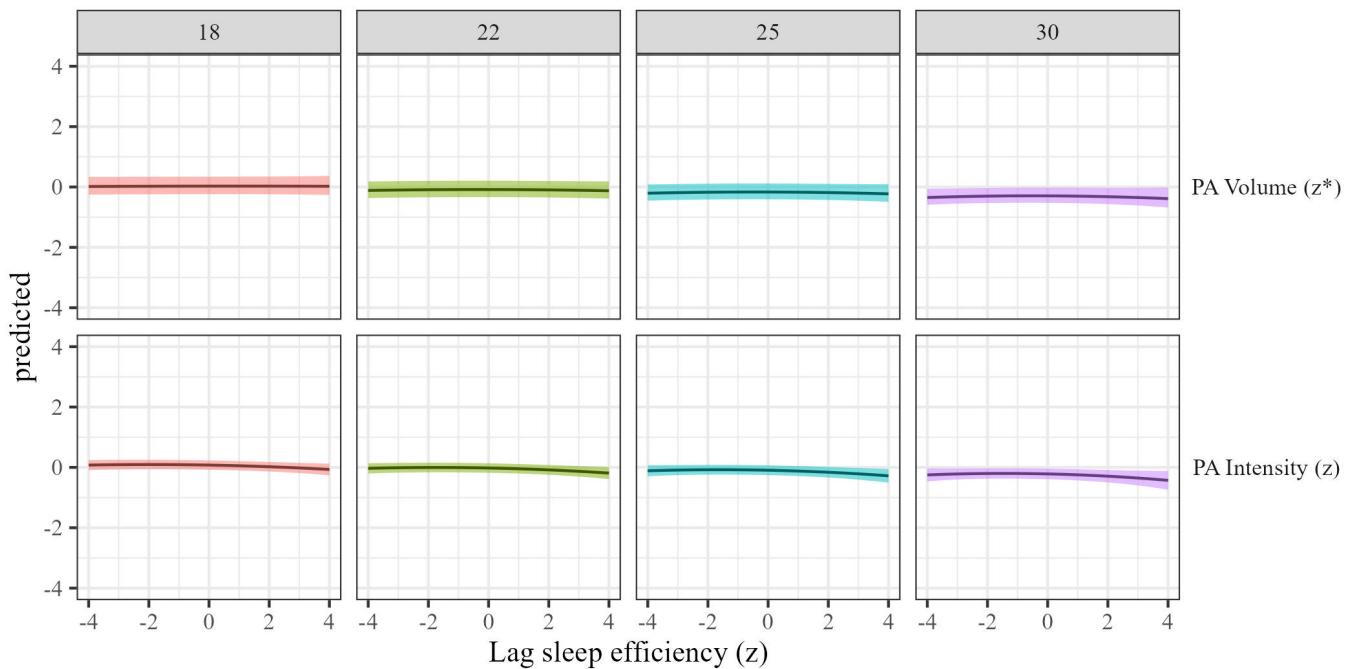


Figure 15. Physical activity by sleep efficiency moderated by BMI

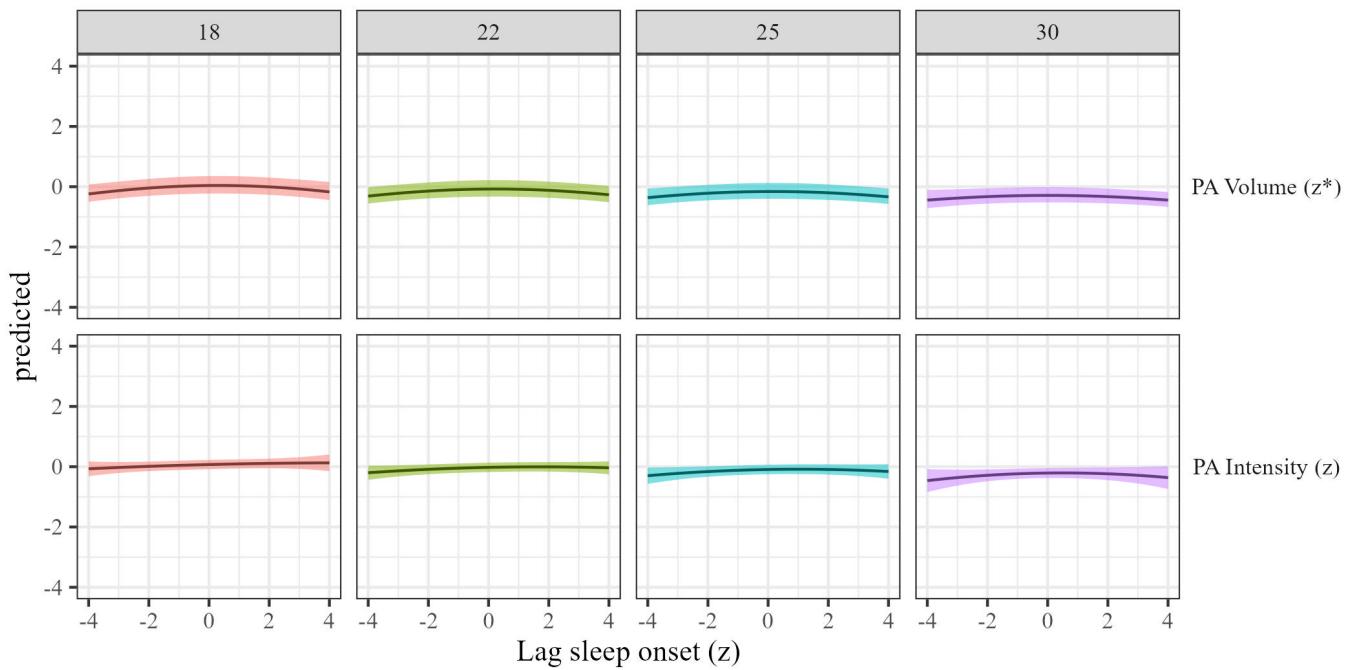


Figure 16. Physical activity by sleep onset moderated by BMI

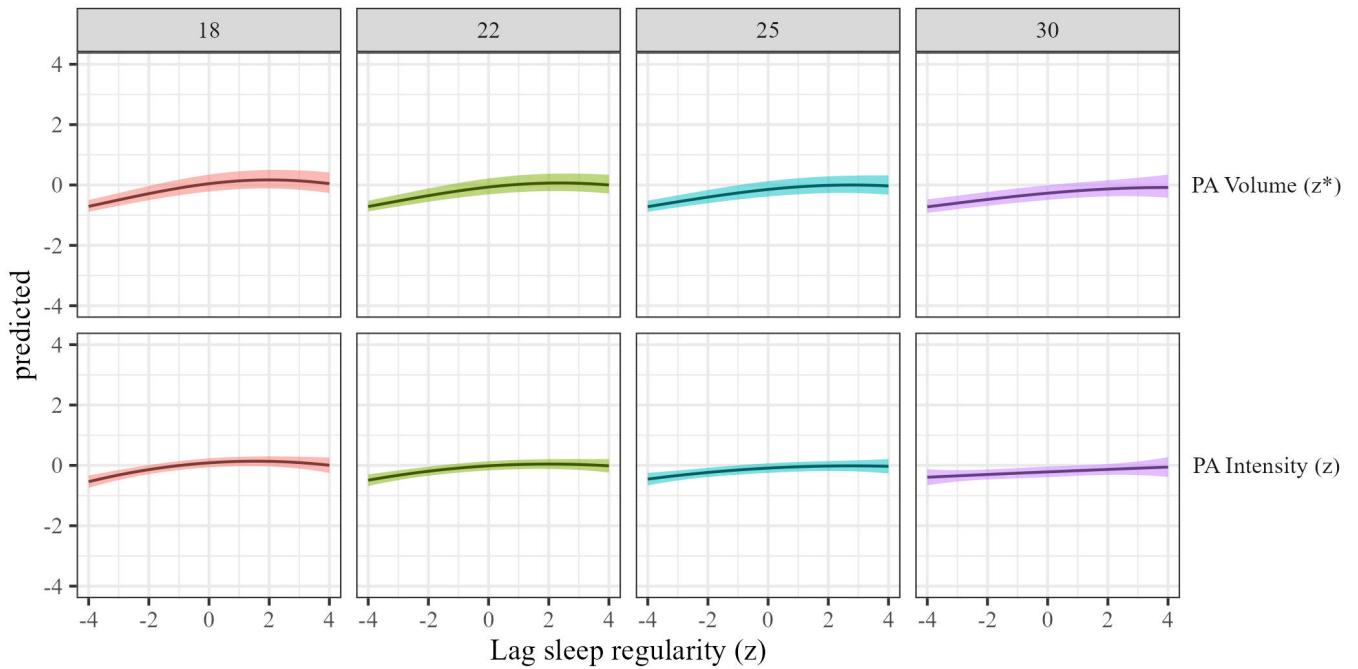


Figure 17. Physical activity by sleep regularity moderated by BMI

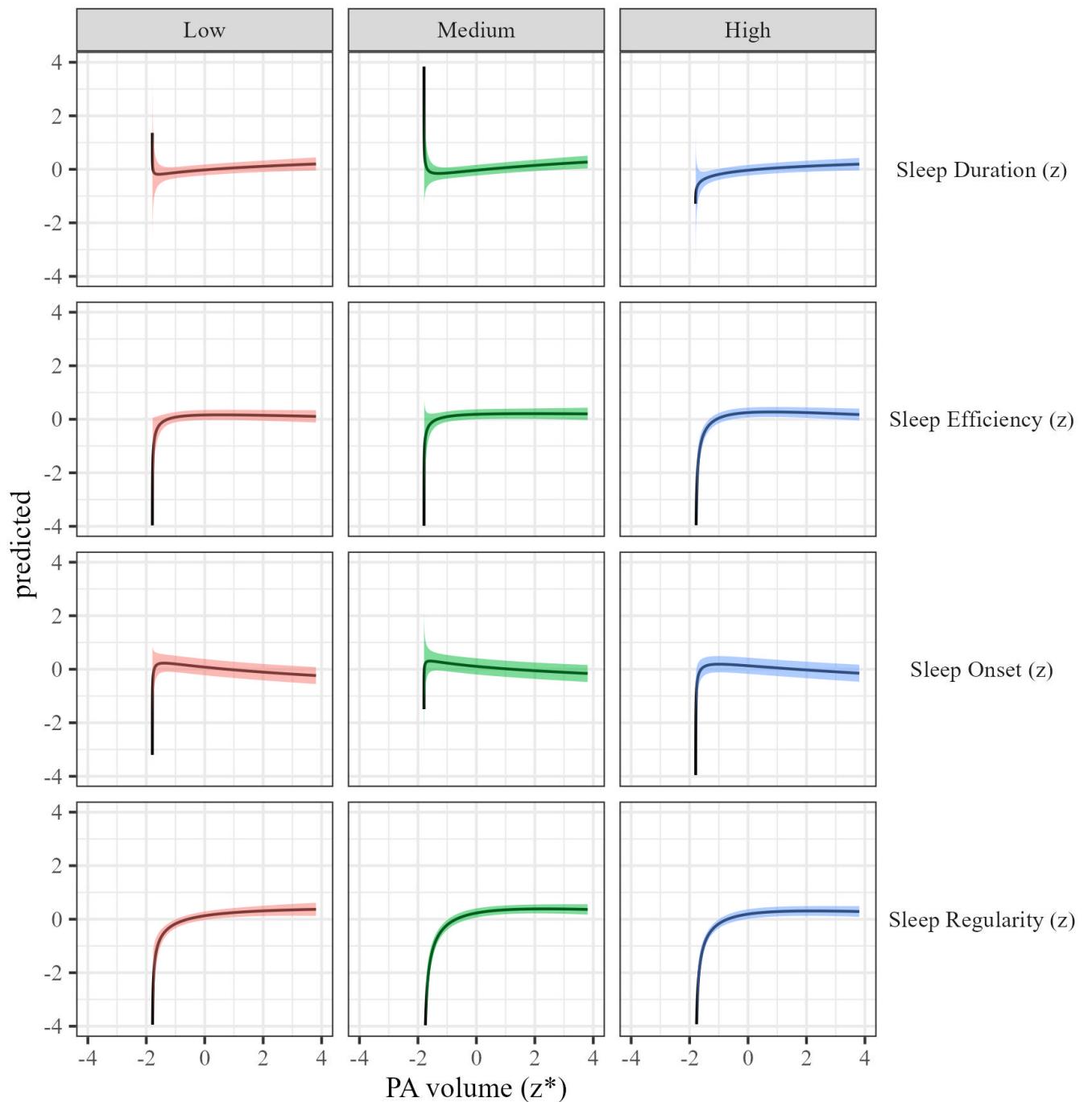


Figure 18. Sleep metrics on Physical activity volume by SES

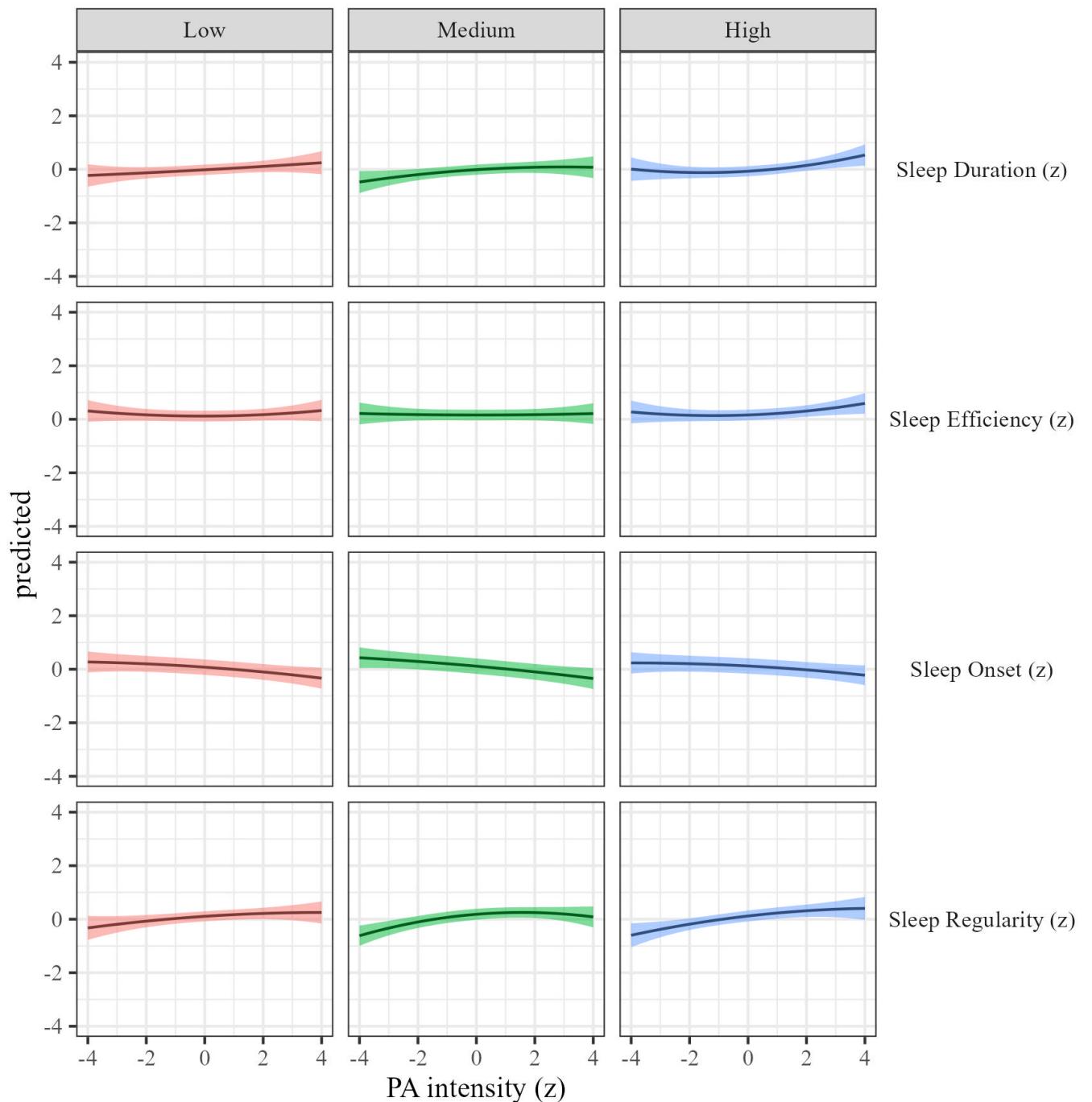


Figure 19. Sleep metrics on Physical activity intensity moderated by SES

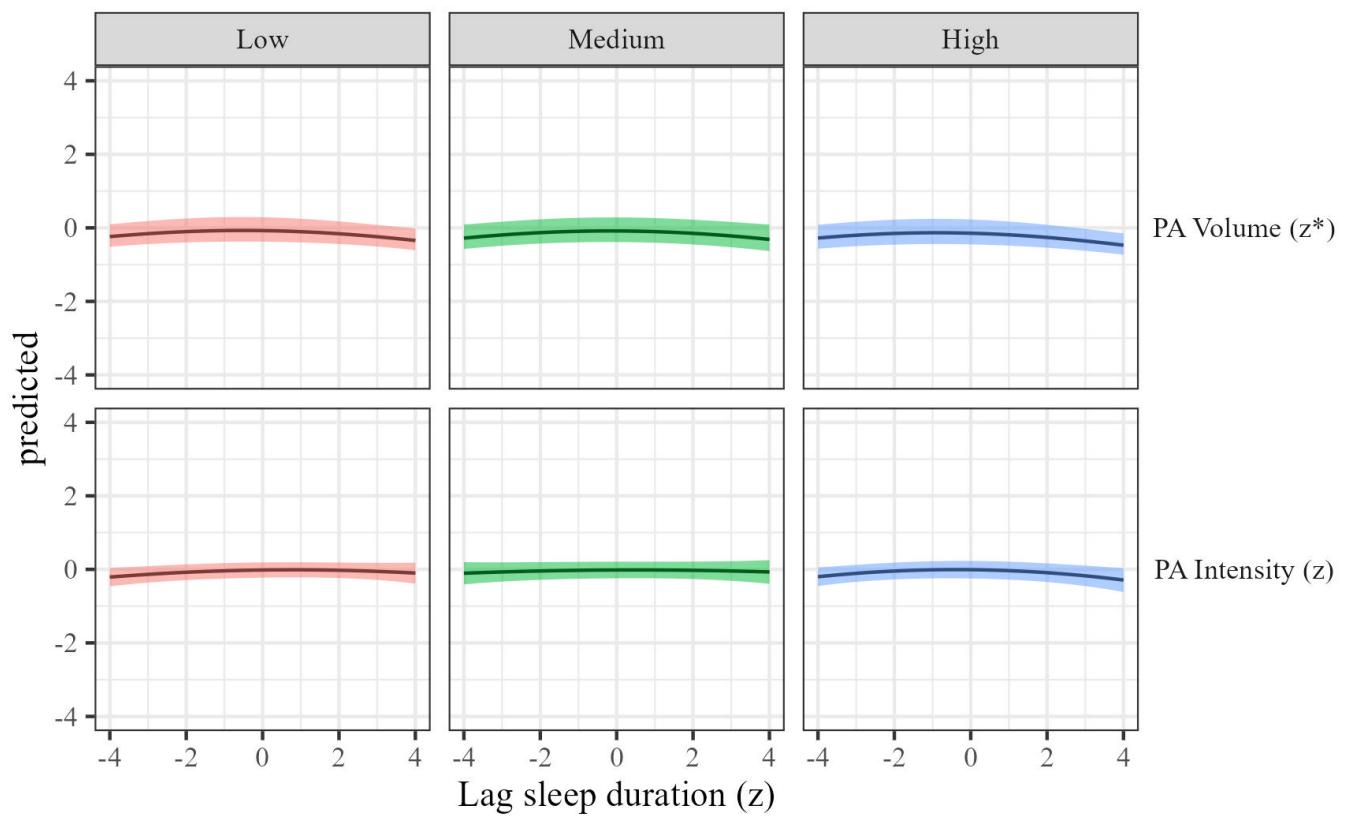


Figure 20. Physical activity by sleep duration moderated by SES

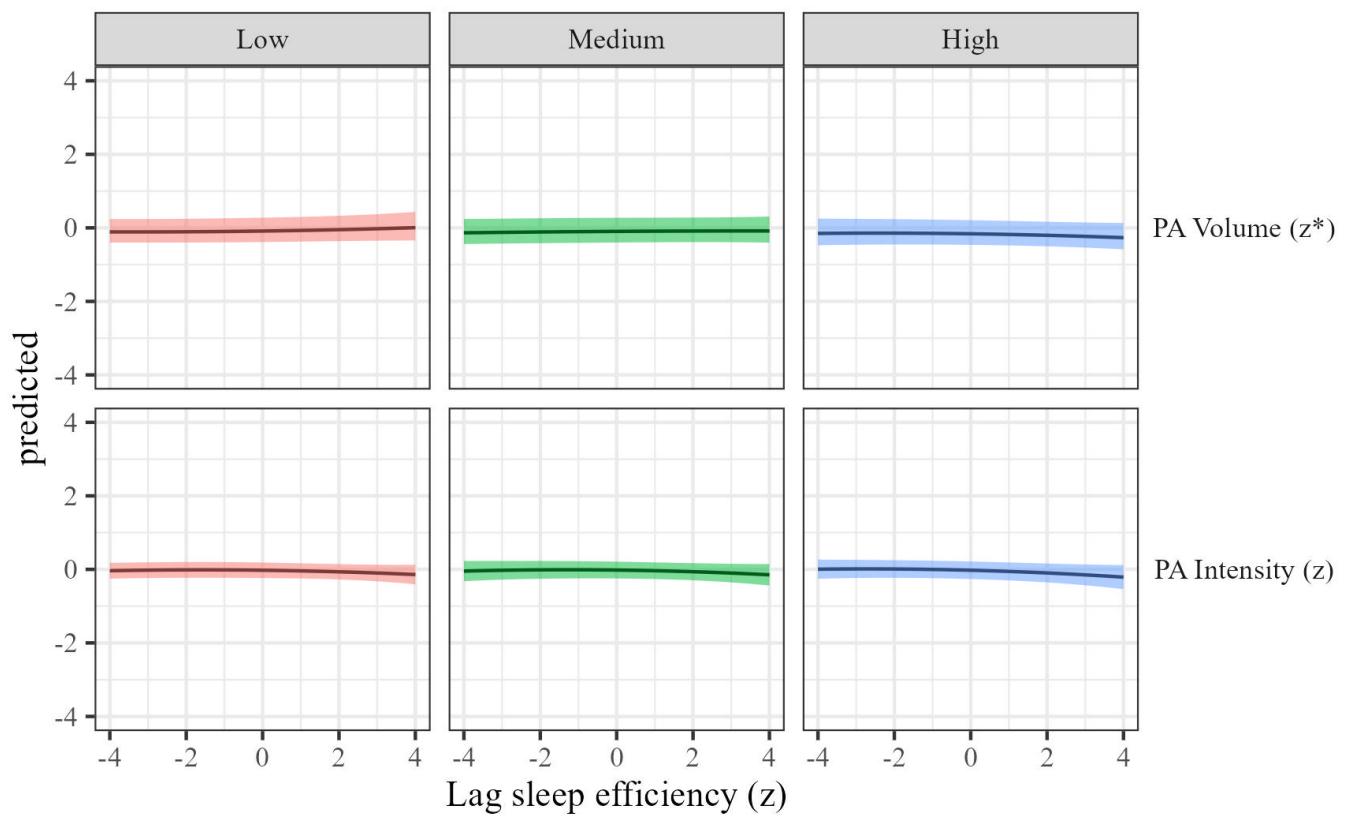


Figure 21. Physical activity by sleep efficiency moderated by SES

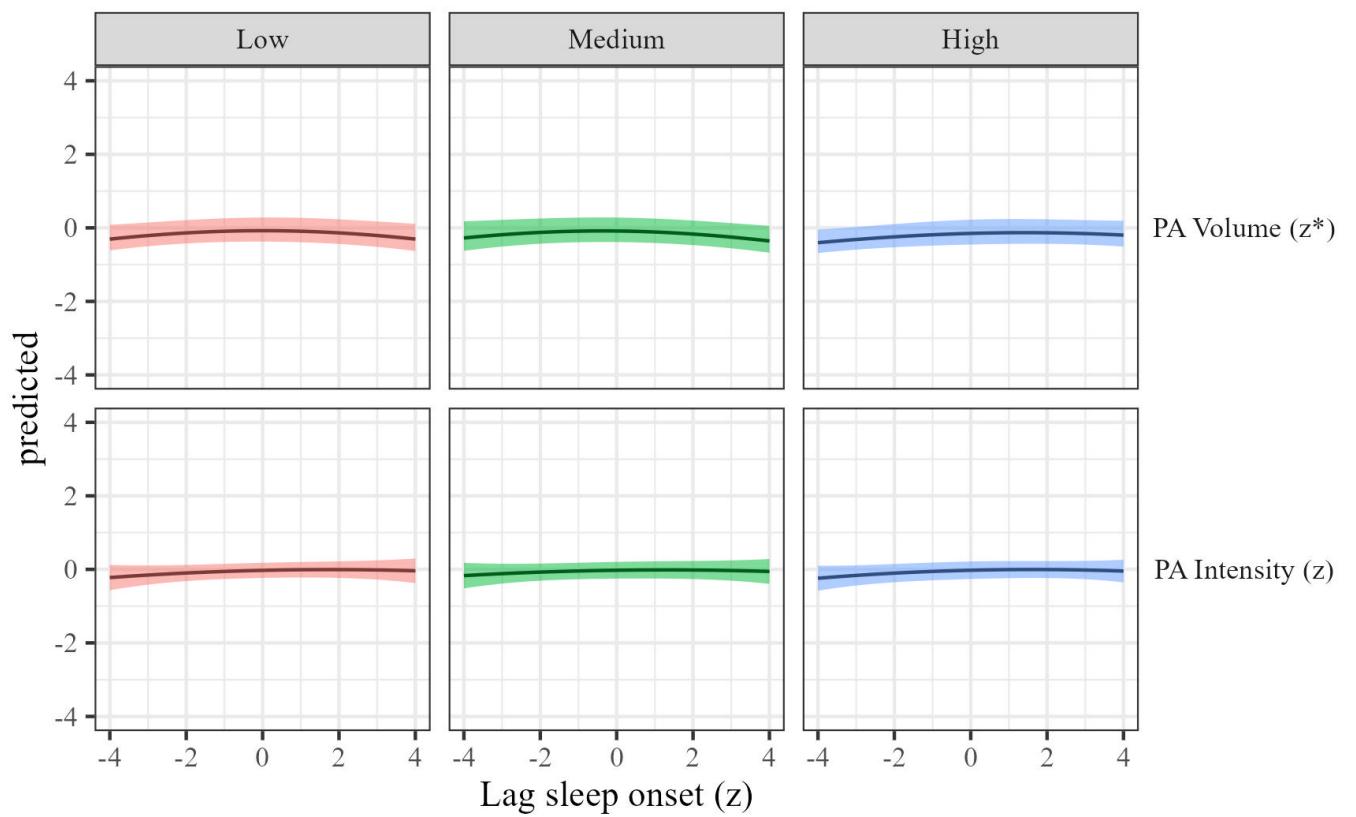


Figure 22. Physical activity by sleep onset moderated by SES

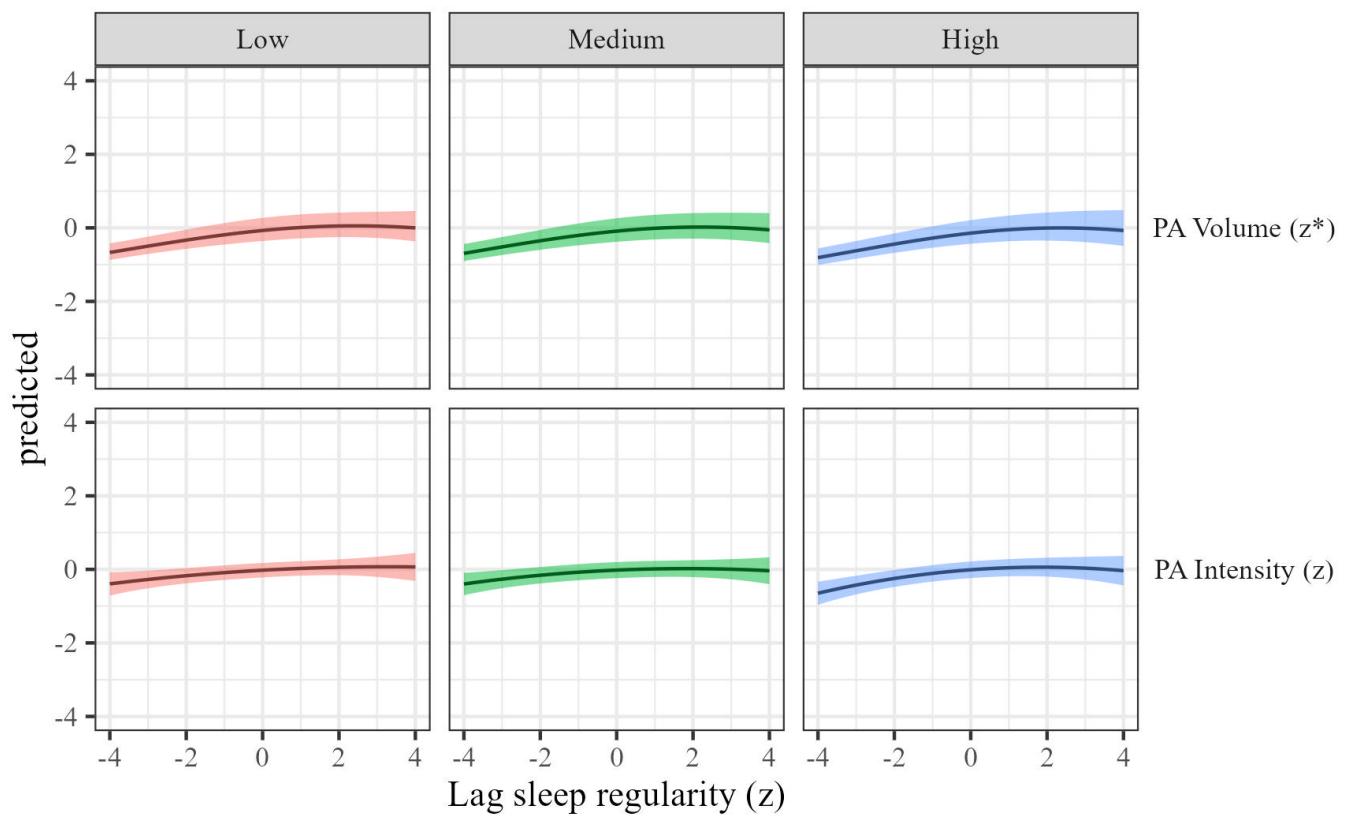


Figure 23. Physical activity by sleep regularity moderated by SES

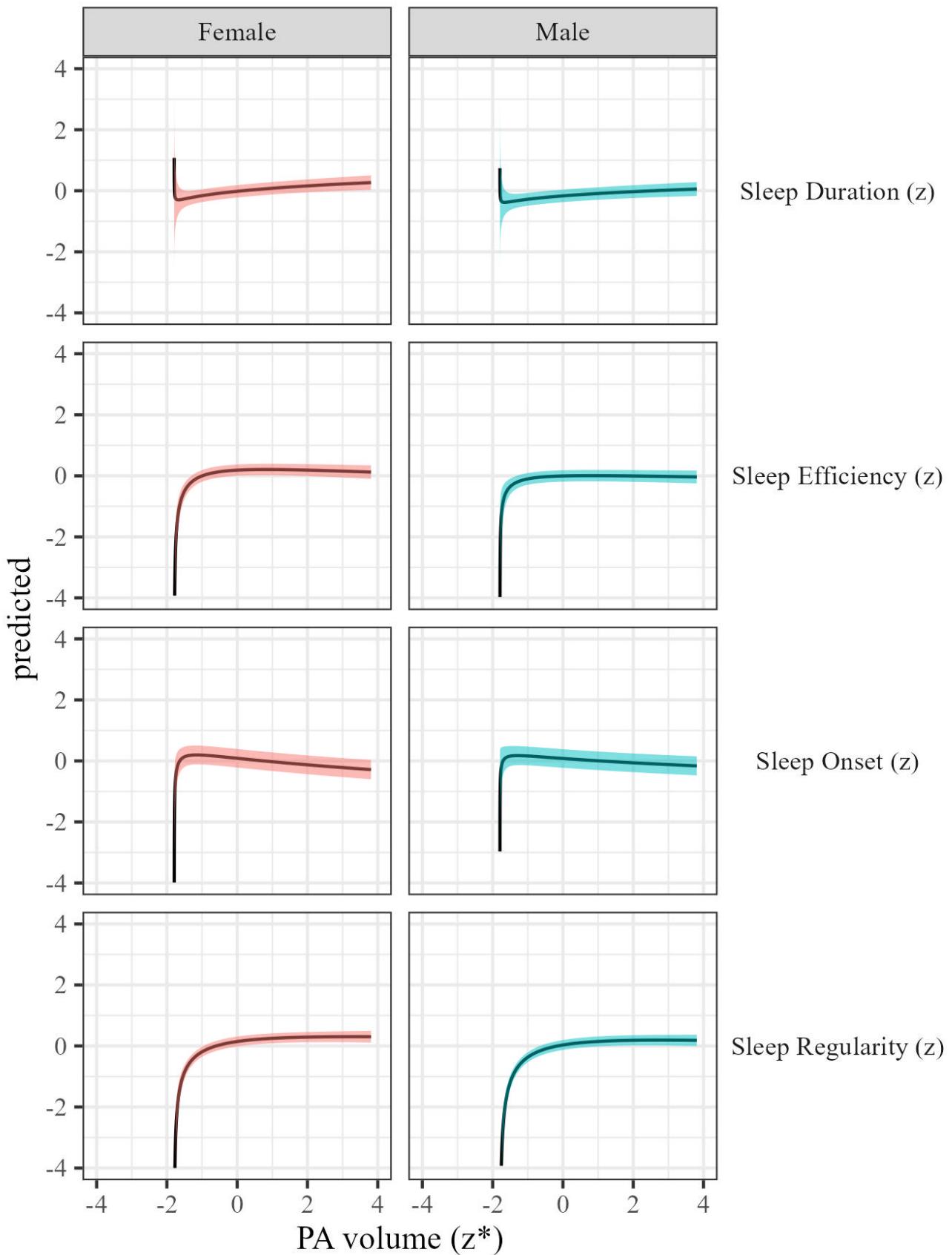


Figure 24. Sleep metrics on Physical activity volume by sex

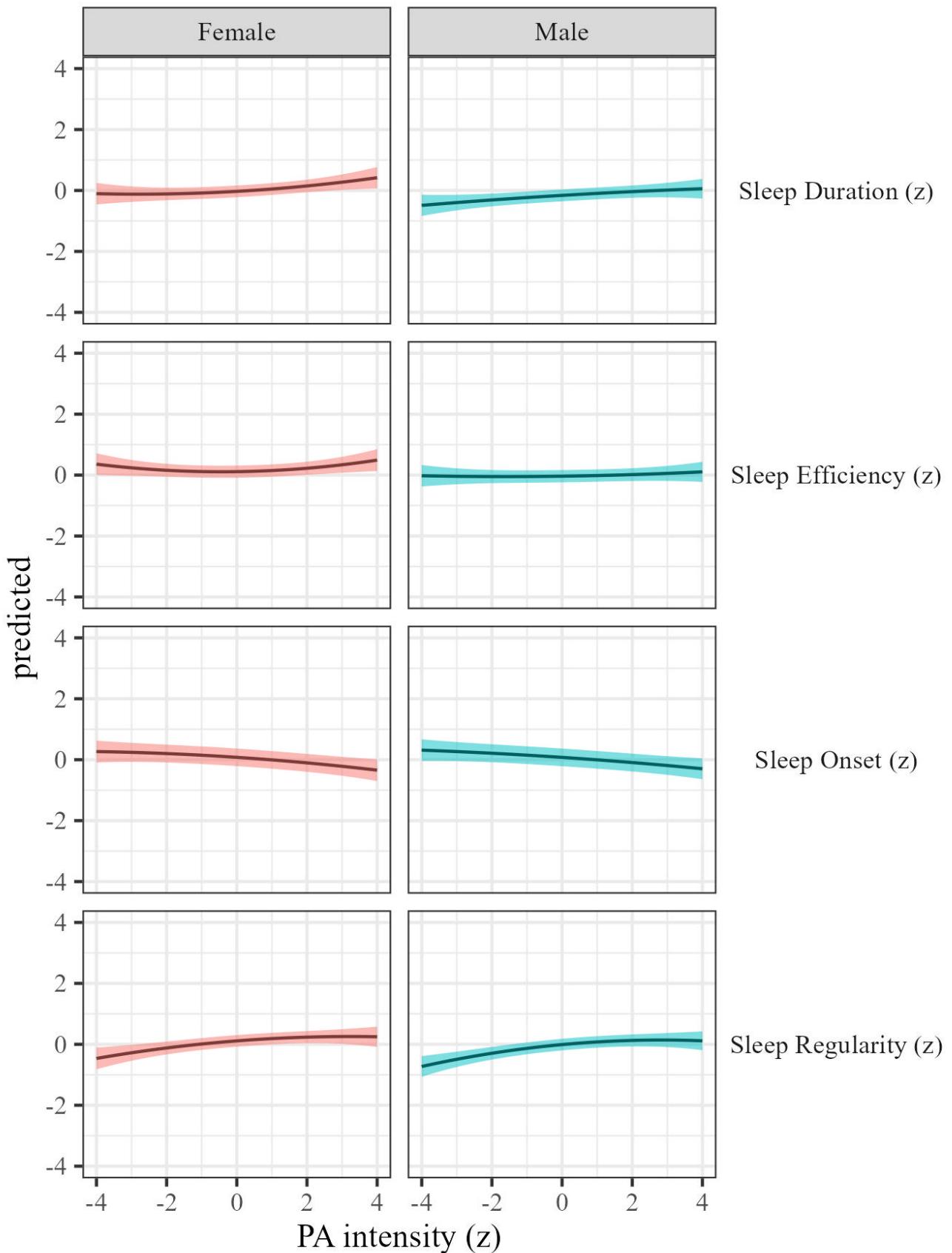


Figure 25. Sleep metrics on Physical activity intensity moderated by sex

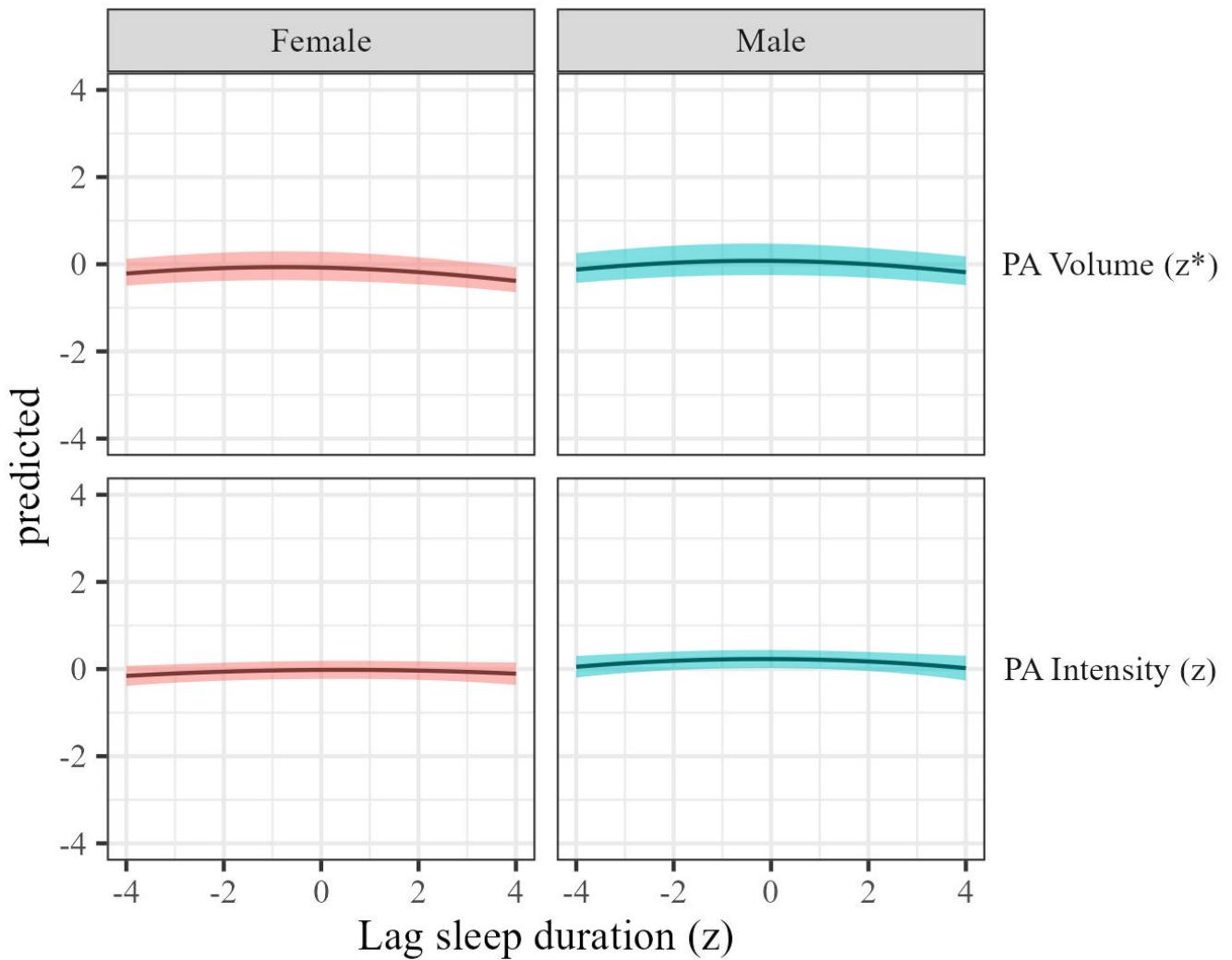


Figure 26. Physical activity by sleep duration moderated by sex

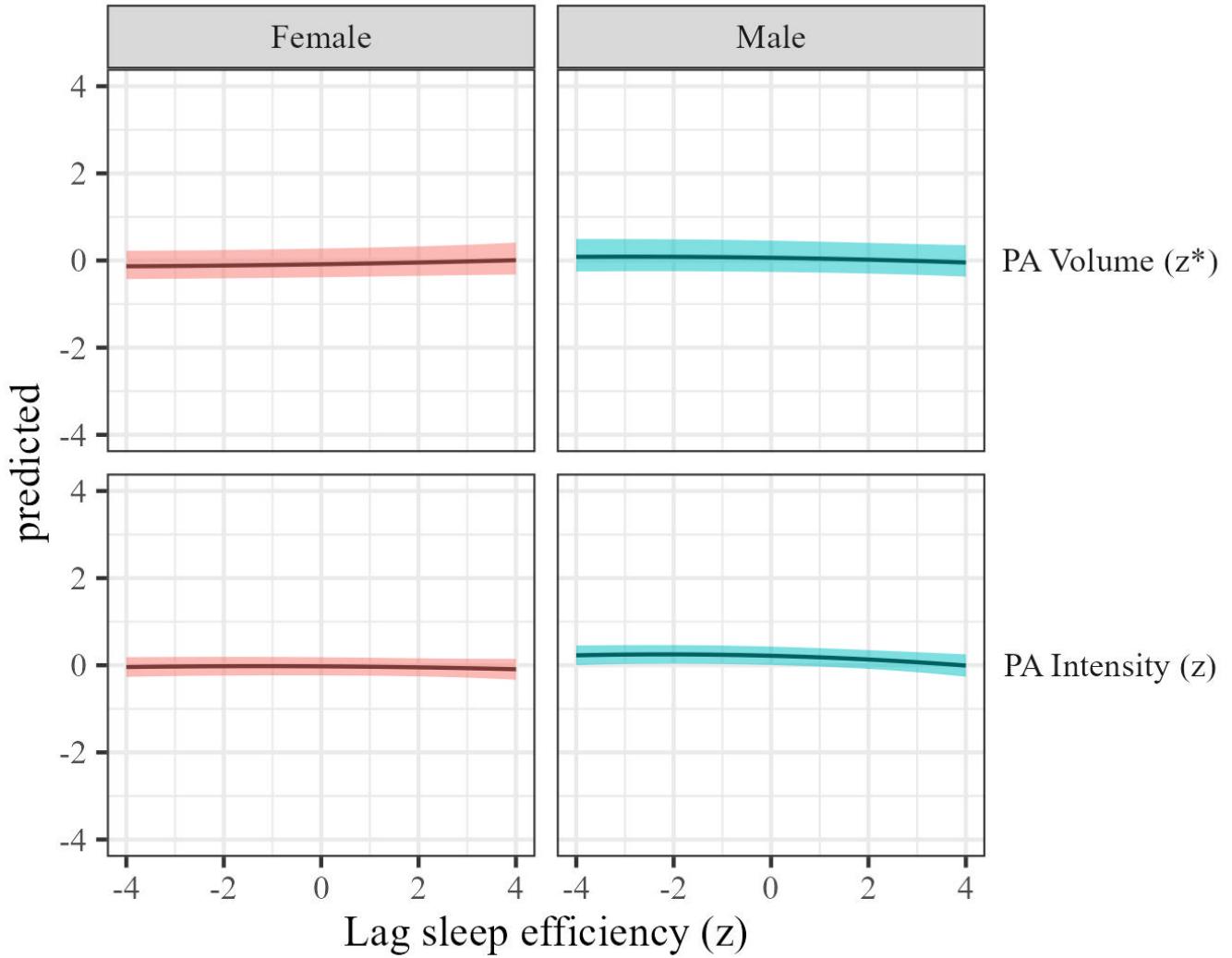


Figure 27. Physical activity by sleep efficiency moderated by sex

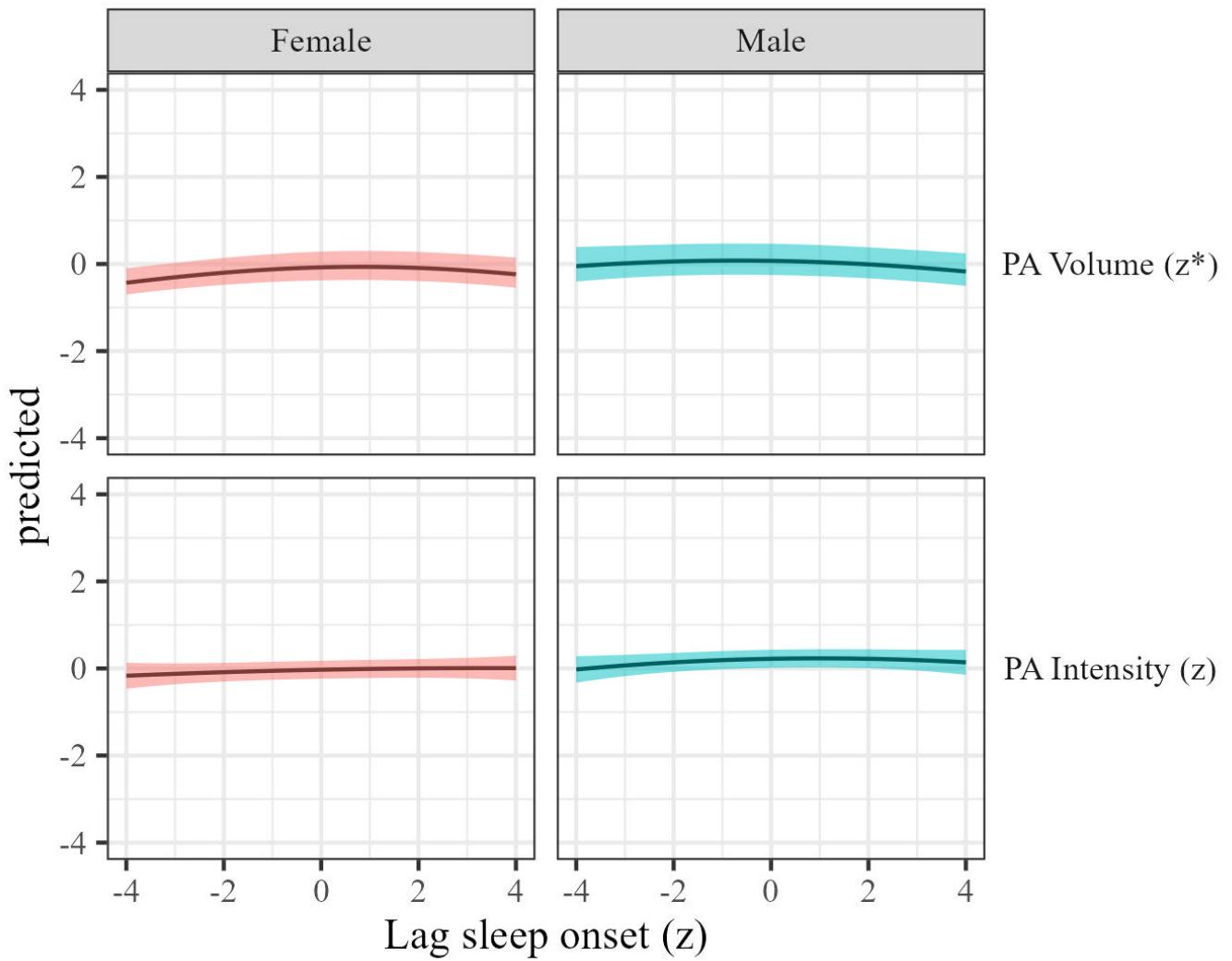


Figure 28. Physical activity by sleep onset moderated by sex

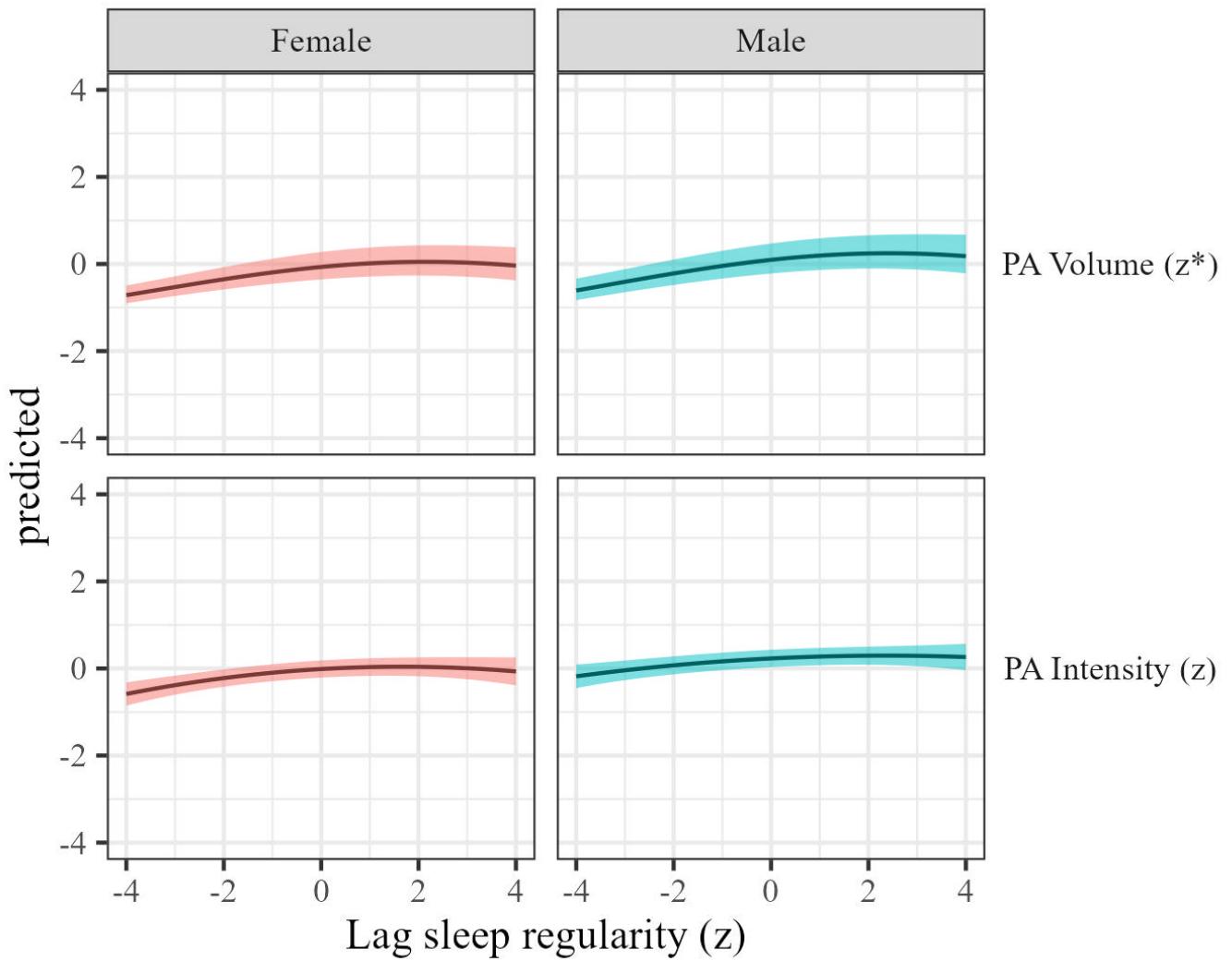


Figure 29. Physical activity by sleep regularity moderated by sex

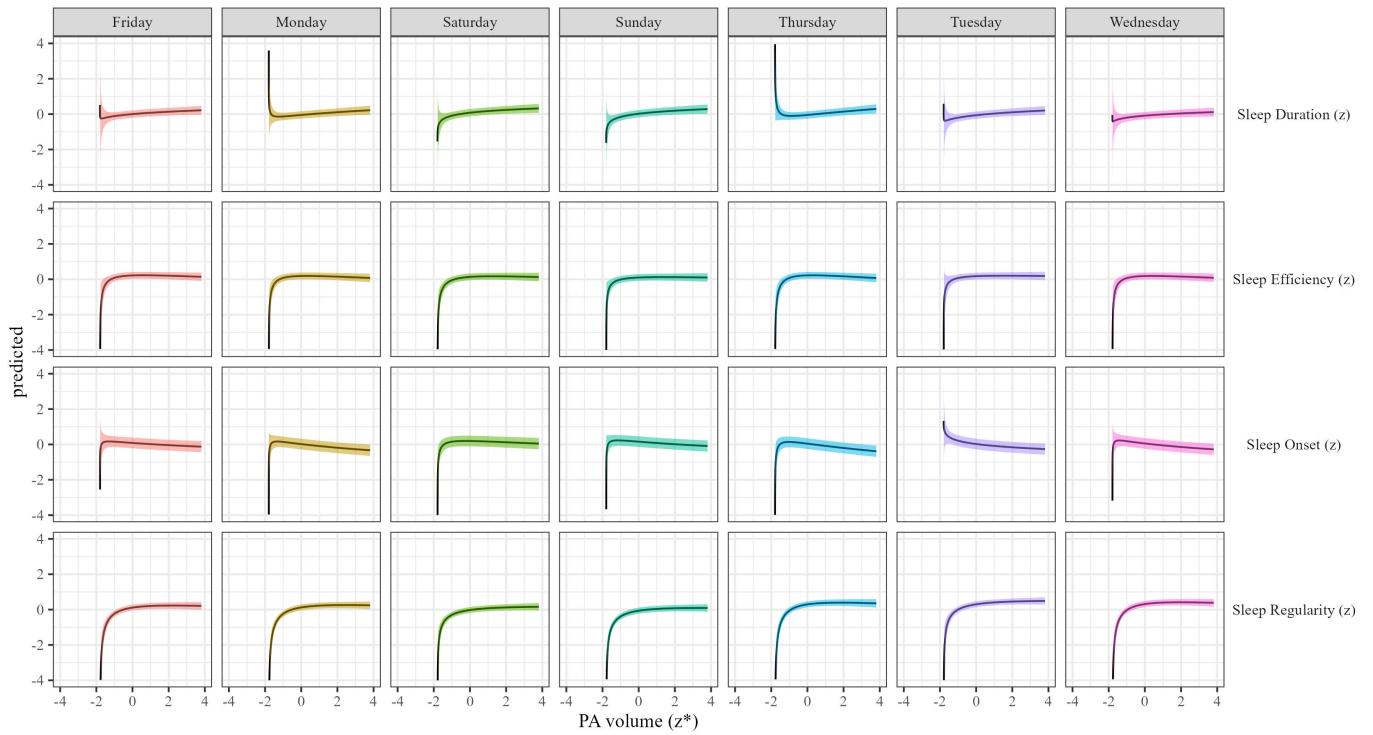


Figure 30. Sleep metrics on Physical activity volume by weekday

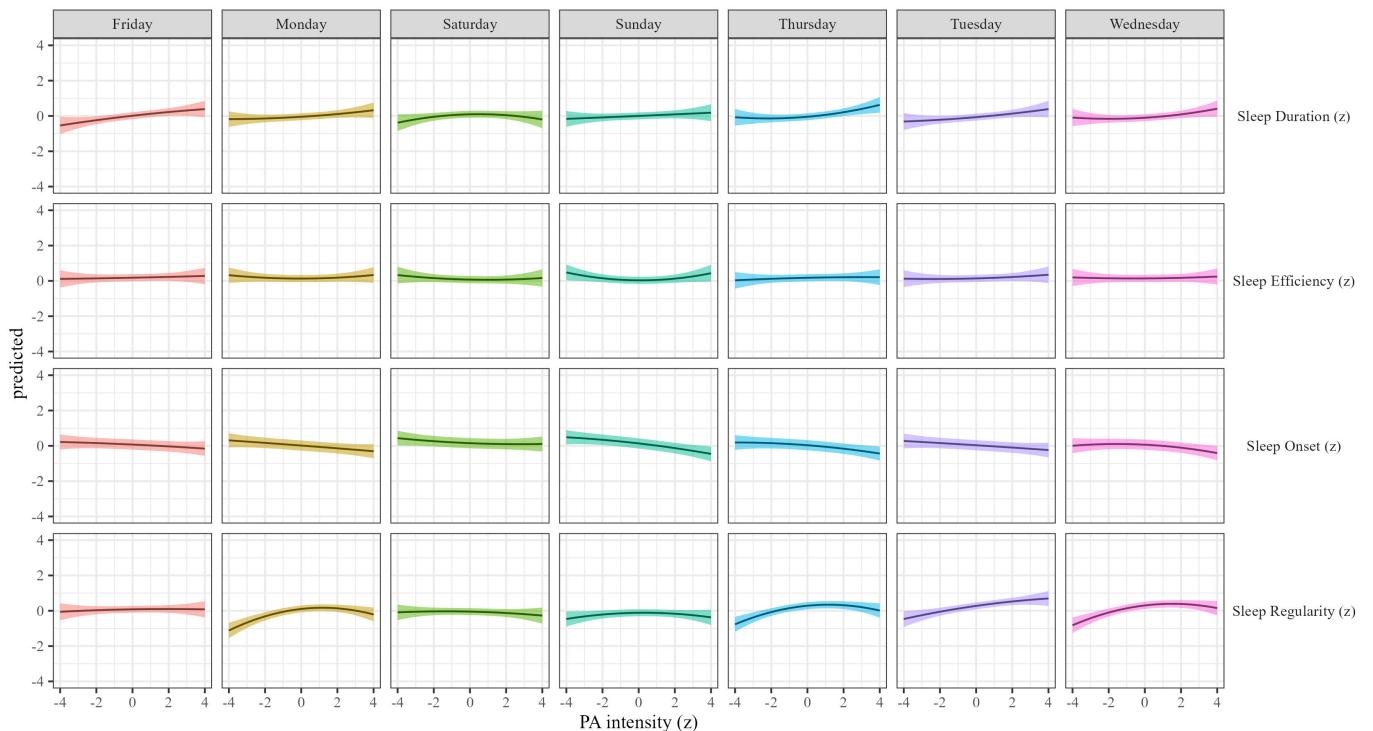


Figure 31. Sleep metrics on Physical activity intensity moderated by weekday

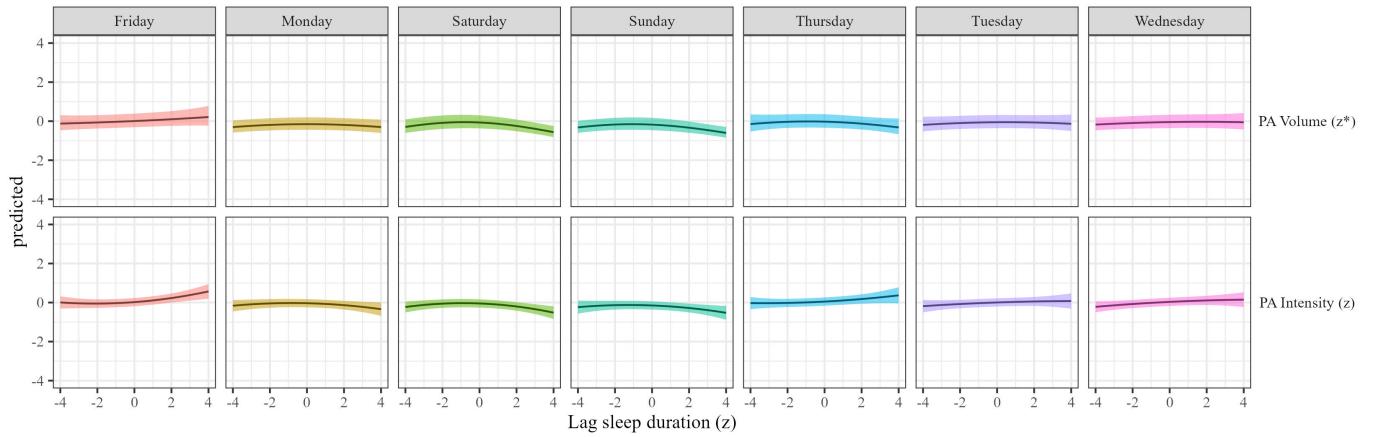


Figure 32. Physical activity by sleep duration moderated by weekday

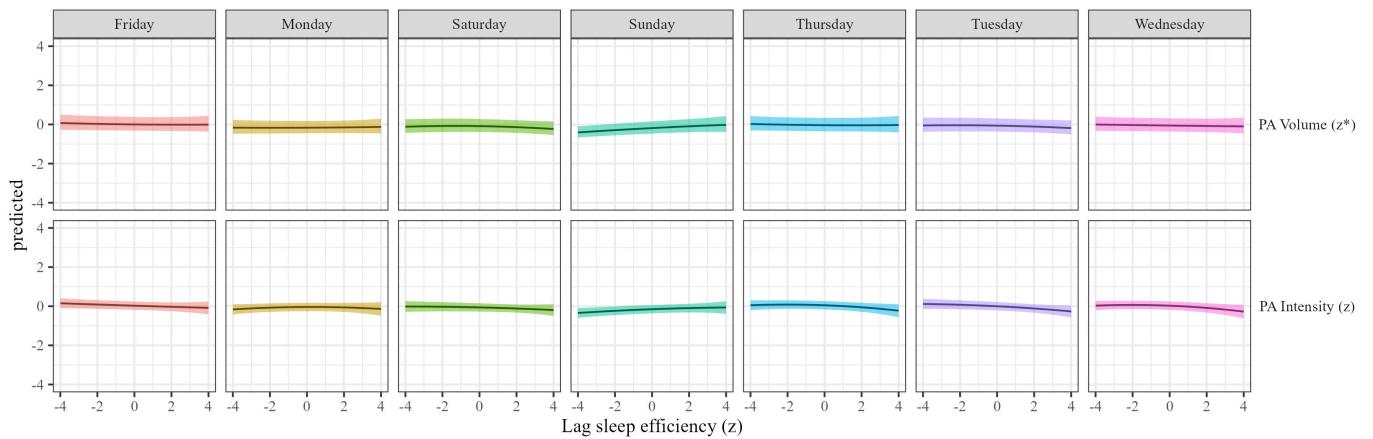


Figure 33. Physical activity by sleep efficiency moderated by weekday

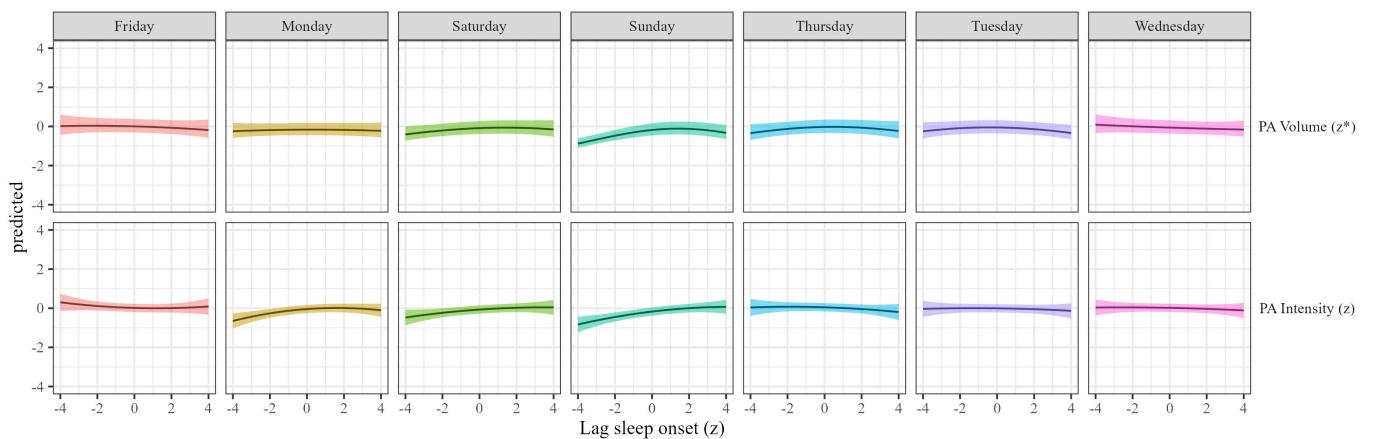


Figure 34. Physical activity by sleep onset moderated by weekday

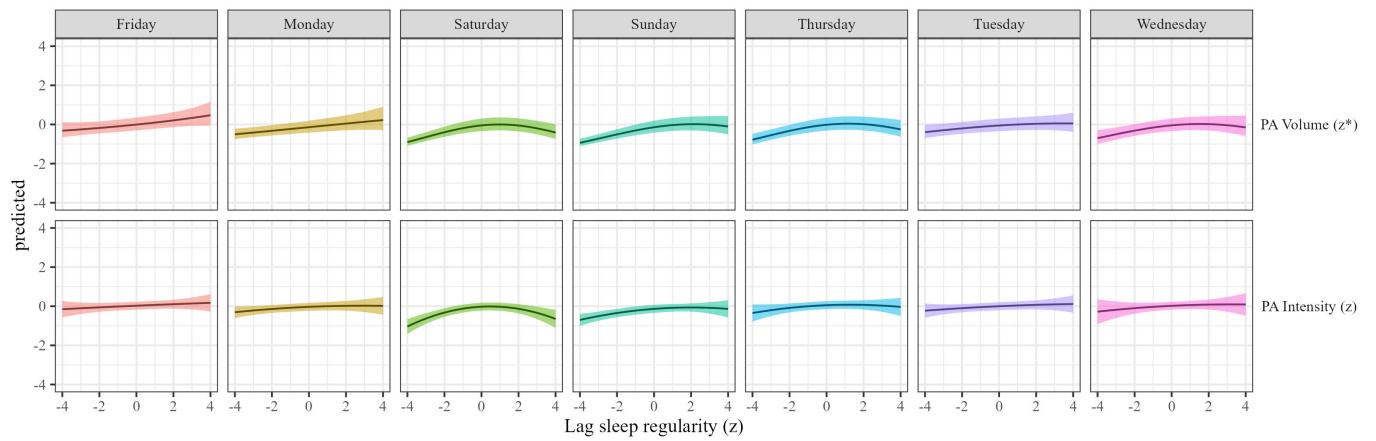


Figure 35. Physical activity by sleep regularity moderated by weekday

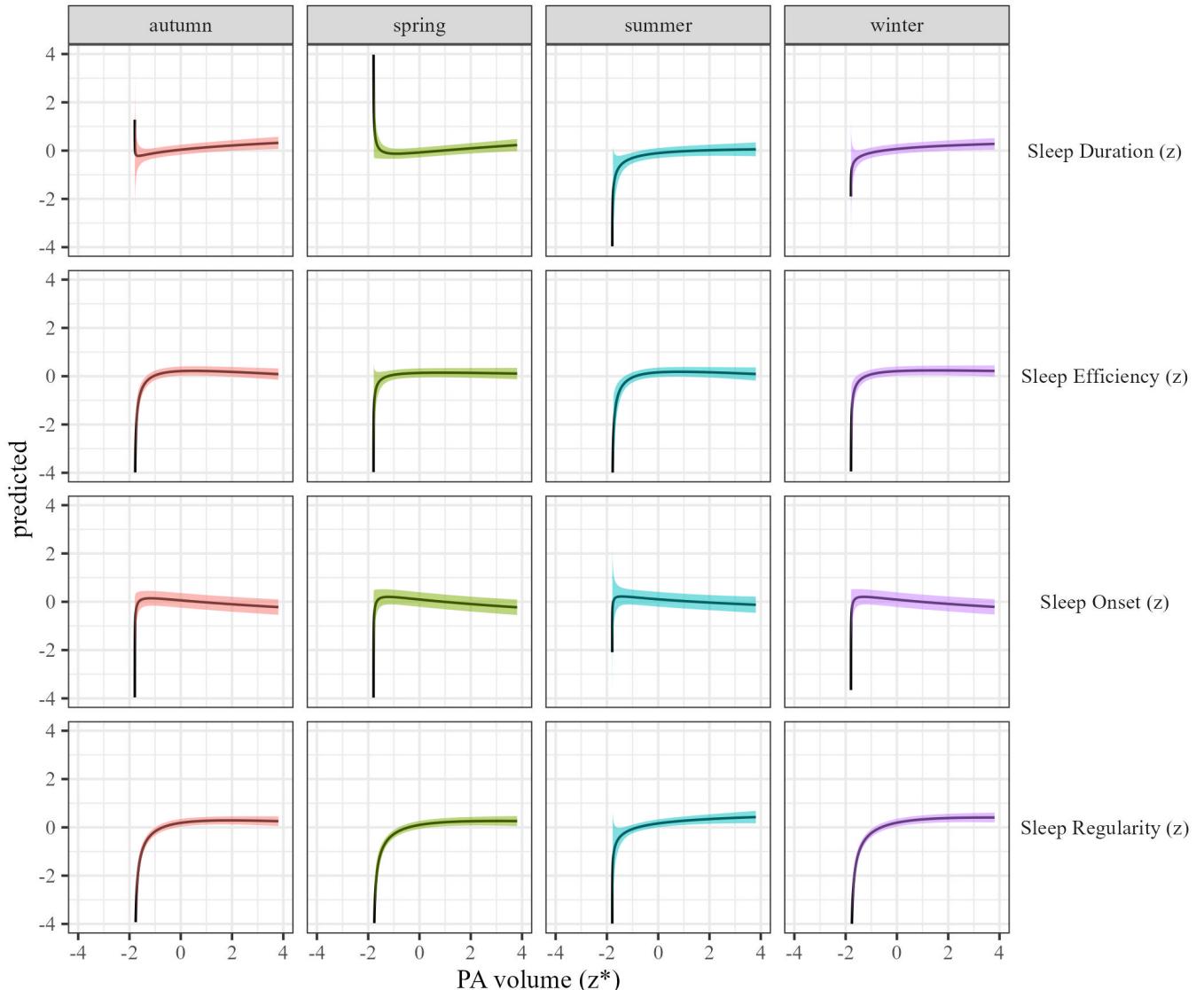


Figure 36. Sleep metrics on Physical activity volume by season

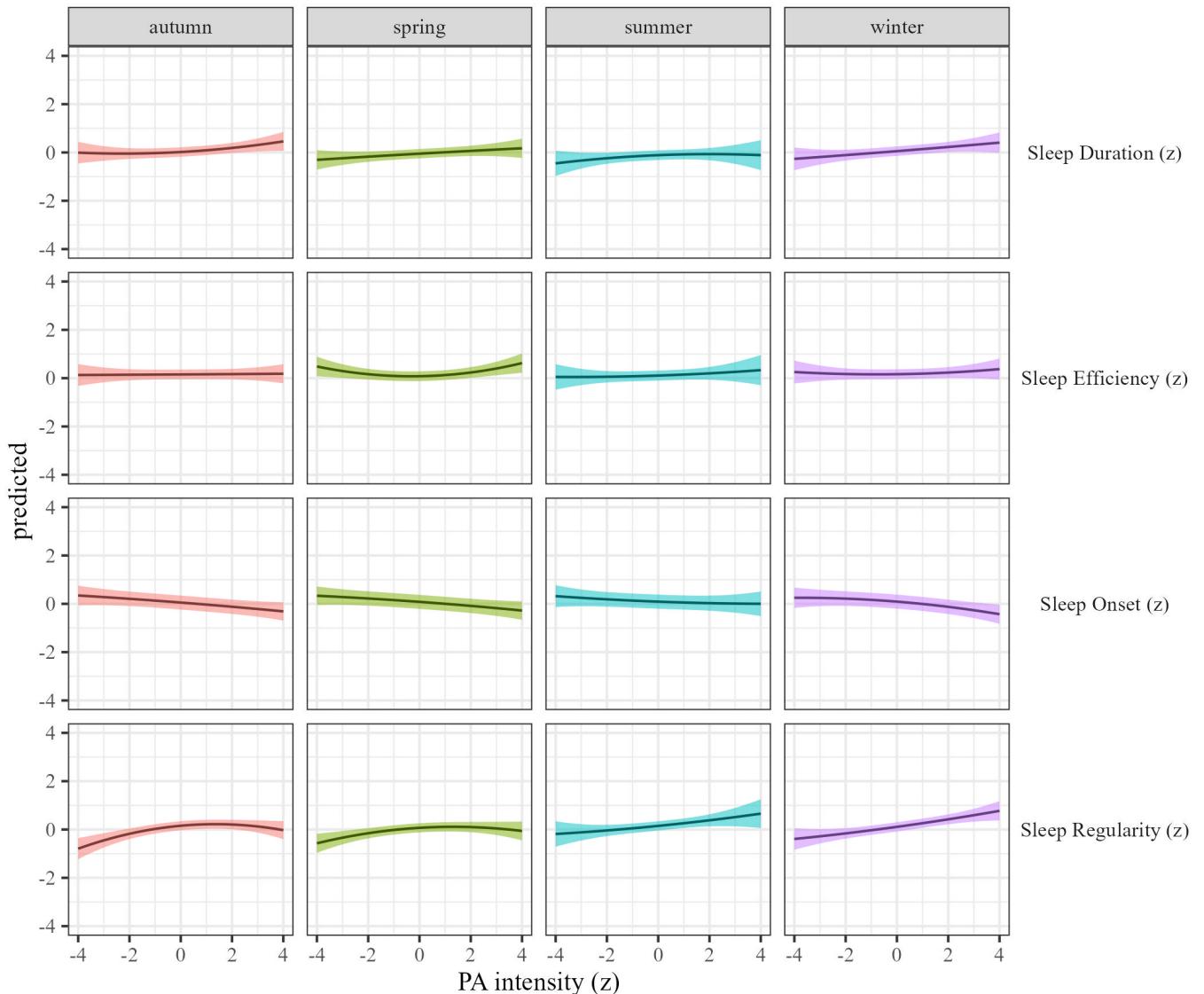


Figure 37. Sleep metrics on Physical activity intensity moderated by season

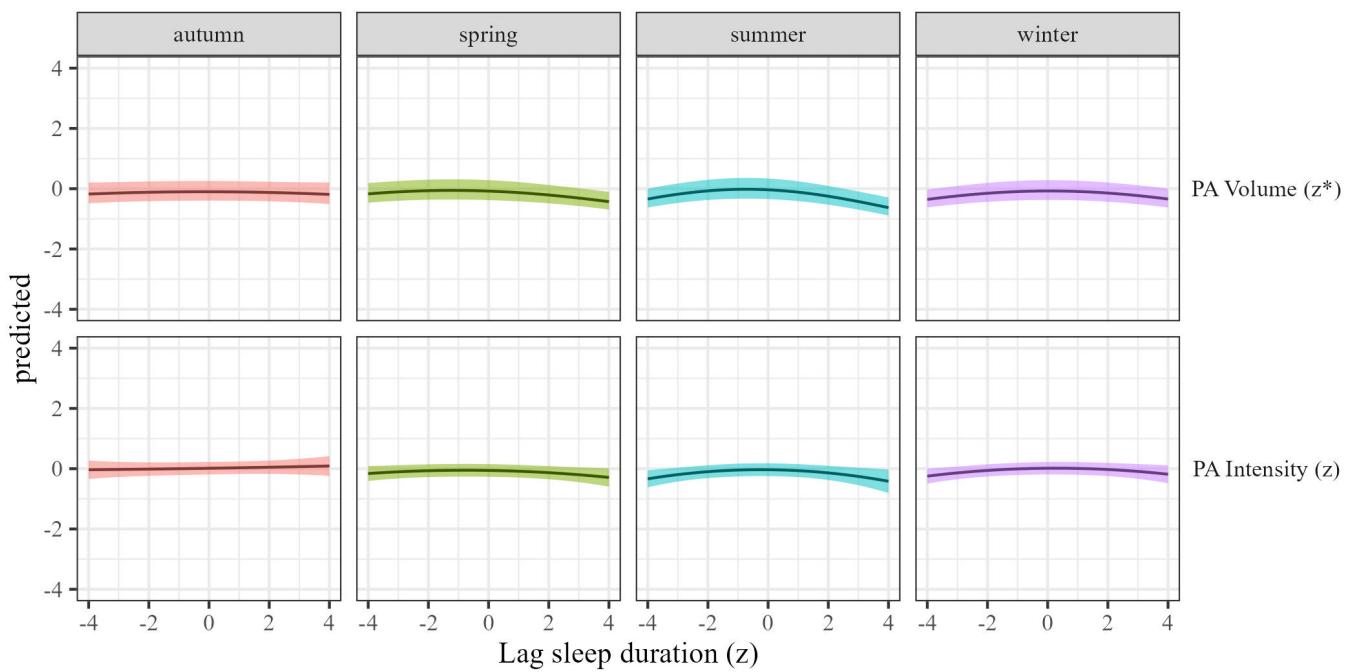


Figure 38. Physical activity by sleep duration moderated by season

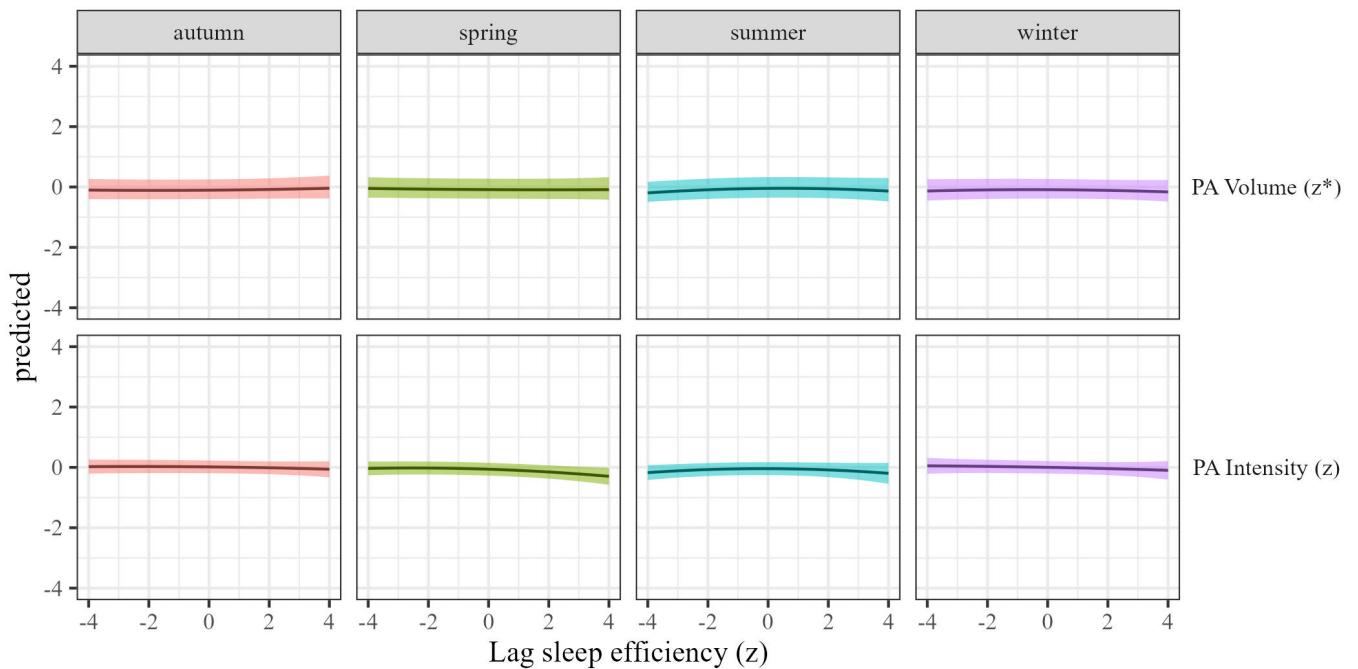


Figure 39. Physical activity by sleep efficiency moderated by season

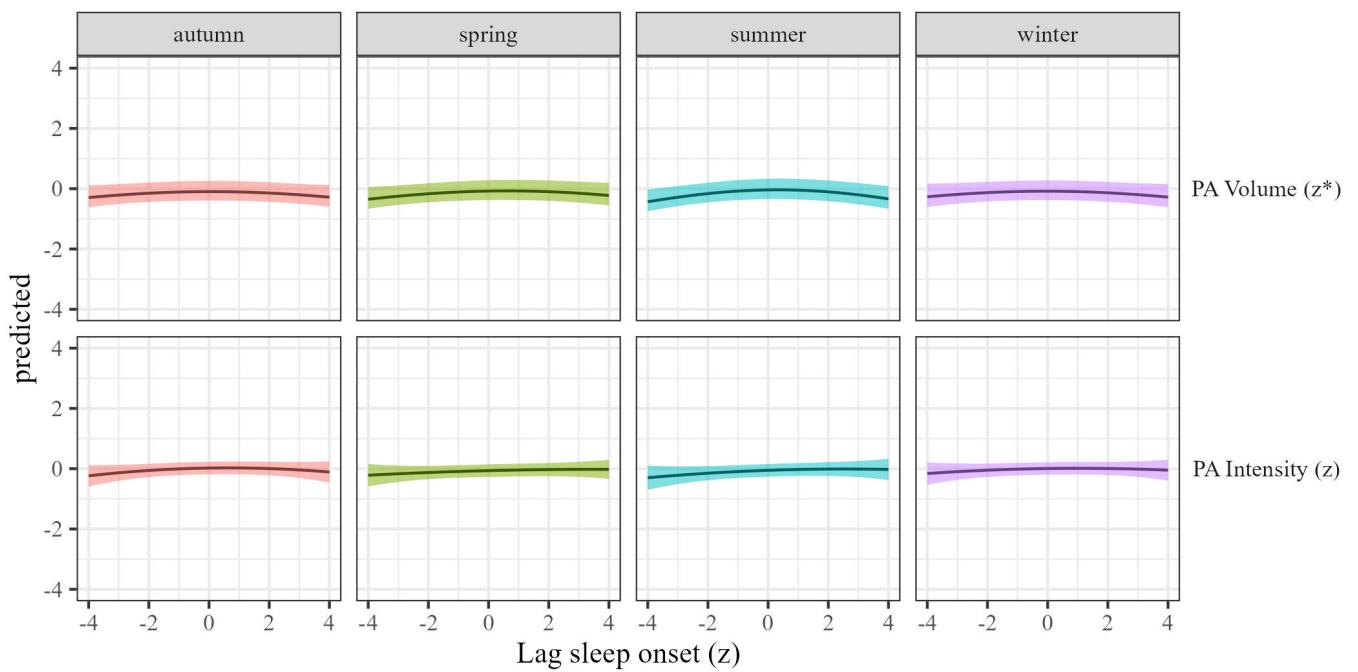


Figure 40. Physical activity by sleep onset moderated by season

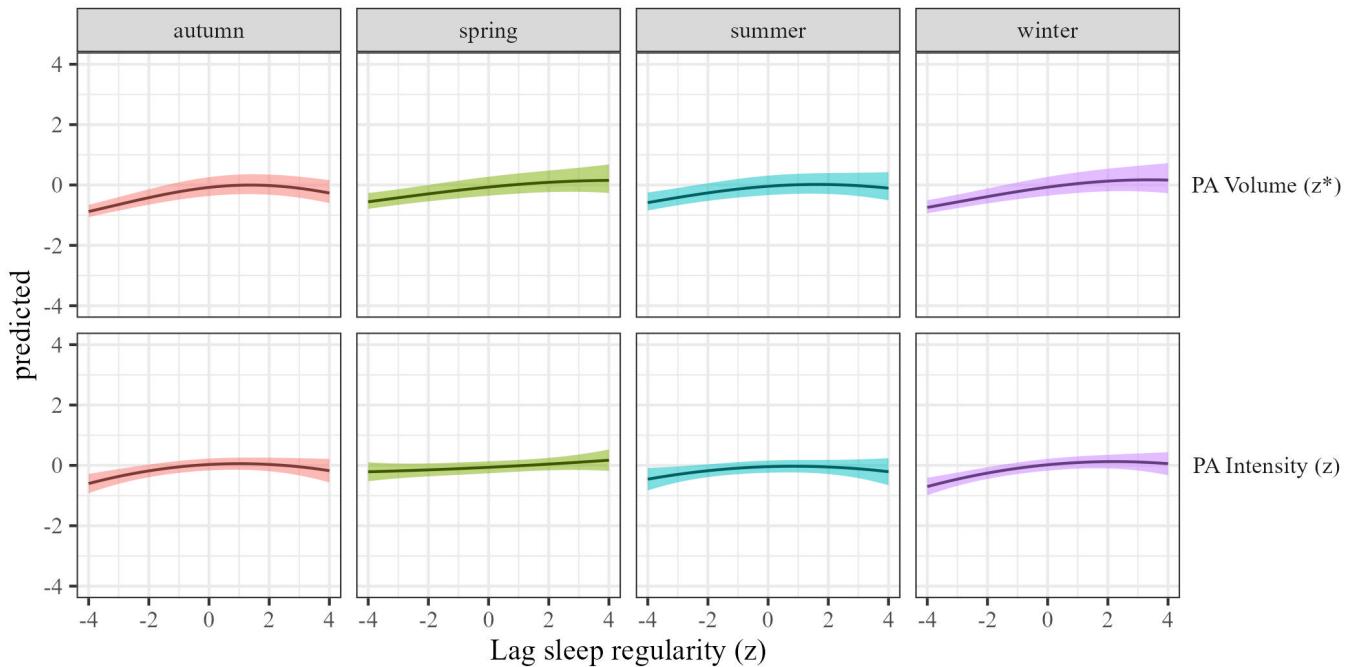


Figure 41. Physical activity by sleep regularity moderated by season

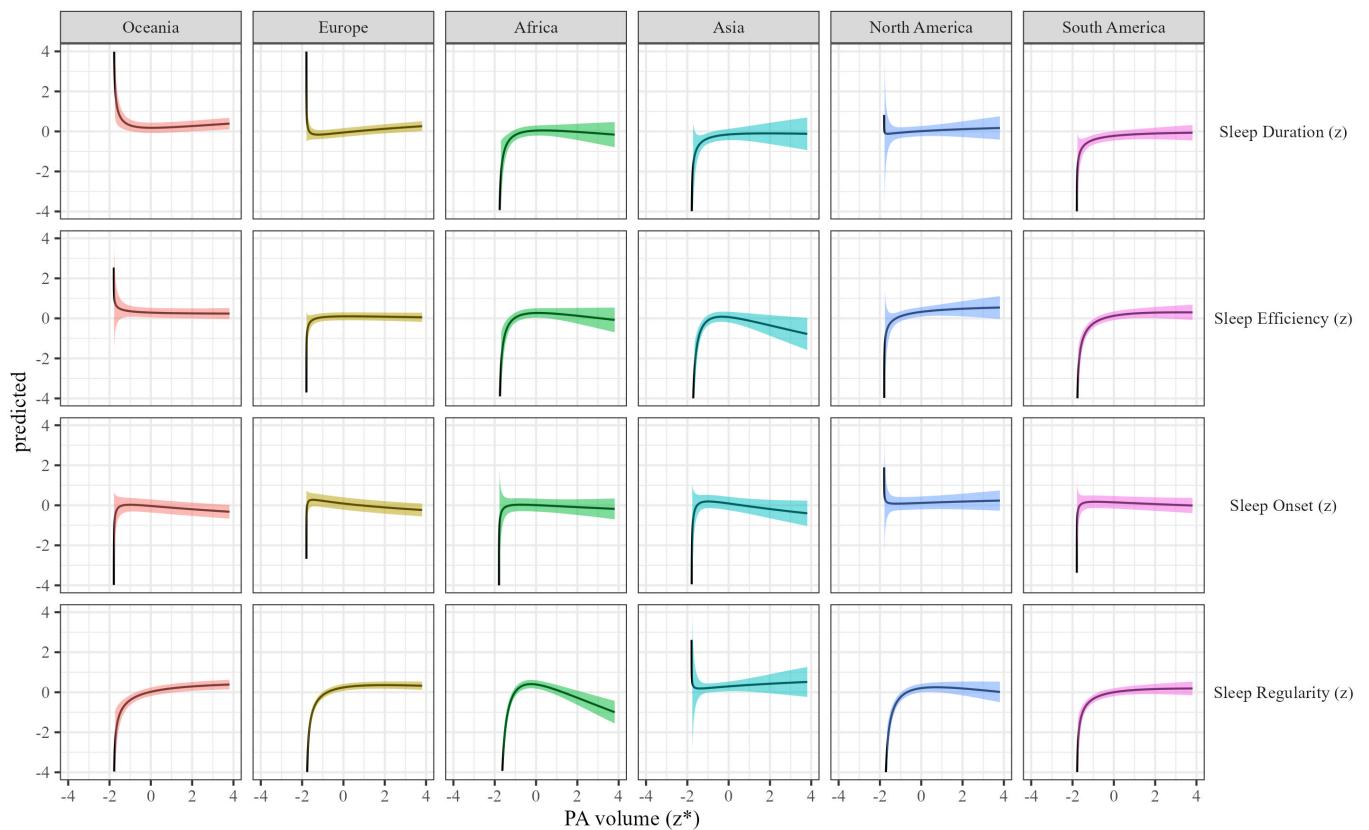


Figure 42. Sleep metrics on Physical activity volume by region

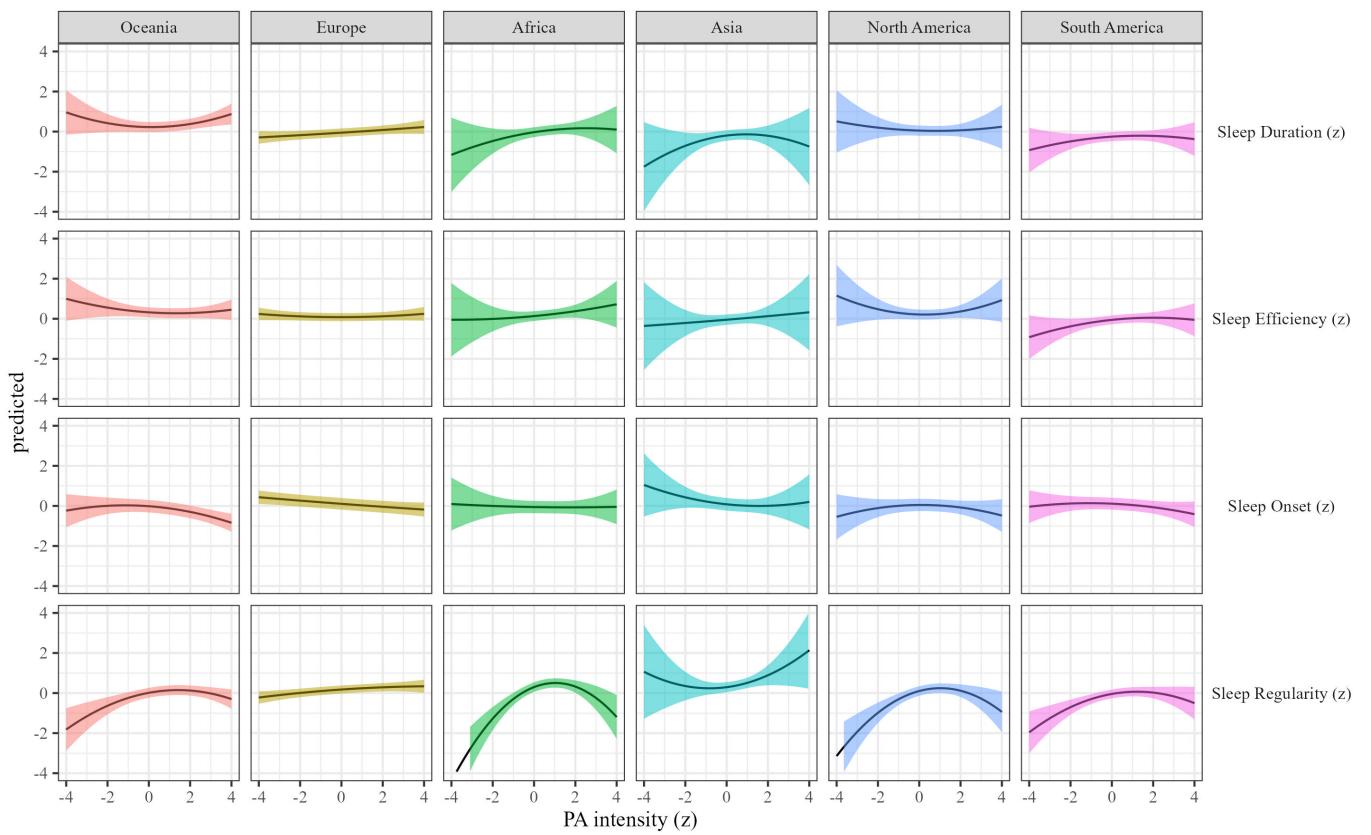


Figure 43. Sleep metrics on Physical activity intensity moderated by region

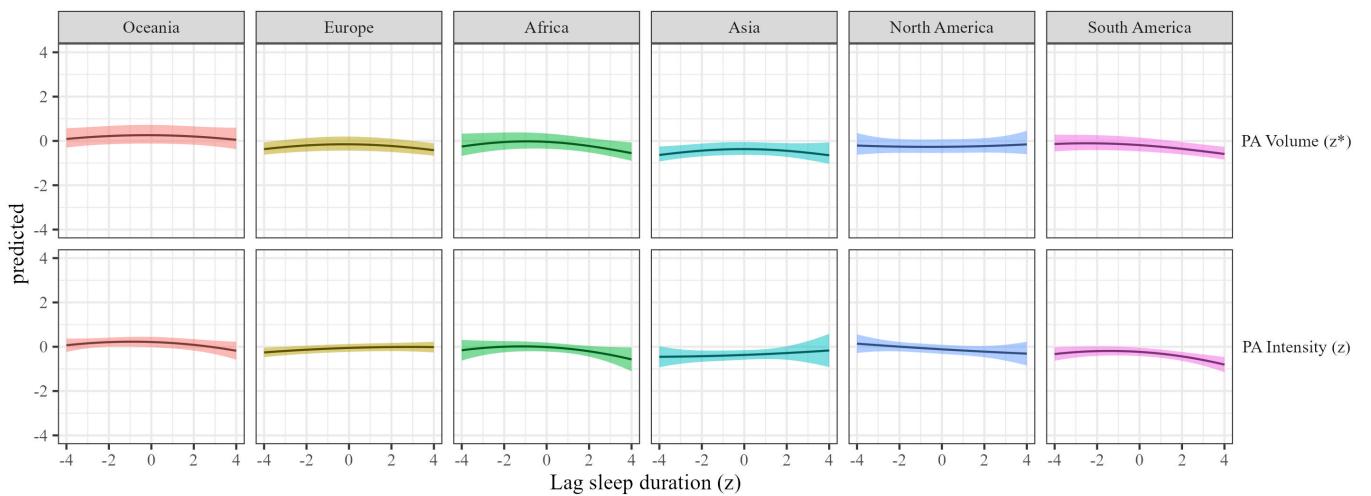


Figure 44. Physical activity by sleep duration moderated by region

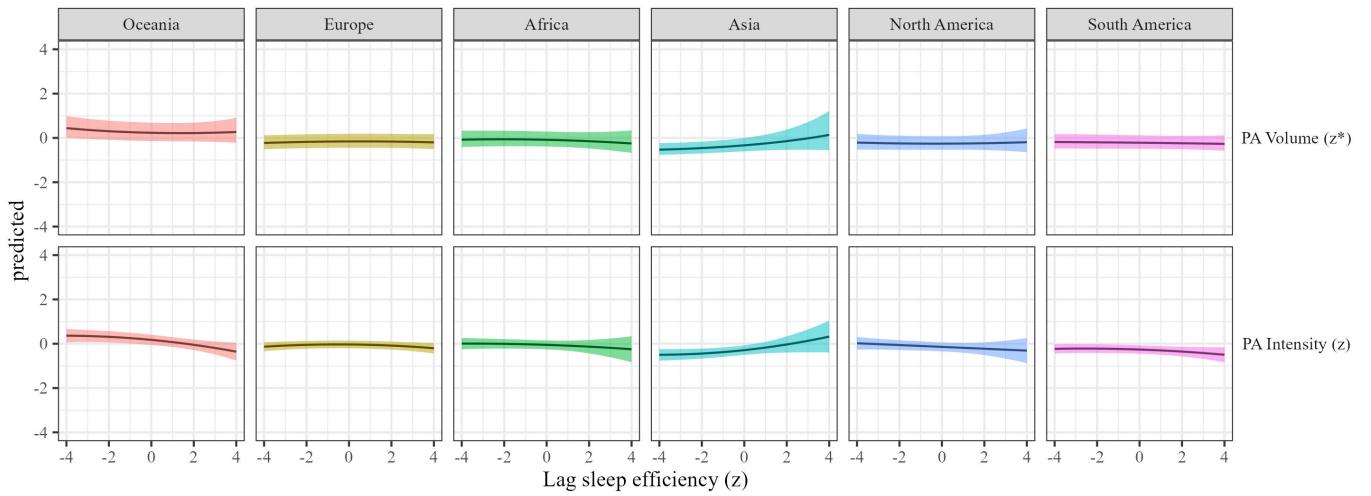


Figure 45. Physical activity by sleep efficiency moderated by region

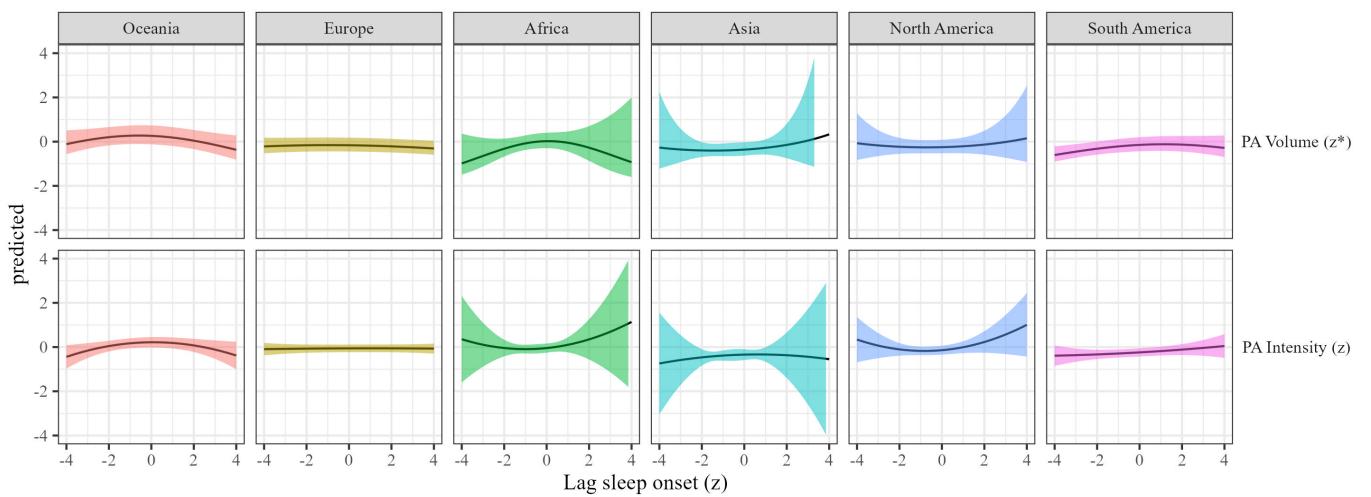


Figure 46. Physical activity by sleep onset moderated by region

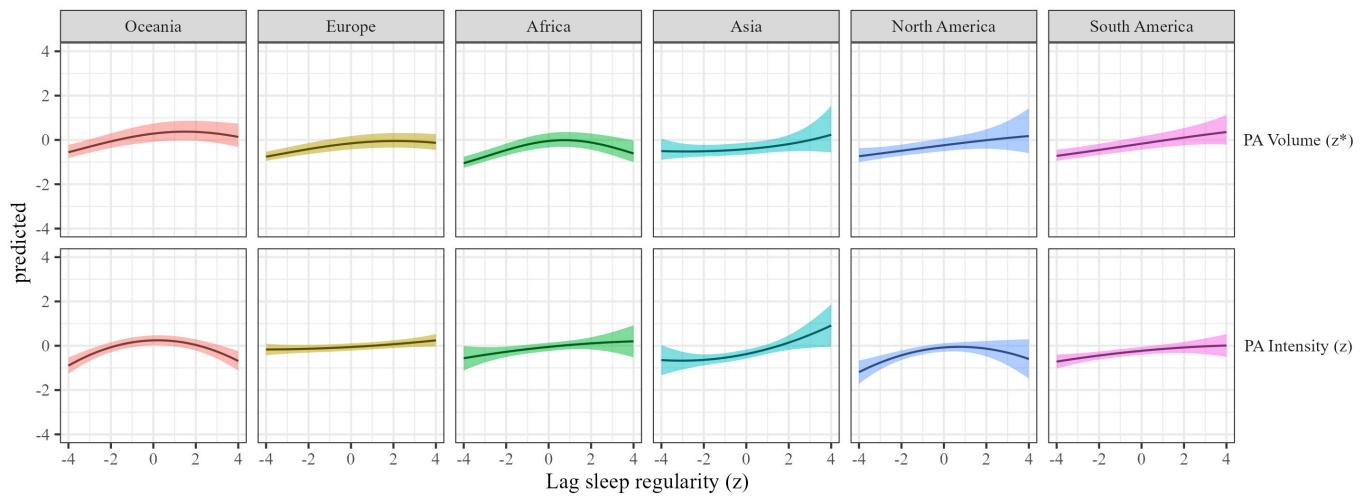


Figure 47. Physical activity by sleep regularity moderated by region

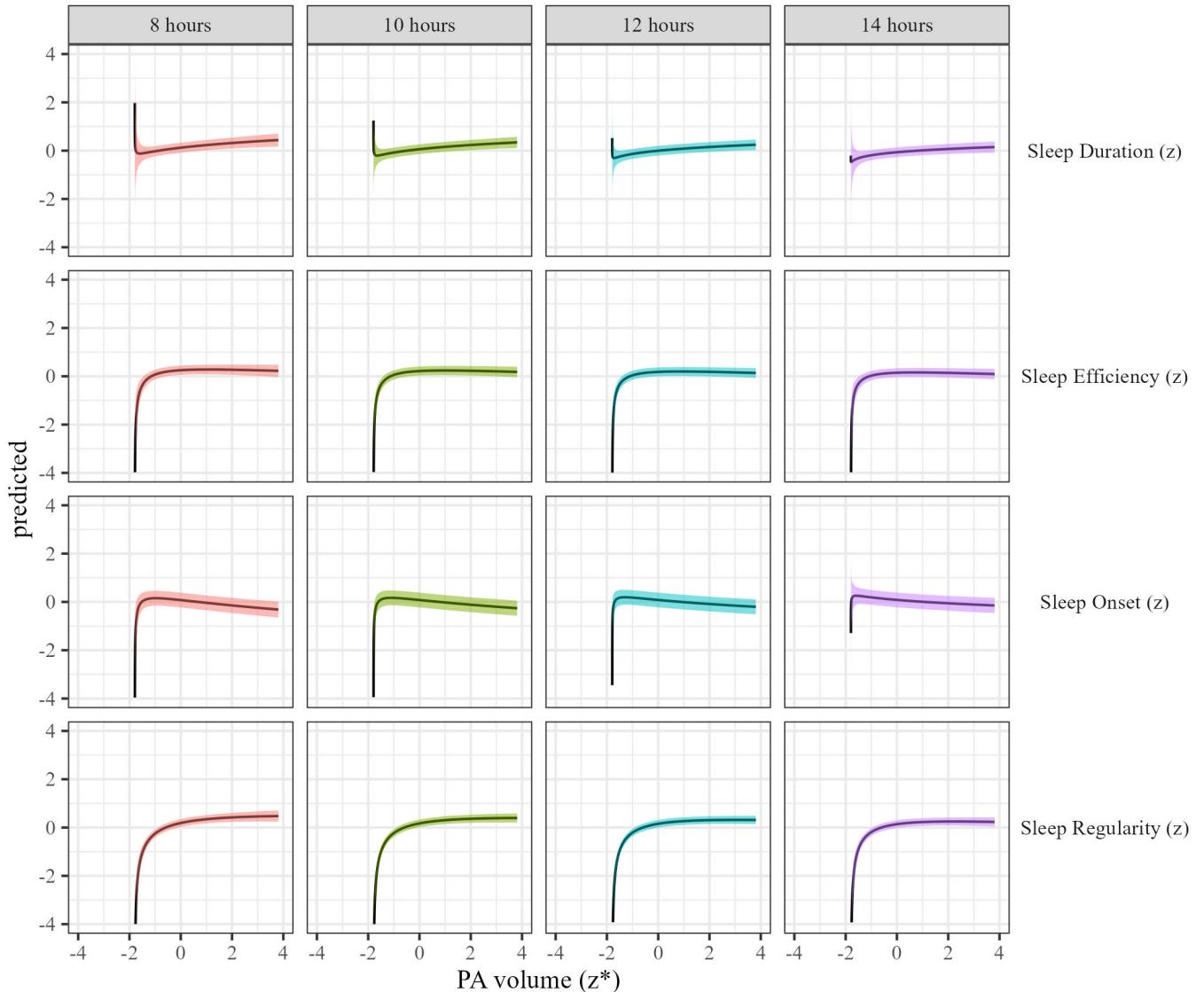


Figure 48. Sleep metrics on Physical activity volume by daylight hours

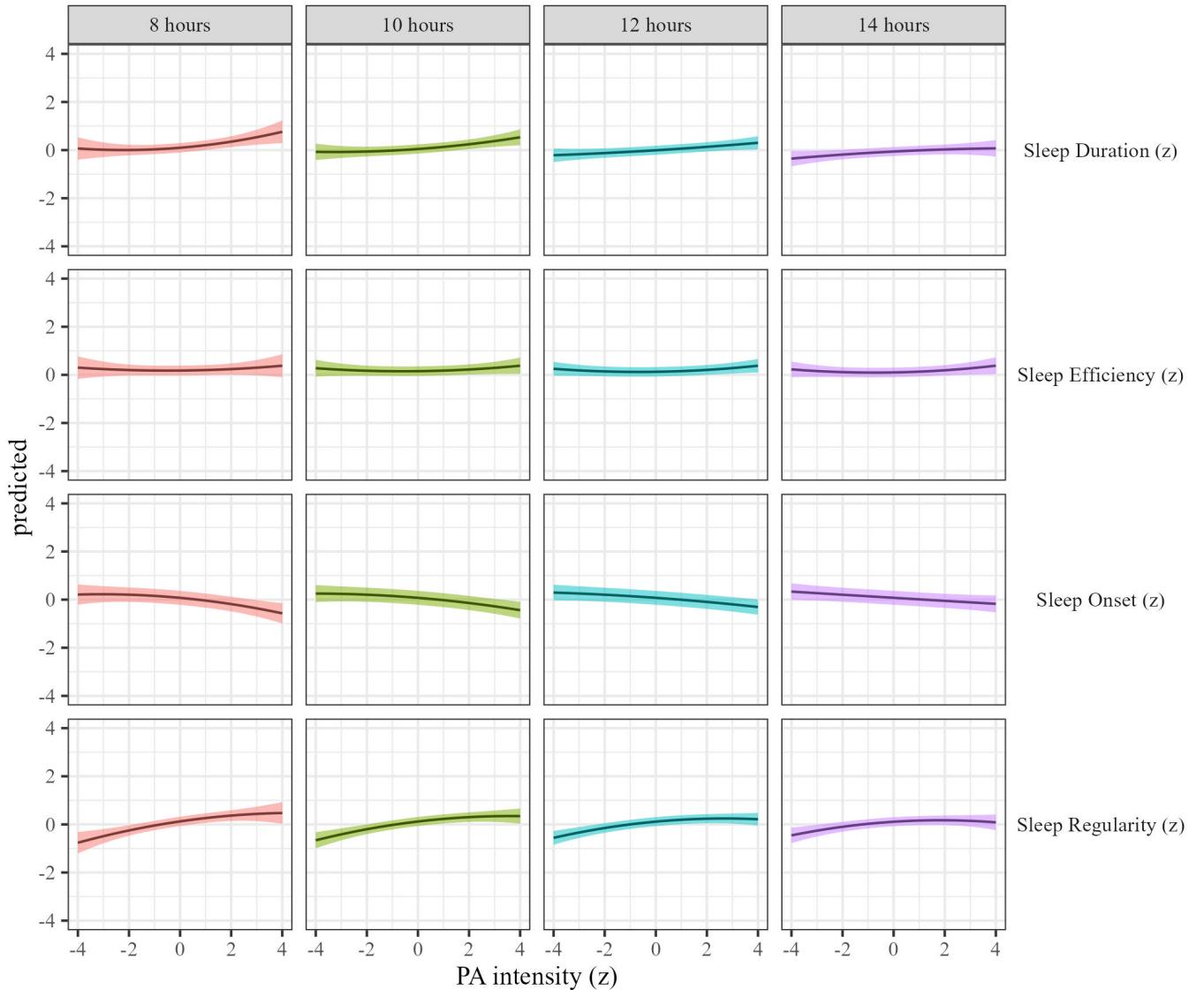


Figure 49. Sleep metrics on Physical activity intensity moderated by daylight hours

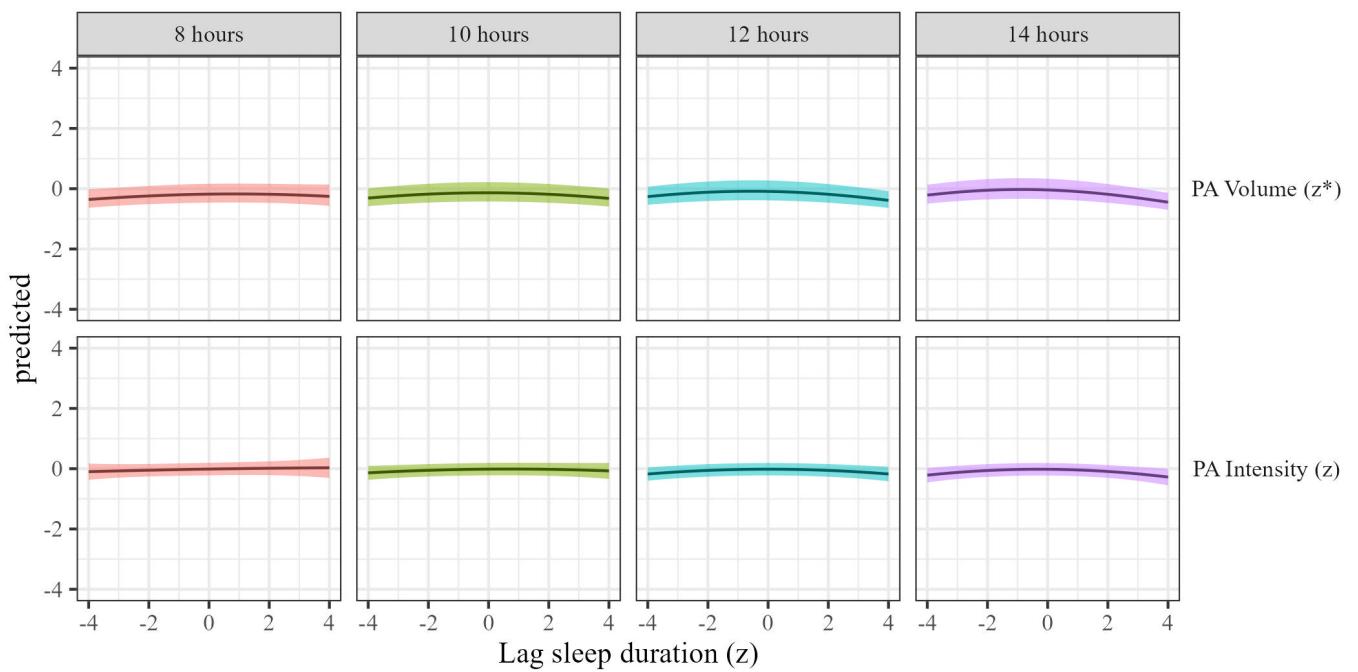


Figure 50. Physical activity by sleep duration moderated by daylight hours

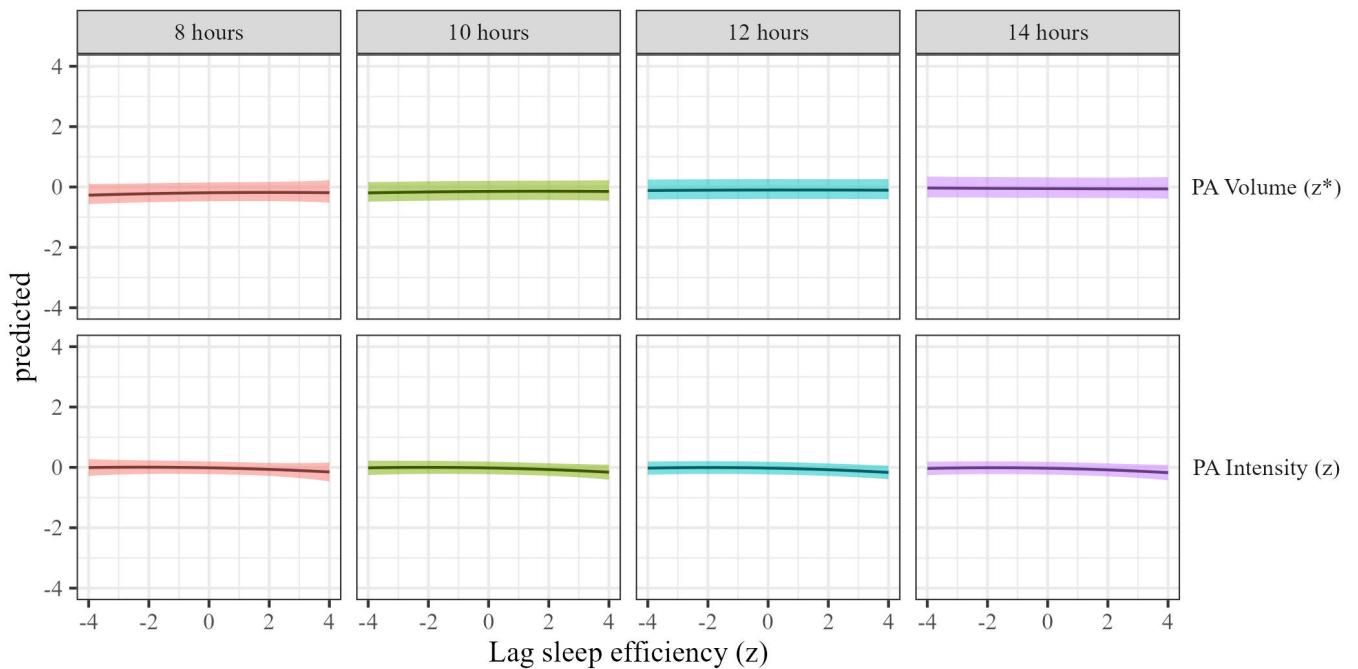


Figure 51. Physical activity by sleep efficiency moderated by daylight hours

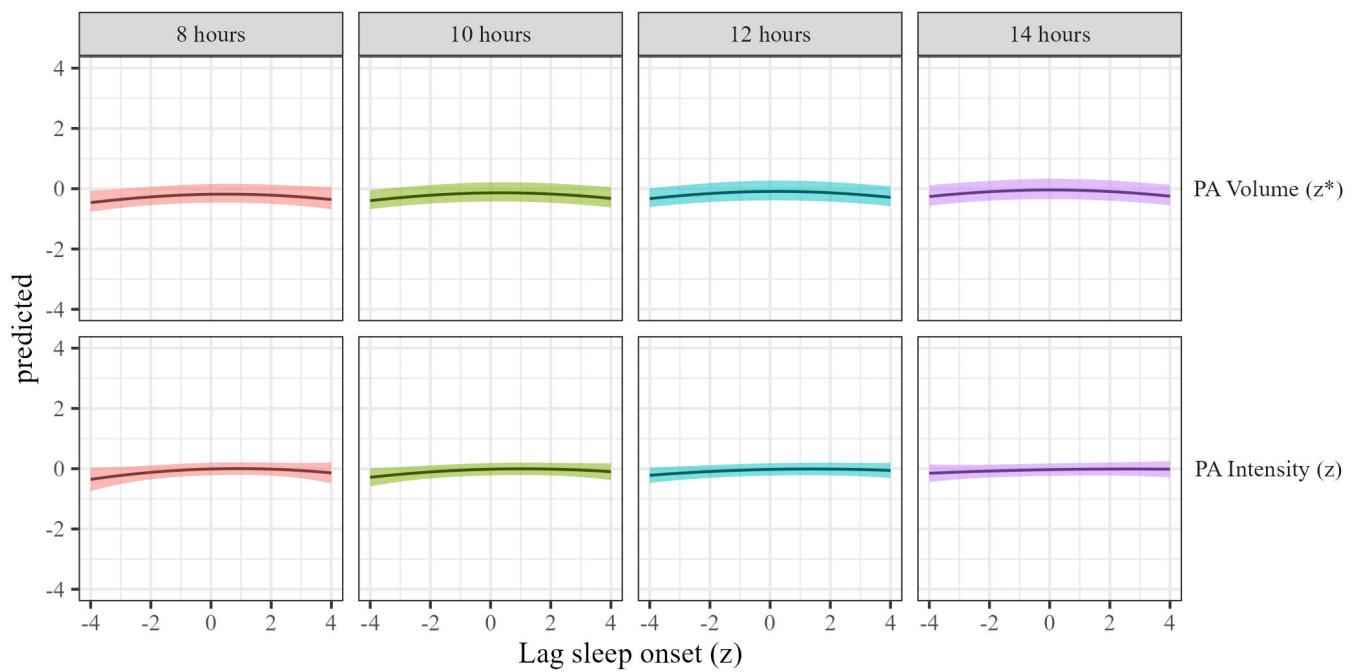


Figure 52. Physical activity by sleep onset moderated by daylight hours

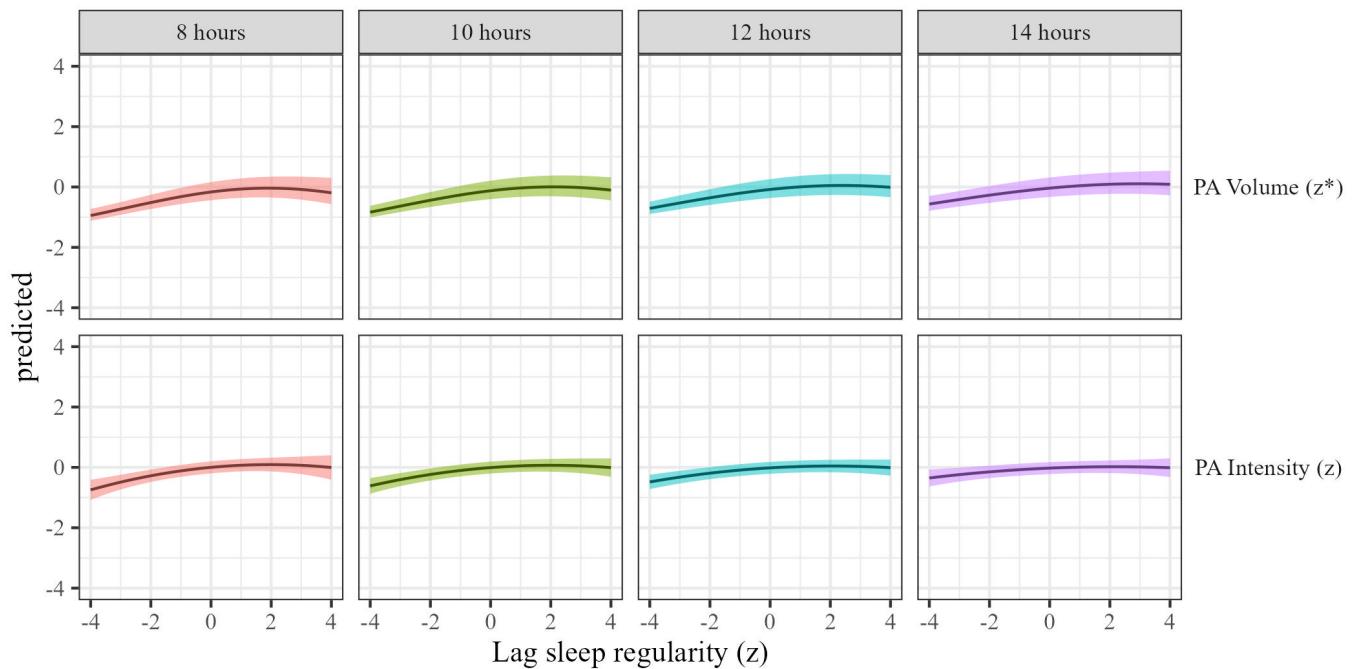


Figure 53. Physical activity by sleep regularity moderated by daylight hours

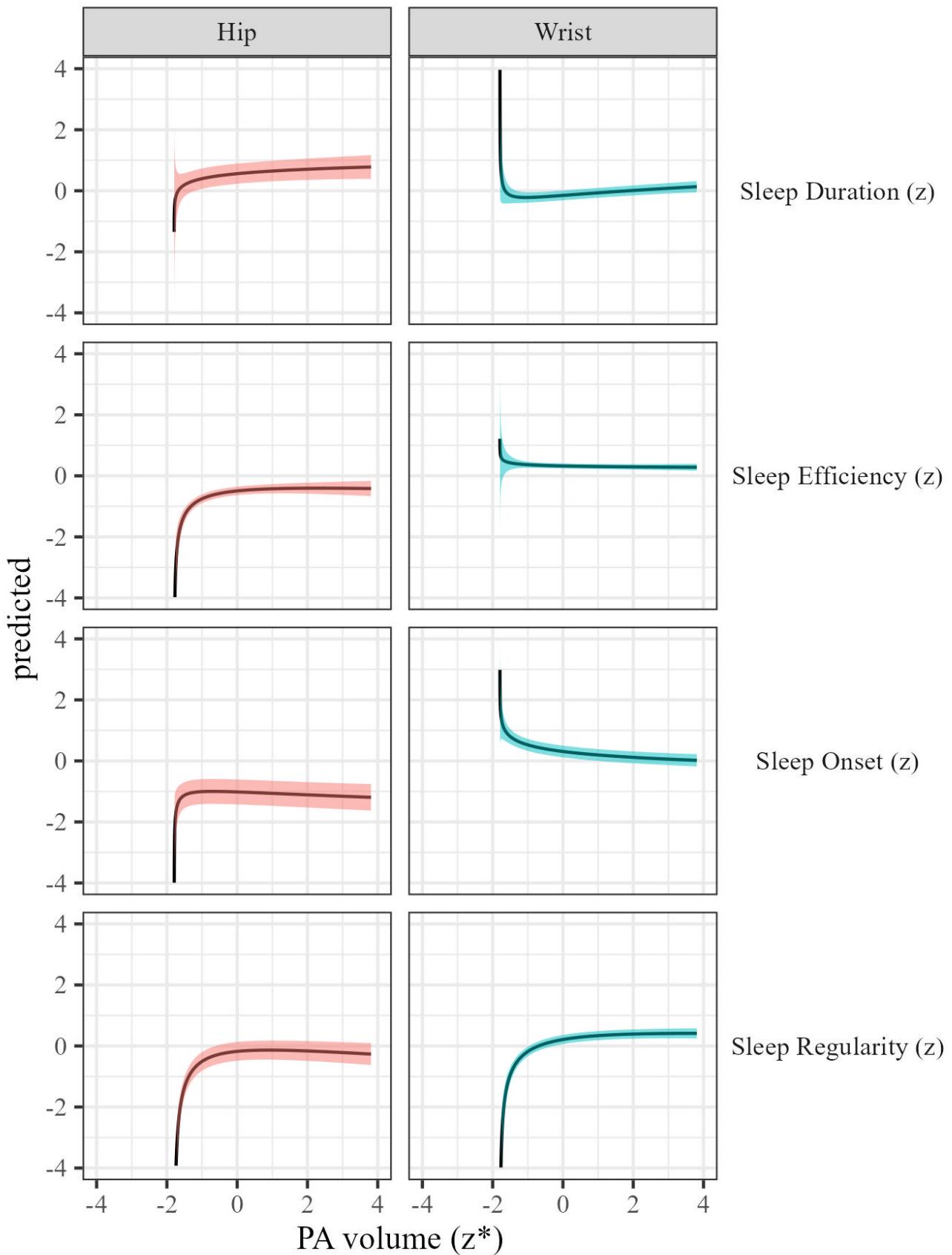


Figure 54. Sleep metrics on Physical activity volume by wear location

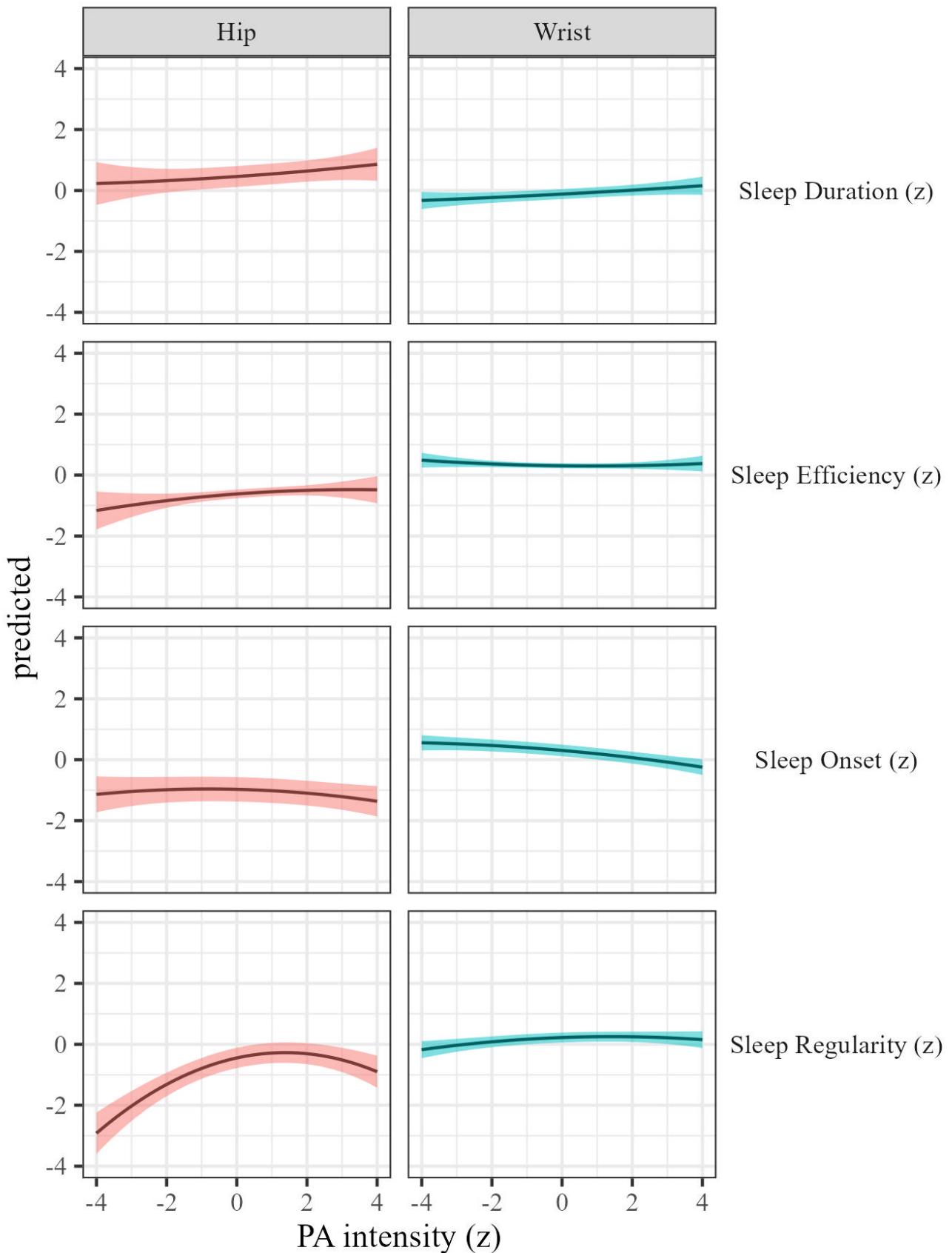


Figure 55. Sleep metrics on Physical activity intensity moderated by wear location

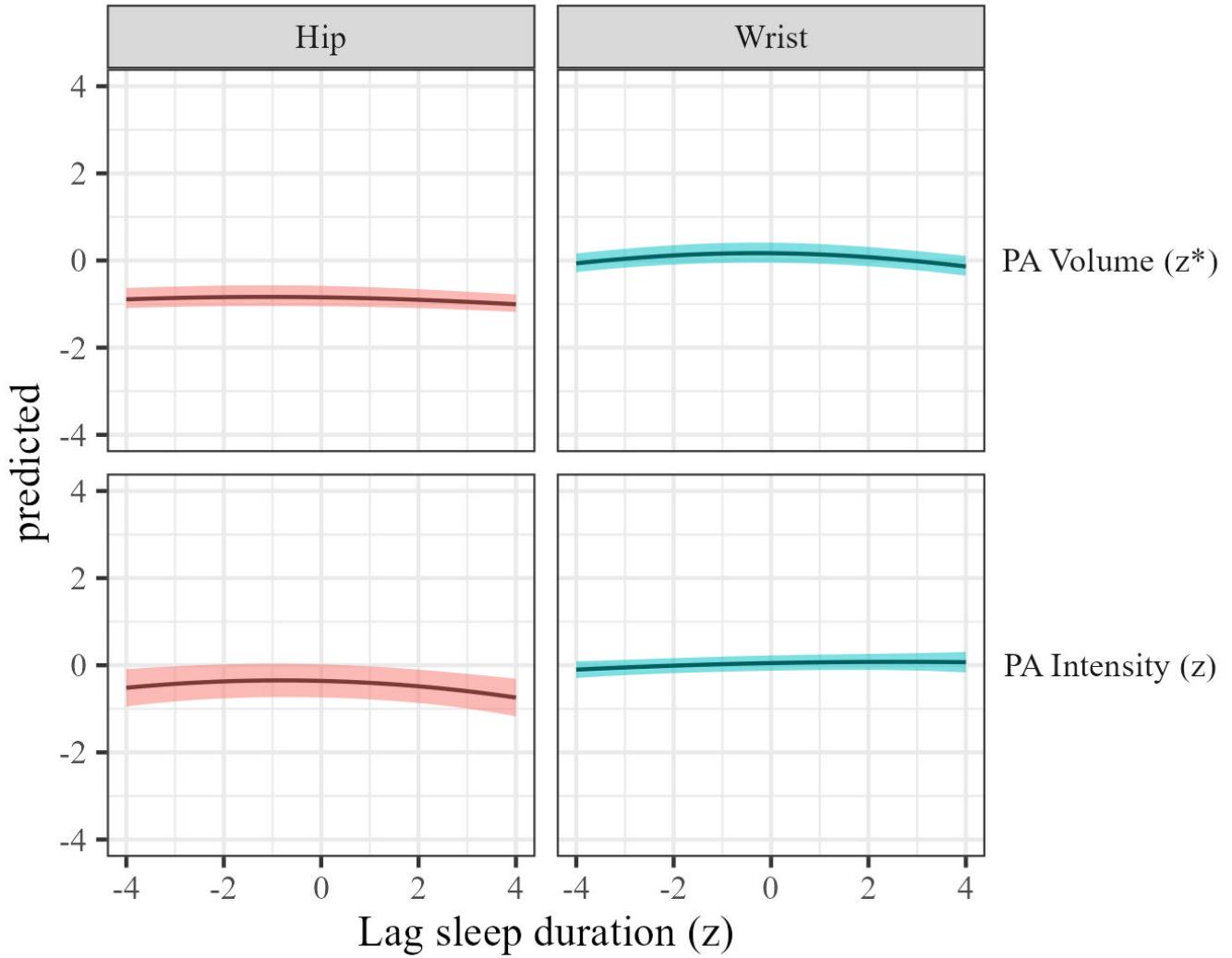


Figure 56. Physical activity by sleep duration moderated by wear location

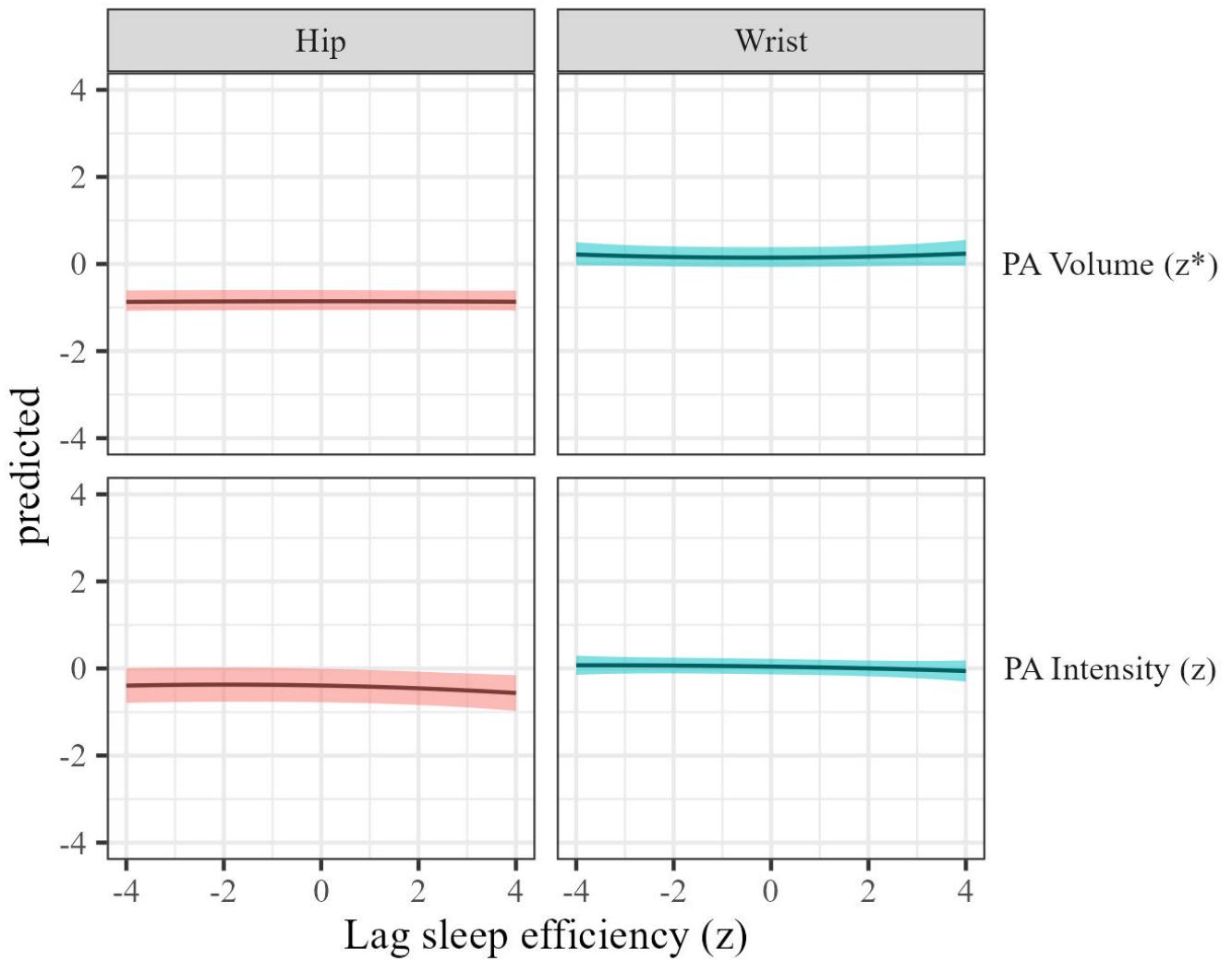


Figure 57. Physical activity by sleep efficiency moderated by wear location

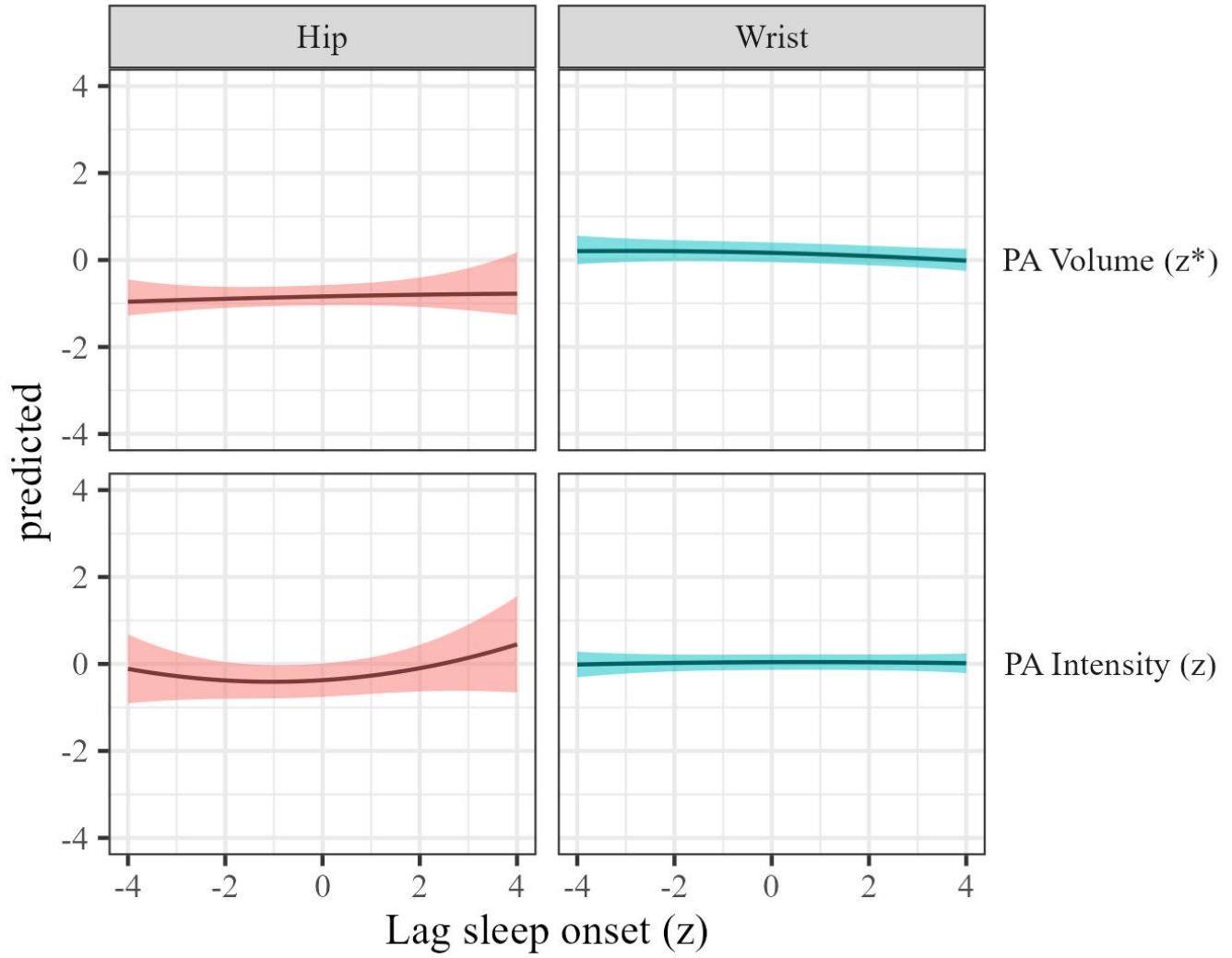


Figure 58. Physical activity by sleep onset moderated by wear location

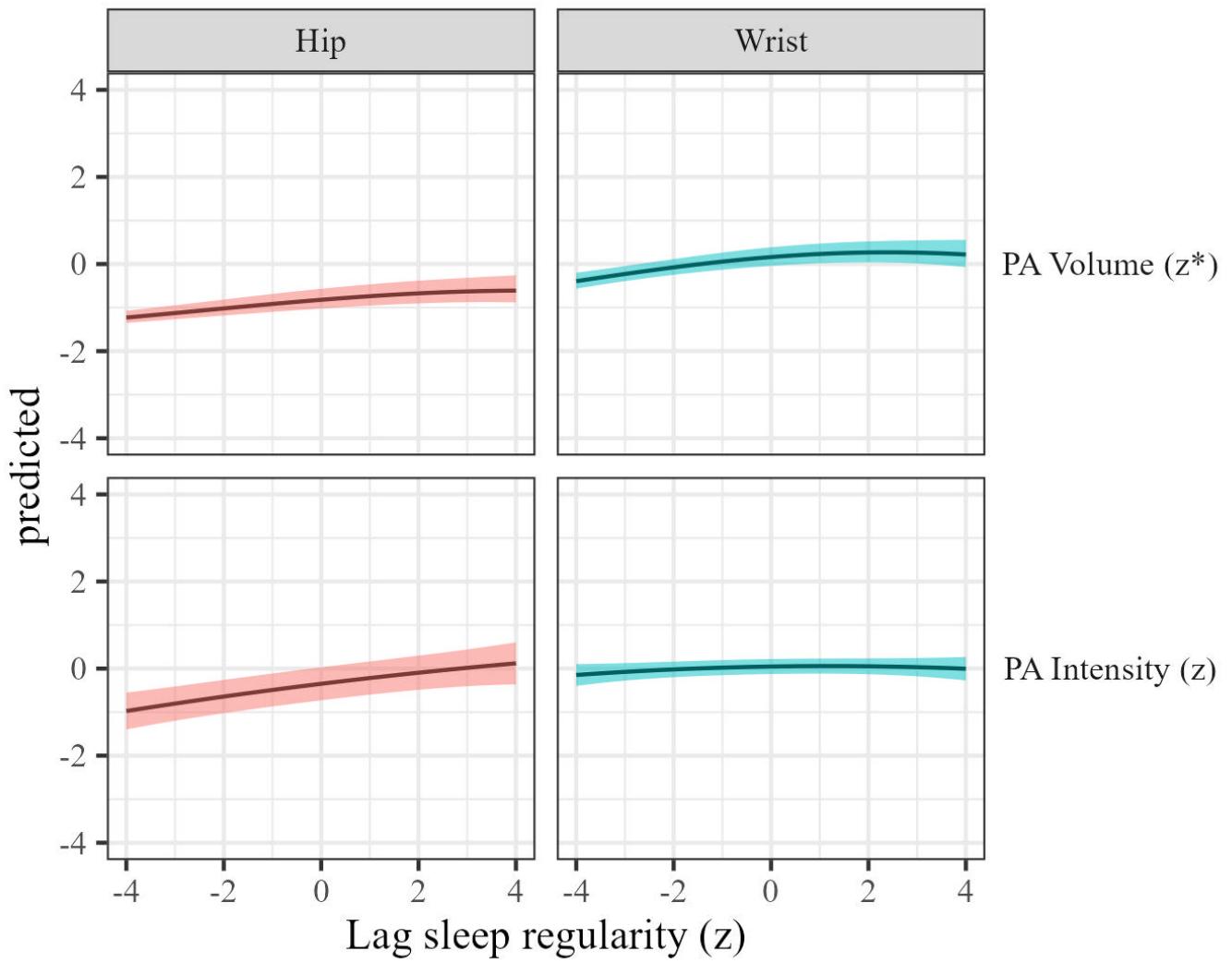


Figure 59. Physical activity by sleep regularity moderated by wear location

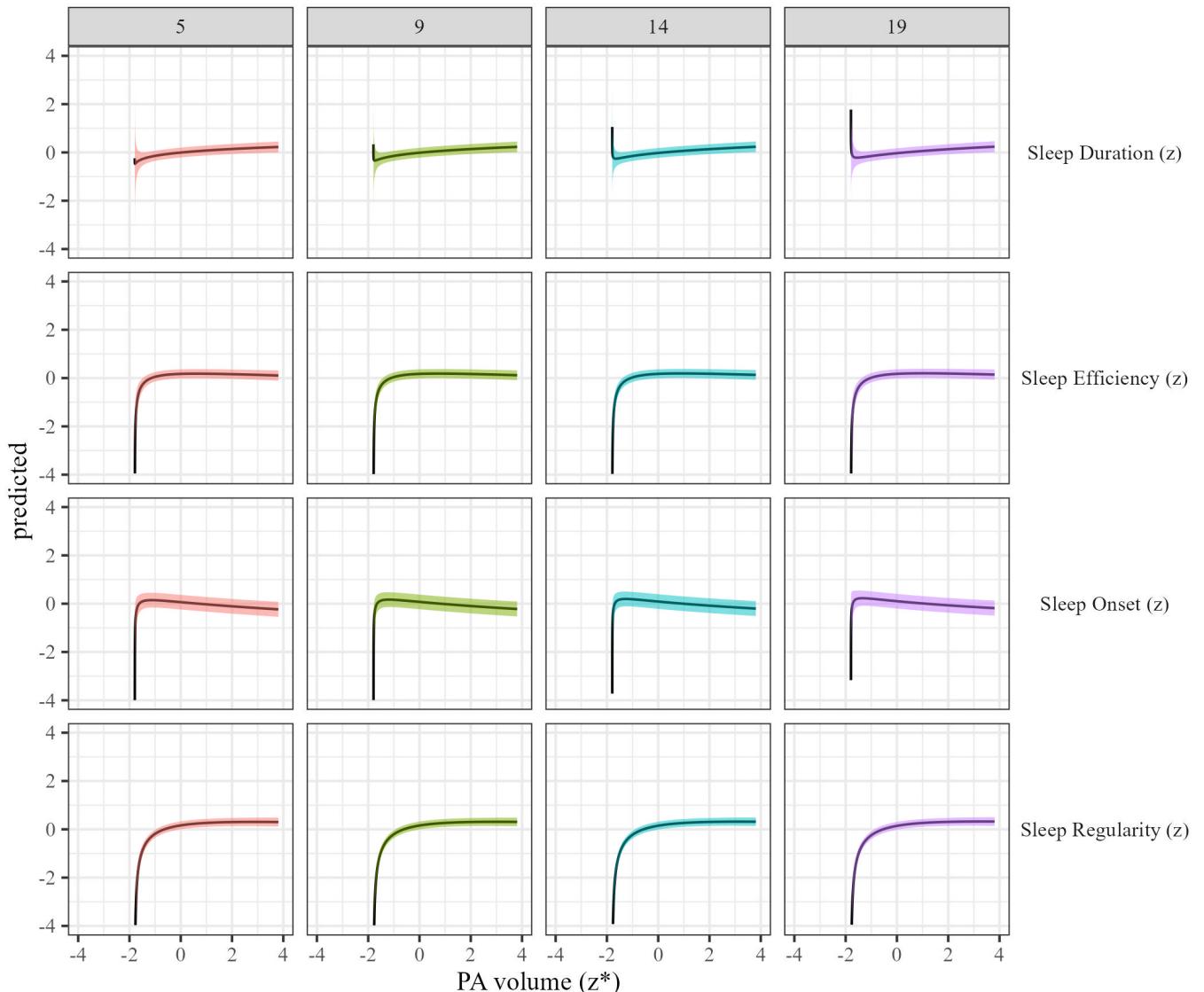


Figure 60. Sleep metrics on Physical activity volume by most active hour

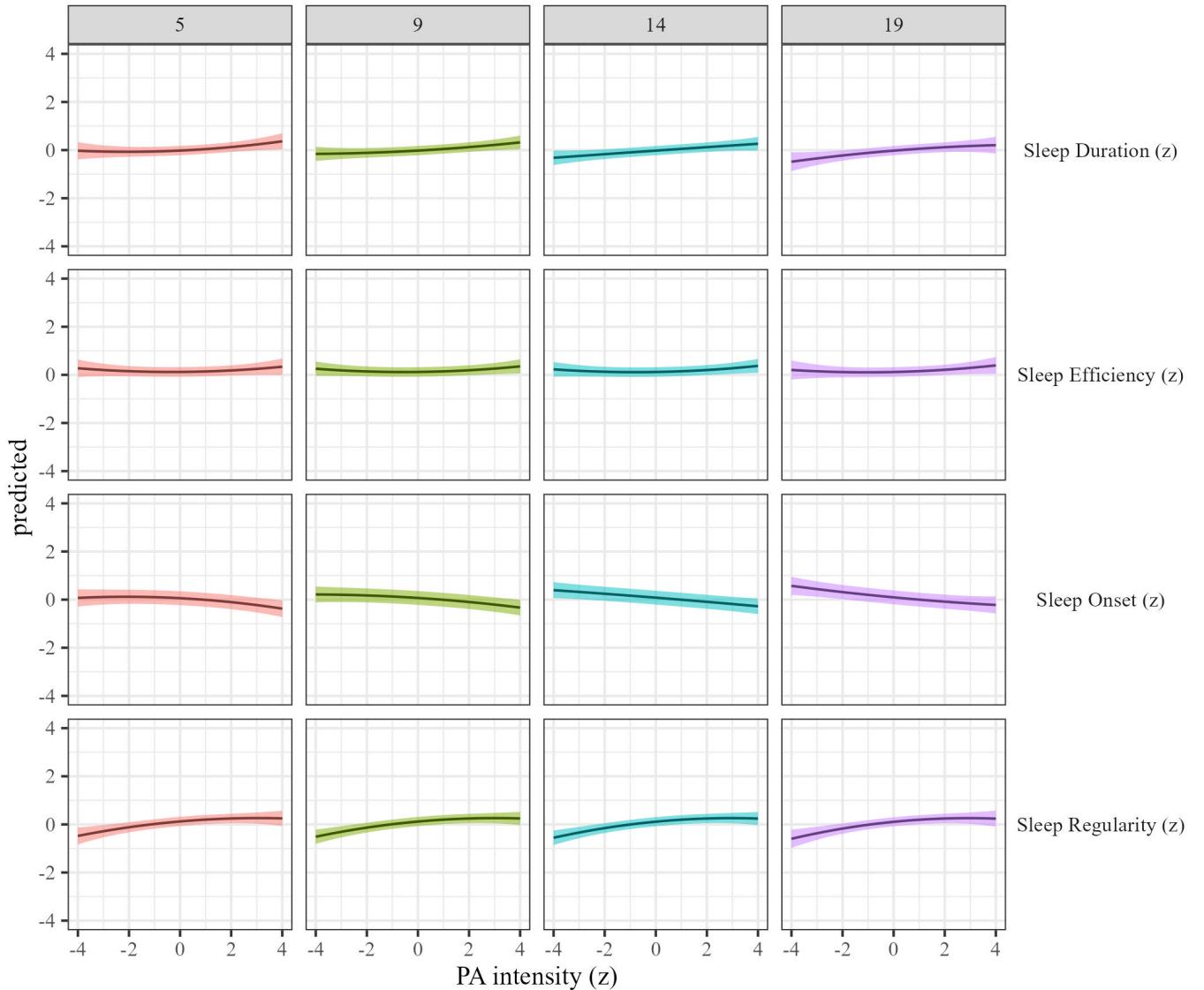


Figure 61. Sleep metrics on Physical activity intensity moderated by most active hour

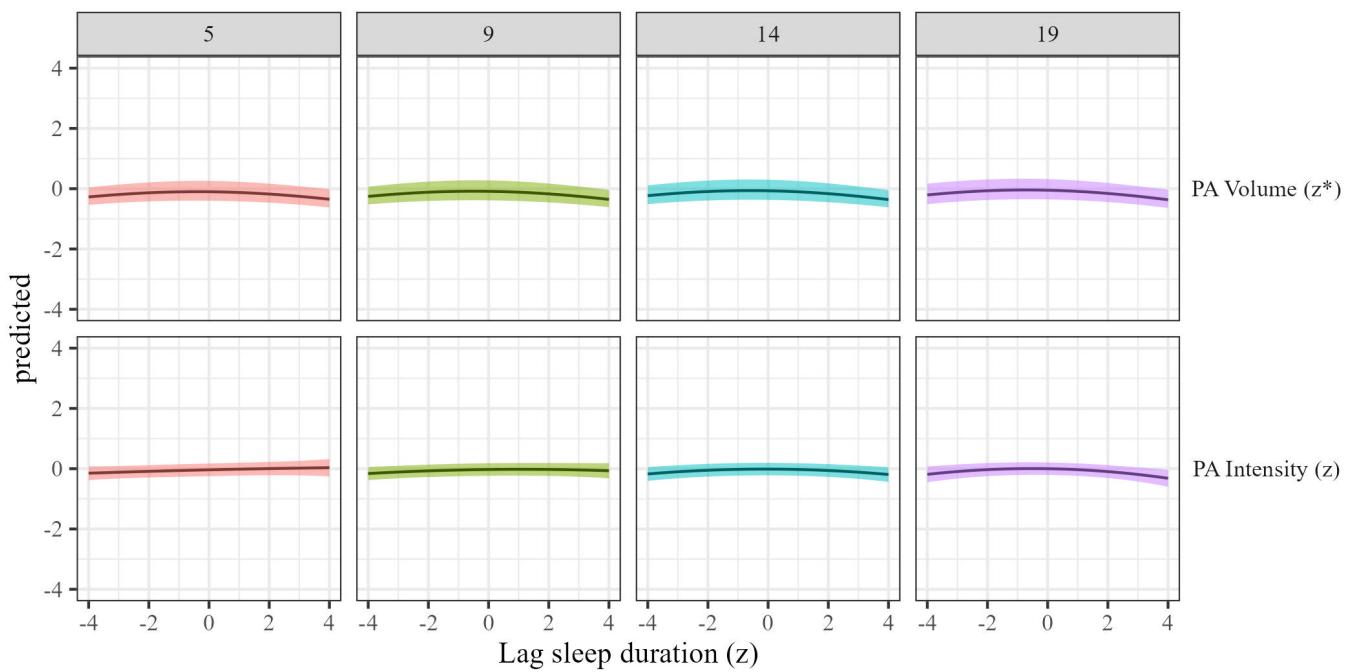


Figure 62. Physical activity by sleep duration moderated by most active hour

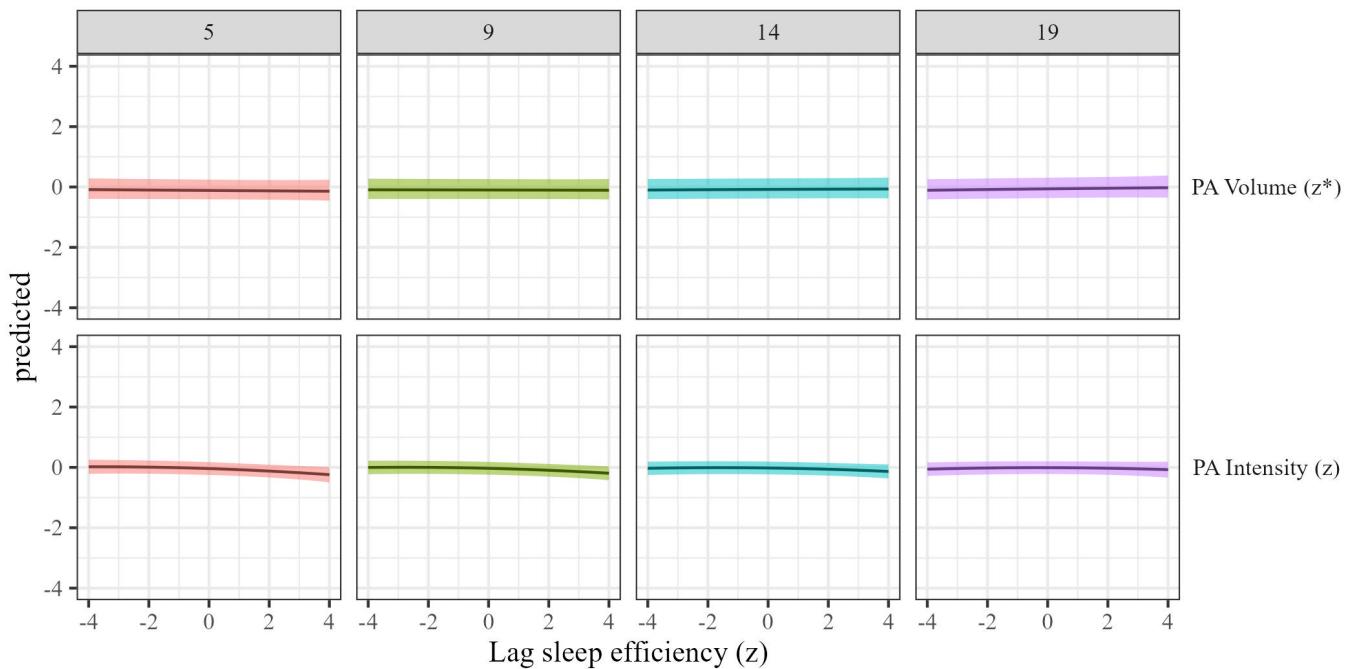


Figure 63. Physical activity by sleep efficiency moderated by most active hour

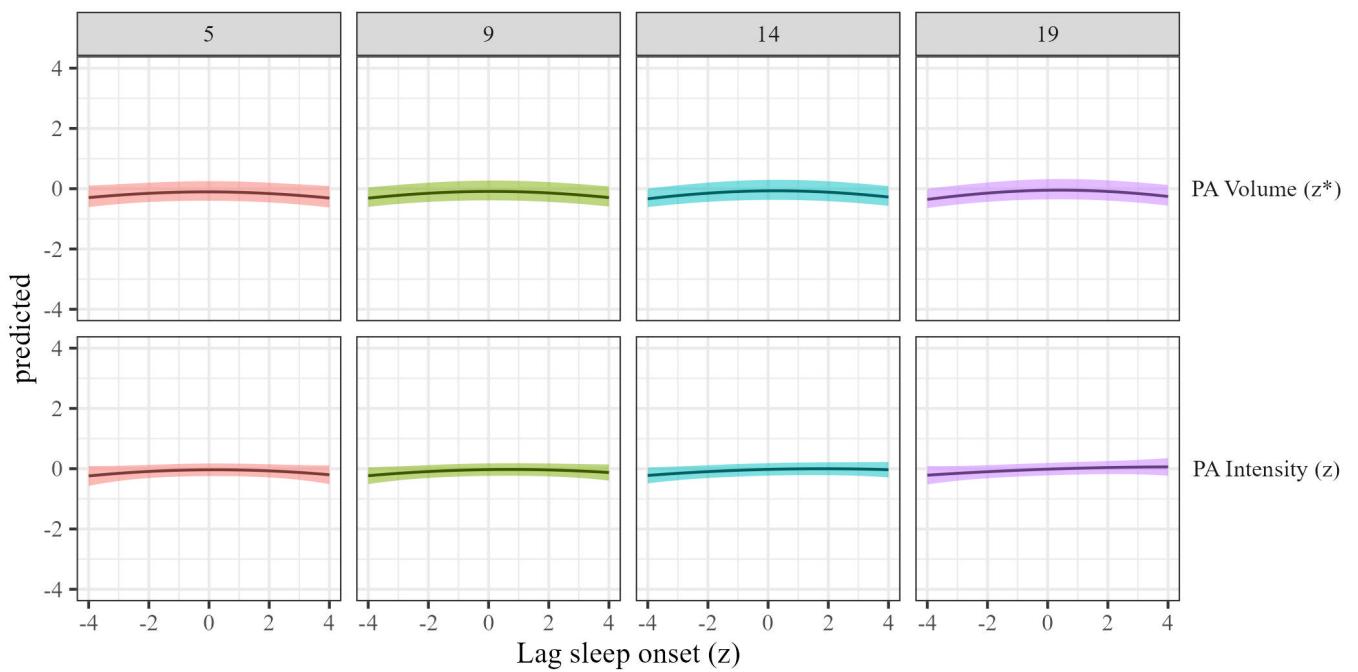


Figure 64. Physical activity by sleep onset moderated by most active hour

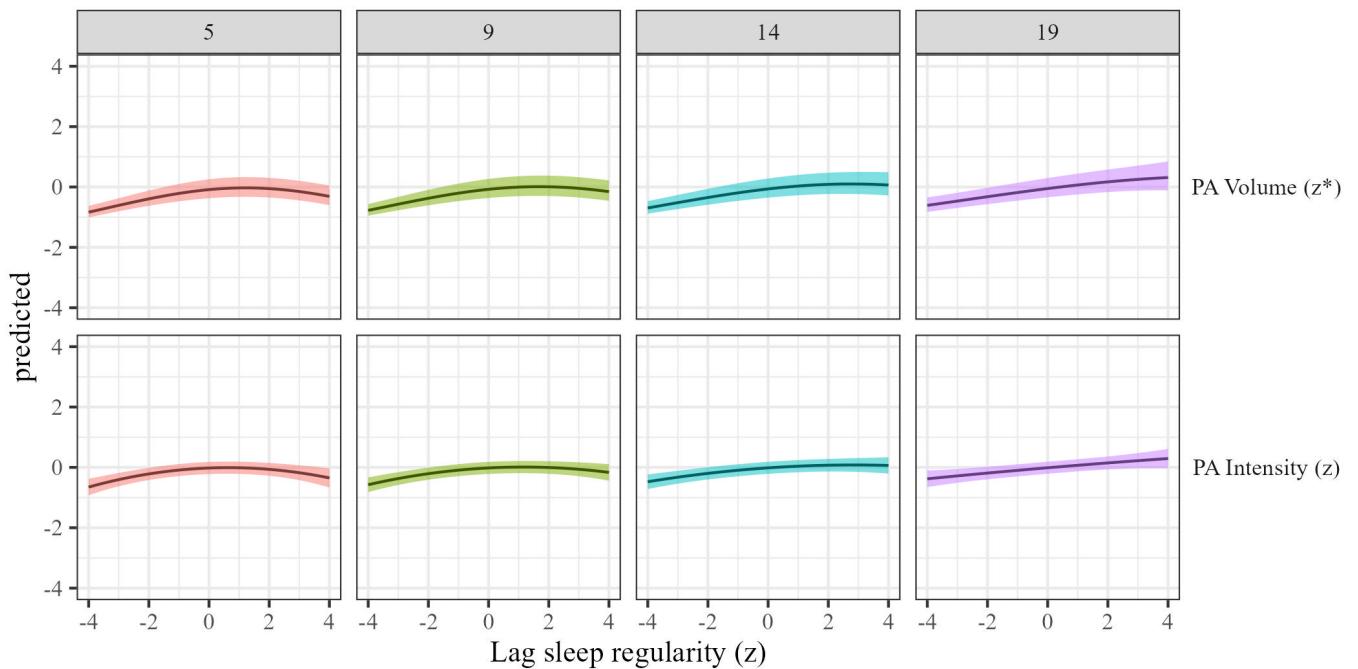


Figure 65. Physical activity by sleep regularity moderated by most active hour