

## Multiverse analysis

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

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### Abstract

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

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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.

## Log Transforming PA Volume

Based on preliminary modelling on a subset of the data, we chose to leave physical activity volume in its natural form to enhance interpretability. The log scale meant that the variable became unintepretable towards the edge of its range. 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 associated figures are back-transformed to the scale range.

**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.

**ethnicity**

**The effects of physical activity volume on sleep by ethnicity.** 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 ethnicity, and the results are presented in Table 24 and Figure 66

**The effects of physical activity intensity on sleep by ethnicity.** We estimated how physical activity intensity affects sleep across ethnicity. We present the results in Table 24 and Figure 67.

**The effects of sleep duration on physical activity.** We estimated the effect of sleep duration on physical activity by ethnicity. Results, controlling for sex, SES, and BMI are presented in Table 25 and Figure 68.

**The effects of sleep efficiency on physical activity.** We estimated the effect of sleep efficiency on physical activity by ethnicity. Results, controlling for sex, SES, and BMI are presented in Table 25 and Figure 69.

**The effects of sleep onset on physical activity.** We estimated the effect of sleep onset on physical activity by ethnicity. Results, controlling for sex, SES, and BMI are presented in Table 25 and Figure 70.

**The effects of sleep regularity on physical activity.** We estimated the effect of sleep regularity on physical activity by ethnicity. Results are presented in Table 25 and Figure 71.

Table 1

*Model diagnostics*

Model name	Skewness	Kurtosis	Converged (%)
Models moderated by age			
Scale sleep duration by PA volume	0.10	2.65	100.00%
Scale sleep efficiency by PA volume	-0.90	3.40	100.00%
Scale sleep onset by PA volume	0.25	6.90	100.00%
Scale sleep regularity by PA volume	-0.66	1.42	100.00%
Scale sleep duration by PA intensity	0.10	2.65	100.00%
Scale sleep efficiency by PA intensity	-0.90	3.39	100.00%
Scale sleep onset by PA intensity	0.25	6.78	100.00%
Scale sleep regularity by PA intensity	-0.67	1.43	100.00%
Scale PA volume by sleep duration(lagged)	0.90	7.92	100.00%
Scale PA intensity by sleep duration(lagged)	0.19	2.55	100.00%
Scale PA volume by sleep efficiency(lagged)	0.89	7.93	100.00%
Scale PA intensity by sleep efficiency(lagged)	0.19	2.53	100.00%
Scale PA volume by sleep onset(lagged)	0.90	7.89	100.00%
Scale PA intensity by sleep onset(lagged)	0.19	2.54	100.00%
Scale PA volume by sleep regularity(lagged)	0.92	8.01	100.00%
Scale PA intensity by sleep regularity(lagged)	0.22	2.50	100.00%
Models moderated by age fixeddef			
Scale sleep duration by PA volume	0.10	2.65	100.00%
Scale sleep efficiency by PA volume	-0.89	3.39	100.00%
Scale sleep onset by PA volume	0.25	6.90	100.00%
Scale sleep regularity by PA volume	-0.66	1.43	100.00%
Scale sleep duration by PA intensity	0.10	2.65	100.00%
Scale sleep efficiency by PA intensity	-0.89	3.38	100.00%
Scale sleep onset by PA intensity	0.25	6.79	100.00%
Scale sleep regularity by PA intensity	-0.66	1.43	100.00%
Scale PA volume by sleep duration(lagged)	0.90	7.92	100.00%
Scale PA intensity by sleep duration(lagged)	0.20	2.55	100.00%
Scale PA volume by sleep efficiency(lagged)	0.89	7.92	100.00%
Scale PA intensity by sleep efficiency(lagged)	0.19	2.53	100.00%
Scale PA volume by sleep onset(lagged)	0.89	7.89	100.00%
Scale PA intensity by sleep onset(lagged)	0.19	2.54	100.00%
Scale PA volume by sleep regularity(lagged)	0.91	8.01	100.00%
Scale PA intensity by sleep regularity(lagged)	0.22	2.50	100.00%

Table 1 continued

Model name		Skewness	Kurtosis	Converged (%)
Models moderated by age log				
Scale sleep duration by log PA volume	0.10	2.64	100.00%	
Scale sleep efficiency by log PA volume	-0.90	3.42	100.00%	
Scale sleep onset by log PA volume	0.24	6.93	100.00%	
Scale sleep regularity by log PA volume	-0.66	1.45	100.00%	
Scale sleep duration by PA intensity	0.10	2.65	100.00%	
Scale sleep efficiency by PA intensity	-0.90	3.39	100.00%	
Scale sleep onset by PA intensity	0.25	6.78	100.00%	
Scale sleep regularity by PA intensity	-0.67	1.43	100.00%	
Log PA volume by sleep duration(lagged)	-0.44	2.34	100.00%	
Scale PA intensity by sleep duration(lagged)	0.19	2.55	100.00%	
Log PA volume by sleep efficiency(lagged)	-0.45	2.36	100.00%	
Scale PA intensity by sleep efficiency(lagged)	0.19	2.53	100.00%	
Log PA volume by sleep onset(lagged)	-0.45	2.35	100.00%	
Scale PA intensity by sleep onset(lagged)	0.19	2.54	100.00%	
Log PA volume by sleep regularity(lagged)	-0.39	2.22	100.00%	
Scale PA intensity by sleep regularity(lagged)	0.22	2.50	100.00%	
Models moderated by bmi				
Scale sleep duration by PA volume	0.10	2.66	100.00%	
Scale sleep efficiency by PA volume	-0.90	3.40	100.00%	
Scale sleep onset by PA volume	0.25	6.91	100.00%	
Scale sleep regularity by PA volume	-0.66	1.43	100.00%	
Scale sleep duration by PA intensity	0.09	2.64	100.00%	
Scale sleep efficiency by PA intensity	-0.90	3.40	100.00%	
Scale sleep onset by PA intensity	0.25	6.77	100.00%	
Scale sleep regularity by PA intensity	-0.67	1.42	100.00%	
Scale PA volume by sleep duration(lagged)	0.90	7.92	100.00%	
Scale PA intensity by sleep duration(lagged)	0.20	2.56	100.00%	
Scale PA volume by sleep efficiency(lagged)	0.89	7.93	100.00%	
Scale PA intensity by sleep efficiency(lagged)	0.19	2.54	100.00%	
Scale PA volume by sleep onset(lagged)	0.90	7.91	100.00%	
Scale PA intensity by sleep onset(lagged)	0.19	2.54	100.00%	
Scale PA volume by sleep regularity(lagged)	0.91	8.02	100.00%	
Scale PA intensity by sleep regularity(lagged)	0.21	2.52	100.00%	
Models moderated by ses				

Table 1 continued

Model name	Skewness	Kurtosis	Converged (%)
Scale sleep duration by PA volume	0.10	2.65	100.00%
Scale sleep efficiency by PA volume	-0.90	3.39	100.00%
Scale sleep onset by PA volume	0.25	6.93	100.00%
Scale sleep regularity by PA volume	-0.66	1.43	100.00%
Scale sleep duration by PA intensity	0.10	2.65	100.00%
Scale sleep efficiency by PA intensity	-0.90	3.39	100.00%
Scale sleep onset by PA intensity	0.25	6.78	100.00%
Scale sleep regularity by PA intensity	-0.67	1.41	100.00%
Scale PA volume by sleep duration(lagged)	0.90	7.93	100.00%
Scale PA intensity by sleep duration(lagged)	0.19	2.54	100.00%
Scale PA volume by sleep efficiency(lagged)	0.89	7.92	100.00%
Scale PA intensity by sleep efficiency(lagged)	0.19	2.54	100.00%
Scale PA volume by sleep onset(lagged)	0.89	7.88	100.00%
Scale PA intensity by sleep onset(lagged)	0.19	2.54	100.00%
Scale PA volume by sleep regularity(lagged)	0.91	8.01	100.00%
Scale PA intensity by sleep regularity(lagged)	0.21	2.51	100.00%
Models moderated by weekday			
Scale sleep duration by PA volume	0.08	2.63	100.00%
Scale sleep efficiency by PA volume	-0.89	3.41	100.00%
Scale sleep onset by PA volume	0.22	7.04	100.00%
Scale sleep regularity by PA volume	-0.70	1.66	100.00%
Scale sleep duration by PA intensity	0.08	2.64	100.00%
Scale sleep efficiency by PA intensity	-0.89	3.40	100.00%
Scale sleep onset by PA intensity	0.21	6.80	100.00%
Scale sleep regularity by PA intensity	-0.71	1.71	100.00%
Scale PA volume by sleep duration(lagged)	0.95	8.15	100.00%
Scale PA intensity by sleep duration(lagged)	0.25	2.63	100.00%
Scale PA volume by sleep efficiency(lagged)	0.94	8.17	100.00%
Scale PA intensity by sleep efficiency(lagged)	0.25	2.70	100.00%
Scale PA volume by sleep onset(lagged)	0.95	8.16	100.00%
Scale PA intensity by sleep onset(lagged)	0.25	2.69	100.00%
Scale PA volume by sleep regularity(lagged)	0.96	8.24	100.00%
Scale PA intensity by sleep regularity(lagged)	0.26	2.62	100.00%
Models moderated by season			
Scale sleep duration by PA volume	0.10	2.65	100.00%

Table 1 continued

Model name	Skewness	Kurtosis	Converged (%)
Scale sleep efficiency by PA volume	-0.90	3.40	100.00%
Scale sleep onset by PA volume	0.25	6.92	100.00%
Scale sleep regularity by PA volume	-0.66	1.43	100.00%
Scale sleep duration by PA intensity	0.10	2.63	100.00%
Scale sleep efficiency by PA intensity	-0.90	3.40	100.00%
Scale sleep onset by PA intensity	0.25	6.76	100.00%
Scale sleep regularity by PA intensity	-0.66	1.42	100.00%
Scale PA volume by sleep duration(lagged)	0.90	7.90	100.00%
Scale PA intensity by sleep duration(lagged)	0.20	2.55	100.00%
Scale PA volume by sleep efficiency(lagged)	0.89	7.91	100.00%
Scale PA intensity by sleep efficiency(lagged)	0.19	2.54	100.00%
Scale PA volume by sleep onset(lagged)	0.89	7.87	100.00%
Scale PA intensity by sleep onset(lagged)	0.19	2.55	100.00%
Scale PA volume by sleep regularity(lagged)	0.91	8.00	100.00%
Scale PA intensity by sleep regularity(lagged)	0.21	2.53	100.00%
Models moderated by region			
Scale sleep duration by PA volume	0.10	2.66	100.00%
Scale sleep efficiency by PA volume	-0.90	3.46	100.00%
Scale sleep onset by PA volume	0.24	6.92	100.00%
Scale sleep regularity by PA volume	-0.66	1.44	100.00%
Scale sleep duration by PA intensity	0.10	2.63	100.00%
Scale sleep efficiency by PA intensity	-0.89	3.39	100.00%
Scale sleep onset by PA intensity	0.24	6.77	100.00%
Scale sleep regularity by PA intensity	-0.66	1.40	100.00%
Scale PA volume by sleep duration(lagged)	0.90	7.94	100.00%
Scale PA intensity by sleep duration(lagged)	0.19	2.56	100.00%
Scale PA volume by sleep efficiency(lagged)	0.90	7.96	100.00%
Scale PA intensity by sleep efficiency(lagged)	0.19	2.54	100.00%
Scale PA volume by sleep onset(lagged)	0.90	7.92	100.00%
Scale PA intensity by sleep onset(lagged)	0.19	2.55	100.00%
Scale PA volume by sleep regularity(lagged)	0.92	8.05	100.00%
Scale PA intensity by sleep regularity(lagged)	0.21	2.54	100.00%
Models moderated by daylight			
Scale sleep duration by PA volume	0.10	2.66	100.00%
Scale sleep efficiency by PA volume	-0.90	3.41	100.00%

Table 1 continued

Model name	Skewness	Kurtosis	Converged (%)
Scale sleep onset by PA volume	0.25	6.92	100.00%
Scale sleep regularity by PA volume	-0.66	1.43	100.00%
Scale sleep duration by PA intensity	0.10	2.65	100.00%
Scale sleep efficiency by PA intensity	-0.90	3.40	100.00%
Scale sleep onset by PA intensity	0.25	6.76	100.00%
Scale sleep regularity by PA intensity	-0.67	1.42	100.00%
Scale PA volume by sleep duration(lagged)	0.90	7.92	100.00%
Scale PA intensity by sleep duration(lagged)	0.20	2.56	100.00%
Scale PA volume by sleep efficiency(lagged)	0.89	7.93	100.00%
Scale PA intensity by sleep efficiency(lagged)	0.19	2.54	100.00%
Scale PA volume by sleep onset(lagged)	0.89	7.90	100.00%
Scale PA intensity by sleep onset(lagged)	0.19	2.54	100.00%
Scale PA volume by sleep regularity(lagged)	0.91	8.02	100.00%
Scale PA intensity by sleep regularity(lagged)	0.21	2.52	100.00%
Models moderated by wear location			
Scale sleep duration by PA volume	0.10	2.66	100.00%
Scale sleep efficiency by PA volume	-0.89	3.43	100.00%
Scale sleep onset by PA volume	0.25	6.92	100.00%
Scale sleep regularity by PA volume	-0.66	1.44	100.00%
Scale sleep duration by PA intensity	0.10	2.65	100.00%
Scale sleep efficiency by PA intensity	-0.89	3.37	100.00%
Scale sleep onset by PA intensity	0.25	6.74	100.00%
Scale sleep regularity by PA intensity	-0.67	1.43	100.00%
Scale PA volume by sleep duration(lagged)	0.90	7.93	100.00%
Scale PA intensity by sleep duration(lagged)	0.20	2.54	100.00%
Scale PA volume by sleep efficiency(lagged)	0.90	7.94	100.00%
Scale PA intensity by sleep efficiency(lagged)	0.19	2.52	100.00%
Scale PA volume by sleep onset(lagged)	0.90	7.90	100.00%
Scale PA intensity by sleep onset(lagged)	0.19	2.54	100.00%
Scale PA volume by sleep regularity(lagged)	0.91	8.03	100.00%
Scale PA intensity by sleep regularity(lagged)	0.23	2.49	100.00%
Models moderated by PA mostactivehr			
Scale sleep duration by PA volume	0.10	2.66	100.00%
Scale sleep efficiency by PA volume	-0.89	3.39	100.00%
Scale sleep onset by PA volume	0.25	6.89	100.00%

Table 1 continued

Model name	Skewness	Kurtosis	Converged (%)
Scale sleep regularity by PA volume	-0.66	1.42	100.00%
Scale sleep duration by PA intensity	0.10	2.65	100.00%
Scale sleep efficiency by PA intensity	-0.90	3.40	100.00%
Scale sleep onset by PA intensity	0.25	6.75	100.00%
Scale sleep regularity by PA intensity	-0.66	1.41	100.00%
Scale PA volume by sleep duration(lagged)	0.90	7.94	100.00%
Scale PA intensity by sleep duration(lagged)	0.19	2.55	100.00%
Scale PA volume by sleep efficiency(lagged)	0.89	7.94	100.00%
Scale PA intensity by sleep efficiency(lagged)	0.19	2.53	100.00%
Scale PA volume by sleep onset(lagged)	0.89	7.92	100.00%
Scale PA intensity by sleep onset(lagged)	0.19	2.54	100.00%
Scale PA volume by sleep regularity(lagged)	0.91	8.03	100.00%
Scale PA intensity by sleep regularity(lagged)	0.21	2.51	100.00%

Table 2

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

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)	0.84 [0.69, 0.98]	0.07	11.30	< .001	0.74 [0.60, 0.89]	0.07	10.16	< .001
Physical activity	0.11 [0.06, 0.15]	0.02	4.67	< .001	0.08 [0.03, 0.13]	0.03	3.25	.002
Age	0.00 [-0.01, 0.00]	0.00	-0.88	.379	0.00 [-0.01, 0.00]	0.00	-0.69	.494
Physical activity <sup>2</sup>	-0.01 [-0.02, 0.00]	0.01	-1.81	.071	0.02 [-0.01, 0.04]	0.01	1.31	.191
Physical activity × age	0.00 [0.00, 0.00]	0.00	-0.49	.628	0.00 [0.00, 0.00]	0.00	-1.22	.226
Age × Physical activity <sup>2</sup>	0.00 [0.00, 0.00]	0.00	-0.79	.431	0.00 [0.00, 0.00]	0.00	-2.09	.037
<b>Sleep efficiency (z)</b>								
(Intercept)	-0.36 [-0.51, -0.21]	0.08	-4.62	< .001	-0.41 [-0.57, -0.26]	0.08	-5.40	< .001
Physical activity	0.11 [0.06, 0.16]	0.03	4.52	< .001	0.05 [0.00, 0.09]	0.02	1.91	.058
Age	0.00 [0.00, 0.00]	0.00	-0.02	.985	0.00 [0.00, 0.00]	0.00	-0.05	.964
Physical activity <sup>2</sup>	-0.03 [-0.04, -0.01]	0.01	-4.47	< .001	-0.02 [-0.05, 0.01]	0.01	-1.54	.124
Physical activity × age	0.00 [0.00, 0.00]	0.00	-3.28	.002	0.00 [0.00, 0.00]	0.00	-1.33	.187
Age × Physical activity <sup>2</sup>	0.00 [0.00, 0.00]	0.00	2.97	.003	0.00 [0.00, 0.00]	0.00	1.02	.308
<b>Sleep onset (z)</b>								
(Intercept)	-1.10 [-1.21, -0.99]	0.06	-19.58	< .001	-1.05 [-1.16, -0.94]	0.06	-18.76	< .001
Physical activity	0.00 [-0.03, 0.03]	0.02	0.08	.939	-0.05 [-0.09, -0.02]	0.02	-3.07	.003
Age	0.00 [0.00, 0.00]	0.00	0.31	.762	0.00 [0.00, 0.00]	0.00	-0.12	.903
Physical activity <sup>2</sup>	-0.01 [-0.01, 0.00]	0.00	-1.53	.131	-0.02 [-0.04, 0.00]	0.01	-2.45	.014
Physical activity × age	0.00 [0.00, 0.00]	0.00	-4.87	< .001	0.00 [0.00, 0.00]	0.00	-0.32	.749
Age × Physical activity <sup>2</sup>	0.00 [0.00, 0.00]	0.00	3.88	< .001	0.00 [0.00, 0.00]	0.00	3.43	< .001
<b>Sleep regularity (z)</b>								

Table 2 continued

Term	Physical activity volume (z)				Physical activity intensity (z)			
	$\beta$ [95% CI]	SE	t	p	$\beta$ [95% CI]	SE	t	p
(Intercept)	0.19 [0.04, 0.35]	0.08	2.50	.014	0.10 [-0.06, 0.26]	0.08	1.20	.236
Physical activity	0.22 [0.18, 0.27]	0.02	9.61	< .001	0.26 [0.21, 0.31]	0.03	9.83	< .001
Age	0.00 [0.00, 0.00]	0.00	0.35	.728	0.00 [-0.01, 0.00]	0.00	-0.72	.480
Physical activity <sup>2</sup>	-0.03 [-0.05, -0.02]	0.01	-5.91	< .001	-0.11 [-0.14, -0.08]	0.02	-7.23	< .001
Physical activity × age	0.00 [0.00, 0.00]	0.00	0.23	.818	0.00 [0.00, 0.00]	0.00	-6.28	< .001
Age × Physical activity <sup>2</sup>	0.00 [0.00, 0.00]	0.00	-1.01	.319	0.00 [0.00, 0.00]	0.00	2.92	.008

*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 (z)			Physical activity intensity (z)					
	$\beta$	[95% CI]	SE	t	p	$\beta$ [95% CI]	SE	t	p
<b>Sleep duration (z)</b>									
(Intercept)	0.13	[0.02, 0.27]	0.08	1.67	.103	0.99	[0.85, 1.13]	0.07	13.82 < .001
Sleep duration	0.01	[-0.01, 0.04]	0.01	1.00	.320	0.01	[-0.01, 0.04]	0.01	1.20 .238
Age	-0.02	[-0.03, -0.01]	0.00	-4.31	.022	-0.02	[-0.03, -0.01]	0.00	-4.19 .033
Sleep duration <sup>2</sup>	-0.01	[-0.03, 0.00]	0.01	-2.17	.053	0.00	[-0.02, 0.01]	0.01	-0.52 .619
Sleep duration × age	0.00	[0.00, 0.00]	0.00	-1.94	.054	0.00	[0.00, 0.00]	0.00	-0.26 .794
Age × Sleep duration <sup>2</sup>	0.00	[0.00, 0.00]	0.00	-0.66	.511	0.00	[0.00, 0.00]	0.00	-0.41 .690
<b>Sleep efficiency (z)</b>									
(Intercept)	0.12	[-0.02, 0.26]	0.07	1.64	.105	1.00	[0.87, 1.13]	0.07	15.01 < .001
Sleep efficiency	0.00	[-0.03, 0.03]	0.01	0.01	.992	0.01	[-0.01, 0.04]	0.01	0.91 .365
Age	-0.02	[-0.03, -0.01]	0.00	-4.38	.020	-0.02	[-0.03, -0.01]	0.00	-4.26 .031
Sleep efficiency <sup>2</sup>	0.00	[-0.01, 0.00]	0.00	-0.75	.457	0.00	[0.00, 0.01]	0.00	0.51 .614
Sleep efficiency × age	0.00	[0.00, 0.00]	0.00	-0.25	.803	0.00	[0.00, 0.00]	0.00	-0.41 .683
Age × Sleep efficiency <sup>2</sup>	0.00	[0.00, 0.00]	0.00	-0.13	.896	0.00	[0.00, 0.00]	0.00	0.09 .927
<b>Sleep onset (z)</b>									
(Intercept)	0.09	[-0.07, 0.25]	0.08	1.12	.276	0.98	[0.83, 1.13]	0.08	12.72 < .001
Sleep onset	-0.04	[-0.09, 0.00]	0.02	-1.91	.108	-0.02	[-0.06, 0.01]	0.02	-1.30 .233
Age	-0.02	[-0.03, -0.01]	0.00	-4.39	.020	-0.02	[-0.03, -0.01]	0.00	-4.29 .030
Sleep onset <sup>2</sup>	-0.01	[-0.03, 0.01]	0.01	-0.84	.406	0.00	[-0.02, 0.02]	0.01	0.22 .823
Sleep onset × age	0.00	[0.00, 0.00]	0.00	1.87	.092	0.00	[0.00, 0.00]	0.00	1.53 .142
Age × Sleep onset <sup>2</sup>	0.00	[0.00, 0.00]	0.00	-0.25	.808	0.00	[0.00, 0.00]	0.00	-0.26 .792
Sleep regularity (z)									

Table 3 continued

Term	Physical activity volume (z)				Physical activity intensity (z)					
	$\beta$	[95% CI]	SE	t	p	$\beta$	[95% CI]	SE	t	p
(Intercept)	0.12	[-0.03, 0.26]	0.07	1.59	.117	1.00	[0.87, 1.13]	0.07	14.90	< .001
Sleep regularity	0.11	[0.07, 0.14]	0.02	5.82	.003	0.07	[0.05, 0.10]	0.01	6.38	< .001
Age	-0.02	[-0.03, -0.01]	0.00	-4.39	.019	-0.02	[-0.03, -0.01]	0.00	-4.28	.030
Sleep regularity <sup>2</sup>	0.01	[-0.01, 0.02]	0.01	0.67	.515	0.00	[-0.01, 0.02]	0.01	0.51	.623
Sleep regularity × age	0.00	[0.00, 0.00]	0.00	-3.42	.011	0.00	[0.00, 0.00]	0.00	-3.24	.018
Age × Sleep regularity <sup>2</sup>	0.00	[0.00, 0.00]	0.00	-0.96	.359	0.00	[0.00, 0.00]	0.00	-0.62	.543

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

*Physical activity predicting sleep controlling for SES, 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)	0.07 [-0.71, 0.84]	0.39	0.17	.863	0.21 [-0.01, 0.43]	0.11	1.88	.061
Log pa volume	-0.10 [-0.52, 0.32]	0.21	-0.48	.635	0.09 [0.04, 0.14]	0.03	3.34	.002
Age	-0.02 [-0.04, 0.00]	0.01	-2.26	.024	0.00 [-0.01, 0.00]	0.00	-1.76	.090
Log pa volume <sup>2</sup>	0.04 [-0.02, 0.10]	0.03	1.29	.199	0.02 [-0.01, 0.04]	0.01	1.21	.226
Log pa volume × age	0.01 [0.00, 0.02]	0.01	2.03	.042	0.00 [0.00, 0.00]	0.00	-1.30	.198
Age × log pa volume <sup>2</sup>	0.00 [0.00, 0.00]	0.00	-2.08	.037	0.00 [0.00, 0.00]	0.00	-1.98	.048
Sleep efficiency (z)								
(Intercept)	-1.91 [-2.70, -1.12]	0.40	-4.72	< .001	0.27 [0.03, 0.52]	0.13	2.18	.029
Log pa volume	1.05 [0.62, 1.48]	0.22	4.79	< .001	0.04 [0.00, 0.09]	0.02	1.84	.067
Age	0.03 [0.01, 0.05]	0.01	2.69	.007	0.00 [0.00, 0.01]	0.00	0.92	.360
Log pa volume <sup>2</sup>	-0.12 [-0.18, -0.06]	0.03	-3.95	< .001	-0.02 [0.05, 0.01]	0.01	-1.41	.160
Log pa volume × age	-0.01 [-0.02, 0.00]	0.01	-2.01	.044	0.00 [0.00, 0.00]	0.00	-1.26	.211
Age × log pa volume <sup>2</sup>	0.00 [0.00, 0.00]	0.00	1.51	.131	0.00 [0.00, 0.00]	0.00	0.88	.377
Sleep onset (z)								
(Intercept)	-0.98 [-1.61, -0.35]	0.32	-3.04	.003	-0.01 [-0.29, 0.27]	0.14	-0.07	.947
Log pa volume	0.54 [0.23, 0.86]	0.16	3.38	< .001	-0.05 [-0.09, -0.02]	0.02	-3.09	.003
Age	0.04 [0.02, 0.05]	0.01	4.75	< .001	0.00 [0.00, 0.00]	0.00	0.30	.763
Log pa volume <sup>2</sup>	-0.08 [-0.12, -0.03]	0.02	-3.44	< .001	-0.02 [-0.04, 0.00]	0.01	-2.40	.016
Log pa volume × age	-0.02 [-0.03, -0.01]	0.00	-4.01	< .001	0.00 [0.00, 0.00]	0.00	-0.29	.772
Age × log pa volume <sup>2</sup>	0.00 [0.00, 0.00]	0.00	3.34	< .001	0.00 [0.00, 0.00]	0.00	3.38	< .001
Sleep regularity (z)								

Table 4 continued

Term	Physical activity volume (ln)				Physical activity intensity (z)					
	$\beta$	[95% CI]	SE	t	p	$\beta$	[95% CI]	SE	t	p
(Intercept)	-2.61	[-3.49, -1.73]	0.45	-5.79	< .001	0.55	[0.32, 0.78]	0.12	4.75	< .001
Log pa volume	1.34	[0.86, 1.83]	0.25	5.44	< .001	0.26	[0.21, 0.31]	0.03	9.84	< .001
Age	-0.02	[-0.04, 0.00]	0.01	-1.68	.997	0.00	[0.00, 0.00]	0.00	-0.17	.868
Log pa volume <sup>2</sup>	-0.14	[-0.20, -0.07]	0.03	-3.94	< .001	-0.11	[-0.14, -0.08]	0.02	-7.04	< .001
Log pa volume × age	0.01	[0.00, 0.03]	0.01	1.87	.065	0.00	[0.00, 0.00]	0.00	-6.20	< .001
Age × log pa volume <sup>2</sup>	0.00	[0.00, 0.00]	0.00	-1.92	.057	0.00	[0.00, 0.00]	0.00	2.77	.011

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

Table 5

*Sleep predicting physical activity controlling for SES, 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)	4.21	[4.02, 4.39]	0.09	45.06	< .001	1.27	[1.03, 1.52]	0.12	10.19	< .001
Sleep duration	0.01	[0.00, 0.02]	0.01	1.49	.137	0.02	[-0.01, 0.04]	0.01	1.20	.237
Age	-0.01	[-0.01, 0.00]	0.00	-3.75	.036	-0.02	[-0.03, -0.01]	0.00	-5.32	.017
Sleep duration <sup>2</sup>	-0.01	[-0.01, 0.00]	0.00	-2.22	.026	0.00	[-0.02, 0.01]	0.01	-0.54	.603
Sleep duration × age	0.00	[0.00, 0.00]	0.00	-2.83	.005	0.00	[0.00, 0.00]	0.00	-0.26	.792
Age × Sleep duration <sup>2</sup>	0.00	[0.00, 0.00]	0.00	-2.61	.009	0.00	[0.00, 0.00]	0.00	-0.39	.706
Sleep efficiency (z)										
(Intercept)	4.20	[4.02, 4.38]	0.09	45.23	< .001	1.27	[1.03, 1.51]	0.12	10.42	< .001
Sleep efficiency	0.01	[0.00, 0.03]	0.01	1.98	.048	0.01	[-0.01, 0.04]	0.01	0.94	.351
Age	-0.01	[-0.01, 0.00]	0.00	-3.86	.032	-0.02	[-0.03, -0.01]	0.00	-5.41	.016
Sleep efficiency <sup>2</sup>	0.00	[0.00, 0.00]	0.00	-0.12	.907	0.00	[0.00, 0.01]	0.00	0.51	.611
Sleep efficiency × age	0.00	[0.00, 0.00]	0.00	-1.61	.106	0.00	[0.00, 0.00]	0.00	-0.43	.667
Age × Sleep efficiency <sup>2</sup>	0.00	[0.00, 0.00]	0.00	-0.43	.670	0.00	[0.00, 0.00]	0.00	0.09	.931
Sleep onset (z)										
(Intercept)	4.20	[4.02, 4.39]	0.09	44.59	< .001	1.27	[1.02, 1.51]	0.12	10.15	< .001
Sleep onset	-0.01	[-0.03, 0.01]	0.01	-1.16	.265	-0.02	[-0.06, 0.01]	0.02	-1.25	.248
Age	-0.01	[-0.01, 0.00]	0.00	-3.82	.034	-0.02	[-0.03, -0.01]	0.00	-5.41	.016
Sleep onset <sup>2</sup>	0.00	[-0.01, 0.01]	0.00	-0.66	.511	0.00	[-0.02, 0.02]	0.01	0.20	.844
Sleep onset × age	0.00	[0.00, 0.00]	0.00	1.59	.124	0.00	[0.00, 0.00]	0.00	1.48	.152
Age × Sleep onset <sup>2</sup>	0.00	[0.00, 0.00]	0.00	-1.12	.263	0.00	[0.00, 0.00]	0.00	-0.23	.815
Sleep regularity (z)										

Table 5 continued

Term	Physical activity volume (ln)				Physical activity intensity (z)					
	$\beta$	[95% CI]	SE	t	p	$\beta$	[95% CI]	SE	t	p
(Intercept)	4.18	[4.00, 4.36]	0.09	45.77	< .001	1.25	[1.02, 1.49]	0.12	10.39	< .001
Sleep regularity	0.06	[0.05, 0.08]	0.01	9.31	< .001	0.07	[0.05, 0.10]	0.01	6.43	< .001
Age	-0.01	[-0.01, 0.00]	0.00	-3.92	.030	-0.02	[-0.03, -0.01]	0.00	-5.55	.014
Sleep regularity <sup>2</sup>	0.00	[-0.01, 0.01]	0.00	-0.62	.549	0.00	[-0.01, 0.02]	0.01	0.54	.605
Sleep regularity × age	0.00	[0.00, 0.00]	0.00	-4.29	.001	0.00	[0.00, 0.00]	0.00	-3.27	.017
Age × Sleep regularity <sup>2</sup>	0.00	[0.00, 0.00]	0.00	-0.37	.721	0.00	[0.00, 0.00]	0.00	-0.64	.530

*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 (z)				Physical activity intensity (z)			
	$\beta$ [95% CI]	SE	t	p	$\beta$ [95% CI]	SE	t	p
<i>Sleep duration (z)</i>								
(Intercept)	0.26 [0.03, 0.50]	0.12	2.18	.030	0.24 [0.01, 0.46]	0.11	2.08	.038
Physical activity	0.17 [0.07, 0.26]	0.05	3.49	< .001	0.12 [0.04, 0.20]	0.04	2.93	.004
Physical activity <sup>2</sup>	-0.03 [-0.07, 0.02]	0.02	-1.11	.284	0.01 [-0.04, 0.05]	0.02	0.22	.823
Age	0.00 [-0.01, 0.00]	0.00	-2.01	.049	0.00 [-0.01, 0.00]	0.00	-2.07	.043
Physical activity × bmi	0.00 [-0.01, 0.00]	0.00	-1.56	.120	0.00 [-0.01, 0.00]	0.00	-1.26	.207
<i>Sleep efficiency (z)</i>								
(Intercept)	0.24 [0.00, 0.48]	0.12	1.93	.054	0.27 [0.02, 0.52]	0.13	2.16	.031
Physical activity	0.06 [-0.03, 0.16]	0.05	1.25	.213	0.00 [-0.07, 0.08]	0.04	0.10	.919
Physical activity <sup>2</sup>	0.00 [-0.04, 0.03]	0.02	-0.21	.837	-0.01 [-0.06, 0.03]	0.02	-0.45	.650
Age	0.00 [0.00, 0.01]	0.00	1.36	.173	0.00 [0.00, 0.01]	0.00	1.13	.261
Physical activity × bmi	0.00 [0.00, 0.00]	0.00	-0.13	.894	0.00 [0.00, 0.00]	0.00	0.30	.764
<i>Sleep onset (z)</i>								
(Intercept)	-0.05 [-0.34, 0.24]	0.15	-0.36	.717	-0.01 [-0.29, 0.28]	0.14	-0.06	.953
Physical activity	-0.02 [-0.09, 0.05]	0.03	-0.58	.561	-0.08 [-0.13, -0.02]	0.03	-2.76	.006
Physical activity <sup>2</sup>	0.00 [-0.03, 0.03]	0.02	-0.13	.900	-0.02 [-0.06, 0.01]	0.02	-1.15	.256
Age	0.00 [0.00, 0.00]	0.00	1.23	.219	0.00 [0.00, 0.00]	0.00	0.74	.458
Physical activity × bmi	0.00 [-0.01, 0.00]	0.00	-1.07	.287	0.00 [0.00, 0.00]	0.00	0.26	.792
<i>Sleep regularity (z)</i>								
(Intercept)	0.26 [0.06, 0.46]	0.10	2.55	.011	0.55 [0.32, 0.77]	0.11	4.81	< .001
Physical activity	-0.11 [-0.21, 0.00]	0.05	-1.99	.050	0.17 [0.07, 0.26]	0.05	3.51	.001
Physical activity <sup>2</sup>	0.08 [0.03, 0.13]	0.02	3.30	.003	-0.03 [-0.09, 0.04]	0.03	-0.82	.430

Term	Physical activity volume (z)				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	0.85	.397	0.00 [0.00, 0.00]	0.00	0.62	.534
Physical activity $\times$ bmi	0.02 [0.01, 0.02]	0.00	6.63	< .001	0.00 [-0.01, 0.00]	0.00	-1.60	.112

*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 (z)				Physical activity intensity (z)					
	$\beta$	[95% CI]	SE	t	p	$\beta$	[95% CI]	SE	t	p
<b>Sleep duration (z)</b>										
(Intercept)	1.32	[0.93, 1.70]	0.20	6.68	< .001	1.26	[1.02, 1.50]	0.12	10.16	< .001
Sleep duration	0.00	[-0.04, 0.04]	0.02	-0.07	.944	0.03	[-0.01, 0.08]	0.02	1.56	.124
Sleep duration <sup>2</sup>	-0.02	[-0.04, 0.01]	0.01	-1.25	.230	0.01	[-0.02, 0.03]	0.01	0.56	.588
Age	-0.02	[-0.03, -0.01]	0.00	-4.66	.016	-0.02	[-0.03, -0.01]	0.00	-5.44	.015
Sleep duration × bmi	0.00	[0.00, 0.00]	0.00	-0.25	.802	0.00	[0.00, 0.00]	0.00	-1.02	.314
<b>Sleep efficiency (z)</b>										
(Intercept)	1.30	[0.92, 1.69]	0.20	6.63	< .001	1.28	[1.04, 1.52]	0.12	10.55	< .001
Sleep efficiency	0.00	[-0.06, 0.05]	0.03	-0.02	.981	-0.02	[-0.08, 0.04]	0.03	-0.51	.619
Sleep efficiency <sup>2</sup>	0.00	[-0.02, 0.01]	0.01	-0.50	.623	-0.01	[-0.02, 0.01]	0.01	-0.93	.356
Age	-0.02	[-0.03, -0.01]	0.00	-4.67	.015	-0.02	[-0.03, -0.01]	0.00	-5.43	.015
Sleep efficiency × bmi	0.00	[0.00, 0.00]	0.00	-0.06	.950	0.00	[0.00, 0.00]	0.00	0.78	.450
<b>Sleep onset (z)</b>										
(Intercept)	1.32	[0.92, 1.71]	0.20	6.53	< .001	1.26	[1.02, 1.50]	0.12	10.29	< .001
Sleep onset	-0.03	[-0.10, 0.04]	0.04	-0.79	.449	-0.02	[-0.07, 0.03]	0.03	-0.82	.411
Sleep onset <sup>2</sup>	-0.02	[-0.05, 0.02]	0.02	-1.00	.330	0.01	[-0.02, 0.04]	0.01	0.76	.451
Age	-0.02	[-0.03, -0.01]	0.00	-4.63	.016	-0.02	[-0.03, -0.01]	0.00	-5.43	.015
Sleep onset × bmi	0.00	[0.00, 0.00]	0.00	0.47	.646	0.00	[0.00, 0.00]	0.00	0.71	.475
<b>Sleep regularity (z)</b>										
(Intercept)	1.27	[0.88, 1.66]	0.20	6.38	< .001	1.24	[1.00, 1.49]	0.13	9.92	< .001
Sleep regularity	0.03	[-0.02, 0.07]	0.02	1.25	.218	0.03	[-0.02, 0.08]	0.03	1.18	.270
Sleep regularity <sup>2</sup>	-0.01	[-0.03, 0.02]	0.01	-0.56	.576	0.01	[-0.01, 0.04]	0.01	1.04	.301

Term	Physical activity volume (z)				Physical activity intensity (z)					
	$\beta$	[95% CI]	SE	t	p	$\beta$	[95% CI]	SE	t	p
Age	-0.02	[-0.03, -0.01]	0.00	-4.72	.015	-0.02	[-0.03, -0.01]	0.00	-5.53	.014
Sleep regularity $\times$ bmi	0.00	[0.00, 0.00]	0.00	1.68	.096	0.00	[0.00, 0.00]	0.00	0.05	.958

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

Table 8

*Physical activity predicting sleep controlling for age, 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)	0.22 [-0.01, 0.44]	0.11	1.89	.059	0.21 [-0.01, 0.43]	0.11	1.90	.058
Physical activity	0.10 [0.04, 0.15]	0.03	3.67	< .001	0.07 [0.04, 0.11]	0.02	4.02	< .001
Physical activity <sup>2</sup>	0.00 [-0.02, 0.02]	0.01	-0.12	.904	0.02 [0.00, 0.04]	0.01	2.01	.045
Age	0.00 [-0.01, 0.00]	0.00	-1.98	.052	0.00 [-0.01, 0.00]	0.00	-2.06	.044
Physical activity × sesmedium	-0.01 [-0.07, 0.06]	0.04	-0.14	.889	0.00 [-0.05, 0.05]	0.03	0.11	.916
Physical activity × sesshigh	0.01 [-0.06, 0.07]	0.03	0.18	.860	-0.01 [-0.05, 0.04]	0.02	-0.24	.810
Sleep efficiency (z)								
(Intercept)	0.25 [0.01, 0.48]	0.12	2.04	.042	0.29 [0.04, 0.53]	0.13	2.29	.022
Physical activity	0.02 [-0.03, 0.07]	0.02	0.87	.386	-0.01 [-0.05, 0.03]	0.02	-0.68	.499
Physical activity <sup>2</sup>	-0.01 [-0.03, 0.00]	0.01	-1.36	.174	-0.01 [-0.03, 0.01]	0.01	-0.84	.399
Age	0.00 [0.00, 0.01]	0.00	1.29	.198	0.00 [0.00, 0.01]	0.00	0.99	.321
Physical activity × sesmedium	0.02 [-0.04, 0.09]	0.03	0.69	.493	0.03 [-0.02, 0.07]	0.02	1.04	.301
Physical activity × sesshigh	0.07 [0.01, 0.13]	0.03	2.38	.017	0.05 [0.00, 0.11]	0.03	1.98	.057
Sleep onset (z)								
(Intercept)	-0.08 [-0.36, 0.21]	0.15	-0.51	.610	-0.02 [-0.30, 0.26]	0.14	-0.13	.894
Physical activity	-0.10 [-0.13, -0.06]	0.02	-5.41	< .001	-0.10 [-0.12, -0.07]	0.01	-6.72	< .001
Physical activity <sup>2</sup>	0.01 [0.00, 0.03]	0.01	1.60	.148	0.00 [-0.02, 0.01]	0.01	-0.12	.902
Age	0.00 [0.00, 0.00]	0.00	1.16	.247	0.00 [0.00, 0.00]	0.00	0.59	.556
Physical activity × sesmedium	0.05 [0.01, 0.10]	0.02	2.24	.026	0.02 [-0.02, 0.06]	0.02	1.11	.277
Physical activity × sesshigh	0.06 [0.02, 0.11]	0.02	2.65	.009	0.04 [0.01, 0.08]	0.02	2.46	.015
Sleep regularity (z)								

Table 8 continued

Term	Physical activity volume (z)			Physical activity intensity (z)				
	$\beta$ [95% CI]	SE	t	p	$\beta$ [95% CI]	SE	t	p
(Intercept)	0.47 [0.27, 0.67]	0.10	4.68	< .001	0.52 [0.30, 0.75]	0.11	4.63	< .001
Physical activity	0.23 [0.18, 0.29]	0.03	8.11	< .001	0.09 [0.04, 0.13]	0.02	3.71	< .001
Physical activity <sup>2</sup>	-0.05 [-0.07, -0.03]	0.01	-5.17	< .001	-0.01 [-0.03, 0.02]	0.01	-0.66	.512
Age	0.00 [0.00, 0.00]	0.00	0.87	.384	0.00 [0.00, 0.00]	0.00	0.50	.617
Physical activity × sesmedium	0.01 [-0.06, 0.08]	0.03	0.22	.823	0.01 [-0.04, 0.07]	0.03	0.52	.607
Physical activity × seshigh	0.00 [-0.08, 0.07]	0.04	-0.07	.942	0.03 [-0.02, 0.09]	0.03	1.15	.261

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

*Sleep predicting physical activity controlling for age, 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)	1.32 [0.93, 1.70]	0.20	6.70	< .001	1.28 [1.04, 1.51]	0.12	10.62	< .001
Sleep duration	-0.01 [-0.04, 0.01]	0.01	-1.00	.318	0.02 [-0.01, 0.04]	0.01	1.48	.138
Sleep duration <sup>2</sup>	-0.01 [-0.03, 0.00]	0.01	-2.44	.016	-0.01 [-0.02, 0.00]	0.01	-1.90	.064
Age	-0.02 [-0.03, -0.01]	0.00	-4.68	.015	-0.02 [-0.03, -0.01]	0.00	-5.46	.015
Sleep duration × sesmedium	0.00 [-0.04, 0.05]	0.02	0.17	.869	0.00 [-0.04, 0.04]	0.02	0.08	.939
Sleep duration × seshigh	0.01 [-0.02, 0.05]	0.02	0.74	.459	-0.01 [-0.04, 0.02]	0.02	-0.79	.428
Sleep efficiency (z)								
(Intercept)	1.29 [0.90, 1.69]	0.20	6.42	< .001	1.27 [1.03, 1.51]	0.12	10.30	< .001
Sleep efficiency	0.01 [-0.02, 0.04]	0.01	0.79	.431	0.01 [-0.02, 0.03]	0.01	0.38	.707
Sleep efficiency <sup>2</sup>	0.01 [-0.01, 0.02]	0.01	0.98	.345	0.00 [-0.01, 0.01]	0.00	0.41	.688
Age	-0.02 [-0.03, -0.01]	0.00	-4.64	.016	-0.02 [-0.03, -0.01]	0.00	-5.42	.016
Sleep efficiency × sesmedium	-0.02 [-0.06, 0.01]	0.02	-1.20	.231	0.00 [-0.03, 0.04]	0.02	0.08	.934
Sleep efficiency × seshigh	-0.02 [-0.05, 0.02]	0.02	-0.89	.372	0.01 [-0.04, 0.05]	0.02	0.22	.828
Sleep onset (z)								
(Intercept)	1.32 [0.93, 1.70]	0.20	6.71	< .001	1.26 [1.02, 1.51]	0.12	10.18	< .001
Sleep onset	0.00 [-0.04, 0.03]	0.02	-0.24	.816	-0.01 [-0.04, 0.02]	0.02	-0.65	.524
Sleep onset <sup>2</sup>	-0.01 [-0.03, 0.00]	0.01	-1.77	.081	0.01 [-0.01, 0.02]	0.01	1.08	.282
Age	-0.02 [-0.03, -0.01]	0.00	-4.69	.015	-0.02 [-0.03, -0.01]	0.00	-5.44	.015
Sleep onset × sesmedium	-0.01 [-0.06, 0.04]	0.03	-0.30	.775	0.01 [-0.02, 0.05]	0.02	0.69	.491
Sleep onset × seshigh	-0.02 [-0.08, 0.03]	0.03	-0.79	.459	0.00 [-0.04, 0.04]	0.02	-0.08	.934
Sleep regularity (z)								

Term	Physical activity volume (z)				Physical activity intensity (z)			
	$\beta$ [95% CI]	SE	t	p	$\beta$ [95% CI]	SE	t	p
(Intercept)	1.27 [0.88, 1.65]	0.20	6.44	< .001	1.25 [1.01, 1.49]	0.12	10.17	< .001
Sleep regularity	0.04 [0.01, 0.08]	0.02	2.56	.045	0.03 [0.00, 0.06]	0.01	2.24	.041
Sleep regularity <sup>2</sup>	0.00 [-0.02, 0.01]	0.01	-0.53	.597	0.00 [-0.01, 0.02]	0.01	0.78	.433
Age	-0.02 [-0.03, -0.01]	0.00	-4.75	.014	-0.02 [-0.03, -0.01]	0.00	-5.50	.015
Sleep regularity × sesmedium	0.02 [-0.01, 0.06]	0.02	1.30	.208	0.00 [-0.03, 0.03]	0.01	-0.06	.954
Sleep regularity × seshigh	0.03 [-0.02, 0.08]	0.03	1.13	.320	0.01 [-0.02, 0.04]	0.02	0.56	.584

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 (z)			Physical activity intensity (z)				
	$\beta$ [95% CI]	SE	t	p	$\beta$ [95% CI]	SE	t	p
Sleep duration (z)								
(Intercept)	0.23 [0.01, 0.46]	0.12	2.02	.044	0.24 [0.02, 0.46]	0.11	2.18	.029
Physical activity	0.11 [0.07, 0.15]	0.02	5.72	< .001	0.06 [0.03, 0.09]	0.01	4.17	< .001
Physical activity <sup>2</sup>	-0.01 [-0.03, 0.00]	0.01	-2.86	.004	-0.01 [-0.02, 0.01]	0.01	-0.56	.573
Age	0.00 [-0.01, 0.00]	0.00	-2.01	.050	0.00 [-0.01, 0.00]	0.00	-2.10	.041
Physical activity × sexmale	-0.02 [-0.07, 0.03]	0.02	-0.87	.384	0.02 [-0.02, 0.06]	0.02	0.95	.344
Sleep efficiency (z)								
(Intercept)	0.24 [0.01, 0.48]	0.12	2.03	.043	0.27 [0.03, 0.52]	0.12	2.22	.027
Physical activity	0.04 [0.00, 0.08]	0.02	2.16	.031	0.00 [-0.03, 0.02]	0.01	-0.30	.762
Physical activity <sup>2</sup>	-0.01 [-0.02, 0.00]	0.01	-2.31	.021	-0.01 [-0.03, 0.01]	0.01	-1.06	.290
Age	0.00 [0.00, 0.01]	0.00	1.34	.181	0.00 [0.00, 0.01]	0.00	1.11	.268
Physical activity × sexmale	0.02 [-0.03, 0.07]	0.03	0.86	.390	0.03 [0.00, 0.07]	0.02	1.77	.077
Sleep onset (z)								
(Intercept)	-0.07 [-0.36, 0.22]	0.15	-0.49	.628	-0.04 [-0.32, 0.24]	0.14	-0.26	.796
Physical activity	-0.08 [-0.10, -0.05]	0.01	-5.19	< .001	-0.07 [-0.09, -0.05]	0.01	-6.62	< .001
Physical activity <sup>2</sup>	0.01 [0.00, 0.02]	0.00	2.39	.017	0.00 [-0.01, 0.02]	0.01	0.72	.473
Age	0.00 [0.00, 0.00]	0.00	1.18	.240	0.00 [0.00, 0.00]	0.00	0.74	.461
Physical activity × sexmale	0.04 [0.00, 0.07]	0.02	2.05	.040	0.00 [-0.03, 0.02]	0.01	-0.26	.794
Sleep regularity (z)								
(Intercept)	0.46 [0.26, 0.65]	0.10	4.51	< .001	0.55 [0.33, 0.77]	0.11	4.95	< .001
Physical activity	0.23 [0.18, 0.27]	0.02	10.77	< .001	0.08 [0.05, 0.12]	0.02	5.22	< .001
Physical activity <sup>2</sup>	-0.04 [-0.05, -0.03]	0.01	-6.12	< .001	-0.04 [-0.07, -0.02]	0.01	-3.30	.008

Term	Physical activity volume (z)				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	0.92	.358	0.00 [0.00, 0.00]	0.00	0.54	.588
Physical activity $\times$ sexmale	0.01 [-0.05, 0.06]	0.03	0.25	.805	0.03 [-0.01, 0.07]	0.02	1.28	.201

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 (z)			Physical activity intensity (z)				
	$\beta$ [95% CI]	SE	t	p	$\beta$ [95% CI]	SE	t	p
<i>Sleep duration (z)</i>								
(Intercept)	1.32 [0.94, 1.71]	0.20	6.70	< .001	1.28 [1.04, 1.52]	0.12	10.41	< .001
Sleep duration	-0.01 [-0.03, 0.01]	0.01	-0.83	.410	0.01 [-0.01, 0.03]	0.01	1.16	.247
Sleep duration <sup>2</sup>	-0.02 [-0.03, -0.01]	0.00	-4.77	< .001	-0.01 [-0.02, 0.00]	0.00	-1.79	.087
Age	-0.02 [-0.03, -0.01]	0.00	-4.66	.016	-0.02 [-0.03, -0.01]	0.00	-5.46	.015
Sleep duration × sexmale	0.00 [-0.02, 0.03]	0.01	0.35	.730	0.01 [-0.02, 0.03]	0.01	0.40	.690
<i>Sleep efficiency (z)</i>								
(Intercept)	1.30 [0.91, 1.69]	0.20	6.55	< .001	1.27 [1.03, 1.51]	0.12	10.45	< .001
Sleep efficiency	0.01 [-0.02, 0.03]	0.01	0.42	.681	0.01 [-0.01, 0.03]	0.01	0.98	.329
Sleep efficiency <sup>2</sup>	0.00 [-0.01, 0.00]	0.00	-1.32	.188	0.00 [-0.01, 0.01]	0.00	0.24	.812
Age	-0.02 [-0.03, -0.01]	0.00	-4.66	.016	-0.02 [-0.03, -0.01]	0.00	-5.45	.015
Sleep efficiency × sexmale	-0.02 [-0.05, 0.02]	0.02	-0.90	.380	-0.01 [-0.03, 0.02]	0.01	-0.36	.722
<i>Sleep onset (z)</i>								
(Intercept)	1.31 [0.92, 1.70]	0.20	6.55	< .001	1.27 [1.03, 1.51]	0.12	10.26	< .001
Sleep onset	0.00 [-0.02, 0.03]	0.01	0.16	.877	-0.01 [-0.03, 0.02]	0.01	-0.56	.581
Sleep onset <sup>2</sup>	-0.01 [-0.02, 0.01]	0.01	-0.91	.364	0.00 [-0.01, 0.02]	0.01	0.22	.825
Age	-0.02 [-0.03, -0.01]	0.00	-4.65	.016	-0.02 [-0.03, -0.01]	0.00	-5.44	.015
Sleep onset × sexmale	-0.03 [-0.06, 0.00]	0.02	-1.78	.087	0.00 [-0.02, 0.03]	0.01	0.25	.806
<i>Sleep regularity (z)</i>								
(Intercept)	1.27 [0.89, 1.66]	0.20	6.45	< .001	1.26 [1.03, 1.50]	0.12	10.42	< .001
Sleep regularity	0.05 [0.03, 0.07]	0.01	5.13	< .001	0.03 [0.01, 0.05]	0.01	2.56	.030
Sleep regularity <sup>2</sup>	-0.01 [-0.02, 0.01]	0.01	-0.93	.358	-0.01 [-0.02, 0.00]	0.01	-1.18	.244

Term	Physical activity volume (z)			Physical activity intensity (z)				
	$\beta$ [95% CI]	SE	t	p	$\beta$ [95% CI]	SE	t	p
Age	-0.02 [-0.03, -0.01]	0.00	-4.73	.014	-0.02 [-0.03, -0.01]	0.00	-5.52	.014
Sleep regularity $\times$ sexmale	0.02 [0.00, 0.05]	0.01	1.65	.103	0.01 [-0.01, 0.03]	0.01	0.91	.363

*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 (z)			Physical activity intensity (z)				
	$\beta$ [95% CI]	SE	t	p	$\beta$ [95% CI]	SE	t	p
Sleep duration (z)								
(Intercept)	0.24 [0.01, 0.47]	0.12	2.07	.039	0.26 [0.04, 0.48]	0.11	2.32	.020
Physical activity	0.08 [0.03, 0.14]	0.03	3.20	.001	0.10 [0.06, 0.14]	0.02	5.28	< .001
Weekdaymonday	-0.03 [-0.08, 0.02]	0.03	-1.22	.223	-0.05 [-0.11, 0.01]	0.03	-1.79	.074
Weekdaysaturday	0.07 [0.02, 0.12]	0.03	2.88	.004	0.06 [0.00, 0.12]	0.03	2.07	.039
Weekdaysunday	0.00 [-0.05, 0.05]	0.03	-0.09	.931	-0.03 [-0.09, 0.03]	0.03	-1.09	.278
Weekdaythursday	0.00 [-0.06, 0.05]	0.03	-0.18	.860	-0.02 [-0.08, 0.04]	0.03	-0.71	.478
Weekdaytuesday	-0.03 [-0.08, 0.02]	0.03	-1.13	.259	-0.04 [-0.11, 0.02]	0.03	-1.26	.213
Weekdaywednesday	-0.07 [-0.13, -0.01]	0.03	-2.47	.016	-0.09 [-0.15, -0.02]	0.03	-2.56	.016
Physical activity <sup>2</sup>	-0.01 [-0.03, 0.01]	0.01	-1.31	.192	-0.01 [-0.04, 0.01]	0.01	-1.07	.285
Age	0.00 [-0.01, 0.00]	0.00	-2.03	.047	0.00 [-0.01, 0.00]	0.00	-2.06	.045
Physical activity × weekdaymonday	0.03 [-0.04, 0.09]	0.03	0.88	.377	-0.02 [-0.06, 0.03]	0.02	-0.74	.461
Physical activity × weekdaysaturday	0.03 [-0.04, 0.09]	0.03	0.75	.453	-0.06 [-0.11, -0.02]	0.02	-2.65	.008
Physical activity × weekdaysunday	0.03 [-0.03, 0.09]	0.03	0.91	.361	-0.06 [-0.11, -0.02]	0.02	-2.72	.007
Physical activity × weekdaythursday	0.02 [-0.05, 0.08]	0.03	0.47	.635	-0.01 [-0.06, 0.03]	0.02	-0.52	.604
Physical activity × weekdaytuesday	0.01 [-0.06, 0.08]	0.03	0.32	.749	-0.02 [-0.07, 0.03]	0.03	-0.75	.456
Physical activity × weekdaywednesday	-0.03 [-0.10, 0.04]	0.03	-0.82	.411	0.00 [-0.06, 0.05]	0.03	-0.17	.863
Weekdaymonday × Physical activity <sup>2</sup>	0.00 [-0.02, 0.02]	0.01	0.13	.896	0.01 [-0.02, 0.05]	0.02	0.86	.392
Weekdaysaturday × Physical activity <sup>2</sup>	-0.01 [-0.03, 0.01]	0.01	-0.78	.436	0.00 [-0.03, 0.04]	0.02	0.24	.809
Weekdaysunday × Physical activity <sup>2</sup>	0.00 [-0.03, 0.02]	0.01	-0.34	.731	0.02 [-0.01, 0.06]	0.02	1.24	.215
Weekdaythursday × Physical activity <sup>2</sup>	0.00 [-0.02, 0.02]	0.01	-0.37	.714	0.01 [-0.02, 0.05]	0.02	0.63	.527
Weekdaytuesday × Physical activity <sup>2</sup>	0.00 [-0.02, 0.02]	0.01	0.08	.934	0.01 [-0.03, 0.05]	0.02	0.62	.538

Table 12 continued

## TITLE

Term	Physical activity volume (z)				Physical activity intensity (z)			
	$\beta$ [95% CI]	SE	t	p	$\beta$ [95% CI]	SE	t	p
Weekdaywednesday $\times$ Physical activity <sup>2</sup>	0.01 [-0.01, 0.03]	0.01	0.79	.429	0.02 [-0.01, 0.06]	0.02	1.28	.203
Sleep efficiency (z)								
(Intercept)	0.30 [0.06, 0.55]	0.12	2.47	.013	0.33 [0.09, 0.58]	0.13	2.65	.008
Physical activity	0.04 [-0.02, 0.09]	0.03	1.38	.168	0.00 [-0.04, 0.03]	0.02	-0.23	.819
Weekdaymonday	-0.06 [-0.11, -0.01]	0.03	-2.48	.013	-0.06 [-0.12, -0.01]	0.03	-2.19	.029
Weekdaysaturday	-0.10 [-0.15, -0.05]	0.03	-4.03	< .001	-0.12 [-0.18, -0.06]	0.03	-4.14	< .001
Weekdaysunday	-0.13 [-0.18, -0.07]	0.03	-4.54	< .001	-0.14 [-0.20, -0.08]	0.03	-4.59	< .001
Weekdaythursday	0.00 [-0.05, 0.05]	0.03	0.12	.903	0.00 [-0.06, 0.06]	0.03	0.00	> .999
Weekdaytuesday	-0.02 [-0.07, 0.03]	0.03	-0.96	.337	-0.02 [-0.08, 0.04]	0.03	-0.69	.492
Weekdaywednesday	-0.03 [-0.08, 0.02]	0.03	-1.04	.299	-0.02 [-0.08, 0.04]	0.03	-0.75	.456
Physical activity <sup>2</sup>	-0.01 [-0.03, 0.00]	0.01	-1.52	.128	-0.01 [-0.04, 0.02]	0.01	-0.67	.505
Age	0.00 [0.00, 0.01]	0.00	1.29	.198	0.00 [0.00, 0.01]	0.00	1.05	.294
Physical activity $\times$ weekdaymonday	0.02 [-0.05, 0.08]	0.03	0.51	.609	0.00 [-0.05, 0.04]	0.02	-0.05	.962
Physical activity $\times$ weekdaysaturday	0.02 [-0.04, 0.09]	0.03	0.69	.488	-0.02 [-0.07, 0.02]	0.02	-0.91	.360
Physical activity $\times$ weekdaysunday	0.03 [-0.04, 0.10]	0.03	0.90	.369	0.01 [-0.04, 0.06]	0.02	0.45	.652
Physical activity $\times$ weekdaythursday	-0.01 [-0.08, 0.06]	0.03	-0.32	.746	0.03 [-0.01, 0.08]	0.02	1.35	.176
Physical activity $\times$ weekdaytuesday	-0.02 [-0.09, 0.05]	0.03	-0.52	.601	0.01 [-0.04, 0.06]	0.02	0.44	.656
Physical activity $\times$ weekdaywednesday	-0.01 [-0.08, 0.06]	0.04	-0.29	.774	0.03 [-0.02, 0.07]	0.02	1.12	.261
Weekdaymonday $\times$ Physical activity <sup>2</sup>	0.00 [-0.02, 0.02]	0.01	-0.04	.972	-0.01 [-0.04, 0.02]	0.02	-0.50	.614
Weekdaysaturday $\times$ Physical activity <sup>2</sup>	0.00 [-0.02, 0.02]	0.01	-0.06	.950	0.01 [-0.02, 0.05]	0.02	0.71	.480
Weekdaysunday $\times$ Physical activity <sup>2</sup>	0.00 [-0.02, 0.02]	0.01	0.07	.946	0.01 [-0.03, 0.04]	0.02	0.41	.680
Weekdaythursday $\times$ Physical activity <sup>2</sup>	0.01 [-0.02, 0.03]	0.01	0.48	.632	0.00 [-0.03, 0.04]	0.02	0.24	.809
Weekdaytuesday $\times$ Physical activity <sup>2</sup>	0.01 [-0.02, 0.03]	0.01	0.54	.591	0.00 [-0.04, 0.04]	0.02	0.00	.998

Table 12 continued

## TITLE

Term	Physical activity volume (z)				Physical activity intensity (z)			
	$\beta$ [95% CI]	SE	t	p	$\beta$ [95% CI]	SE	t	p
Weekdaywednesday $\times$ Physical activity <sup>2</sup>	0.01 [-0.01, 0.03]	0.01	0.87	.386	0.00 [-0.03, 0.04]	0.02	0.16	.870
Sleep onset (z)								
(Intercept)	-0.04 [-0.33, 0.25]	0.15	-0.27	.791	-0.03 [-0.31, 0.26]	0.14	-0.17	.861
Physical activity	-0.02 [-0.06, 0.01]	0.02	-1.18	.238	-0.04 [-0.07, -0.01]	0.01	-3.07	.002
Weekdaymonday	-0.12 [-0.15, -0.08]	0.02	-6.53	< .001	-0.10 [-0.14, -0.06]	0.02	-4.92	< .001
Weekdaysaturday	0.07 [0.03, 0.11]	0.02	3.82	< .001	0.08 [0.04, 0.12]	0.02	3.66	< .001
Weekdaysunday	0.07 [0.04, 0.11]	0.02	3.95	< .001	0.06 [0.02, 0.10]	0.02	2.93	.004
Weekdaythursday	-0.11 [-0.15, -0.07]	0.02	-5.31	< .001	-0.10 [-0.14, -0.05]	0.02	-4.05	< .001
Weekdaytuesday	-0.09 [-0.13, -0.06]	0.02	-4.95	< .001	-0.07 [-0.12, -0.03]	0.02	-3.25	.002
Weekdaywednesday	-0.08 [-0.12, -0.04]	0.02	-4.06	< .001	-0.06 [-0.10, -0.01]	0.02	-2.43	.018
Physical activity <sup>2</sup>	0.00 [-0.01, 0.02]	0.01	0.64	.520	0.02 [0.00, 0.03]	0.01	1.64	.100
Age	0.00 [0.00, 0.00]	0.00	1.23	.219	0.00 [0.00, 0.00]	0.00	0.79	.432
Physical activity $\times$ weekdaymonday	-0.07 [-0.12, -0.03]	0.02	-3.28	.001	-0.05 [-0.08, -0.02]	0.02	-3.08	.002
Physical activity $\times$ weekdaysaturday	0.05 [0.00, 0.09]	0.02	1.91	.056	0.02 [-0.01, 0.05]	0.02	1.11	.266
Physical activity $\times$ weekdaysunday	0.02 [-0.03, 0.06]	0.02	0.78	.435	-0.03 [-0.07, 0.00]	0.02	-1.88	.062
Physical activity $\times$ weekdaythursday	-0.09 [-0.14, -0.04]	0.02	-3.75	< .001	-0.04 [-0.08, -0.01]	0.02	-2.53	.012
Physical activity $\times$ weekdaytuesday	-0.09 [-0.14, -0.04]	0.02	-3.72	< .001	-0.04 [-0.07, -0.01]	0.02	-2.29	.022
Physical activity $\times$ weekdaywednesday	-0.07 [-0.12, -0.02]	0.02	-2.94	.003	-0.03 [-0.06, 0.01]	0.02	-1.60	.111
Weekdaymonday $\times$ Physical activity <sup>2</sup>	0.00 [-0.01, 0.02]	0.01	0.54	.587	-0.01 [-0.04, 0.01]	0.01	-0.98	.325
Weekdaysaturday $\times$ Physical activity <sup>2</sup>	0.00 [-0.02, 0.01]	0.01	-0.28	.778	-0.01 [-0.03, 0.01]	0.01	-0.80	.423
Weekdaysunday $\times$ Physical activity <sup>2</sup>	-0.01 [-0.03, 0.00]	0.01	-1.72	.085	-0.01 [-0.03, 0.01]	0.01	-0.99	.324
Weekdaythursday $\times$ Physical activity <sup>2</sup>	0.02 [0.00, 0.03]	0.01	2.12	.034	0.00 [-0.02, 0.03]	0.01	0.23	.816
Weekdaytuesday $\times$ Physical activity <sup>2</sup>	0.01 [0.00, 0.03]	0.01	1.39	.166	-0.01 [-0.04, 0.02]	0.01	-0.67	.503

Table 12 continued

## TITLE

Term	Physical activity volume (z)				Physical activity intensity (z)			
	$\beta$ [95% CI]	SE	t	p	$\beta$ [95% CI]	SE	t	p
Weekdaywednesday $\times$ Physical activity <sup>2</sup>	0.01 [0.00, 0.03]	0.01	1.39	.164	-0.02 [-0.04, 0.01]	0.01	-1.28	.201
Sleep regularity (z)								
(Intercept)	0.47 [0.27, 0.67]	0.10	4.53	< .001	0.57 [0.34, 0.79]	0.12	4.85	< .001
Physical activity	0.17 [0.11, 0.23]	0.03	5.76	< .001	0.01 [-0.04, 0.06]	0.03	0.30	.766
Weekdaymonday	0.01 [-0.07, 0.09]	0.04	0.27	.798	0.02 [-0.09, 0.13]	0.06	0.30	.780
Weekdaysaturday	-0.15 [-0.21, -0.08]	0.03	-4.69	< .001	-0.16 [-0.24, -0.09]	0.04	-4.16	< .001
Weekdaysunday	-0.17 [-0.24, -0.11]	0.03	-5.28	< .001	-0.20 [-0.28, -0.13]	0.04	-5.22	< .001
Weekdaythursday	0.15 [0.08, 0.22]	0.04	4.05	.002	0.18 [0.07, 0.28]	0.05	3.35	.020
Weekdaytuesday	0.16 [0.09, 0.24]	0.04	4.35	.002	0.19 [0.09, 0.29]	0.05	3.77	.010
Weekdaywednesday	0.13 [0.06, 0.19]	0.03	3.89	< .001	0.18 [0.10, 0.26]	0.04	4.51	< .001
Physical activity <sup>2</sup>	-0.03 [-0.05, -0.01]	0.01	-3.26	.001	-0.01 [-0.05, 0.02]	0.02	-0.72	.487
Age	0.00 [0.00, 0.00]	0.00	0.78	.438	0.00 [0.00, 0.00]	0.00	0.28	.778
Physical activity $\times$ weekdaymonday	0.07 [-0.01, 0.16]	0.04	1.67	.109	0.13 [0.08, 0.19]	0.03	4.80	< .001
Physical activity $\times$ weekdaysaturday	0.05 [-0.03, 0.12]	0.04	1.25	.213	-0.01 [-0.06, 0.04]	0.03	-0.39	.698
Physical activity $\times$ weekdaysunday	0.11 [0.04, 0.18]	0.04	2.90	.004	0.01 [-0.04, 0.06]	0.03	0.41	.685
Physical activity $\times$ weekdaythursday	0.02 [-0.06, 0.10]	0.04	0.41	.684	0.10 [0.02, 0.18]	0.04	2.57	.042
Physical activity $\times$ weekdaytuesday	-0.01 [-0.09, 0.07]	0.04	-0.25	.801	0.13 [0.07, 0.20]	0.03	3.98	.002
Physical activity $\times$ weekdaywednesday	-0.02 [-0.09, 0.06]	0.04	-0.47	.636	0.09 [0.03, 0.16]	0.03	2.70	.021
Weekdaymonday $\times$ Physical activity <sup>2</sup>	-0.02 [-0.04, 0.01]	0.01	-1.38	.172	-0.05 [-0.10, 0.00]	0.03	-1.79	.106
Weekdaysaturday $\times$ Physical activity <sup>2</sup>	-0.02 [-0.05, 0.01]	0.01	-1.39	.166	-0.01 [-0.06, 0.03]	0.02	-0.57	.575
Weekdaysunday $\times$ Physical activity <sup>2</sup>	-0.02 [-0.05, 0.00]	0.01	-1.75	.083	-0.03 [-0.07, 0.02]	0.02	-1.14	.270
Weekdaythursday $\times$ Physical activity <sup>2</sup>	0.01 [-0.02, 0.03]	0.01	0.55	.583	-0.03 [-0.08, 0.02]	0.02	-1.18	.256
Weekdaytuesday $\times$ Physical activity <sup>2</sup>	0.01 [-0.01, 0.04]	0.01	1.06	.295	-0.02 [-0.08, 0.03]	0.03	-0.74	.482

Table 12 continued

Term	Physical activity volume (z)				Physical activity intensity (z)					
	$\beta$	[95% CI]	SE	t	p	$\beta$	[95% CI]	SE	t	p
Weekdaywednesday $\times$ Physical activity <sup>2</sup>	0.00	[ -0.02, 0.03]	0.01	0.26	.796	-0.06	[ -0.10, -0.01]	0.02	-2.44	.020

*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 (z)				Physical activity intensity (z)			
	$\beta$ [95% CI]	SE	t	p	$\beta$ [95% CI]	SE	t	p
Sleep duration (z)								
(Intercept)	1.40 [1.01, 1.79]	0.20	7.03	< .001	1.34 [1.10, 1.59]	0.12	10.82	< .001
Sleep duration	0.03 [-0.01, 0.06]	0.02	1.60	.111	0.05 [0.02, 0.09]	0.02	2.78	.017
Weekdaymonday	-0.17 [-0.21, -0.13]	0.02	-8.28	< .001	-0.11 [-0.15, -0.07]	0.02	-5.36	< .001
Weekdaysaturday	-0.09 [-0.13, -0.05]	0.02	-4.23	< .001	-0.10 [-0.14, -0.06]	0.02	-4.79	< .001
Weekdaysunday	-0.17 [-0.21, -0.13]	0.02	-8.31	< .001	-0.19 [-0.23, -0.16]	0.02	-10.08	< .001
Weekdaythursday	-0.04 [-0.09, 0.00]	0.02	-1.89	.064	-0.03 [-0.07, 0.01]	0.02	-1.23	.220
Weekdaytuesday	-0.06 [-0.10, -0.02]	0.02	-2.95	.003	-0.06 [-0.09, -0.02]	0.02	-2.87	.004
Weekdaywednesday	-0.05 [-0.09, -0.01]	0.02	-2.35	.019	-0.03 [-0.07, 0.01]	0.02	-1.56	.119
Sleep duration <sup>2</sup>	-0.01 [-0.03, 0.00]	0.01	-1.68	.099	-0.01 [-0.03, 0.01]	0.01	-0.86	.402
Age	-0.02 [-0.03, -0.01]	0.00	-4.65	.016	-0.02 [-0.03, -0.01]	0.00	-5.44	.015
Sleep duration × weekdaymonday	-0.04 [-0.08, 0.00]	0.02	-1.85	.065	-0.07 [-0.11, -0.03]	0.02	-3.20	.003
Sleep duration × weekdaysaturday	-0.04 [-0.08, 0.00]	0.02	-1.75	.087	-0.06 [-0.10, -0.02]	0.02	-2.95	.005
Sleep duration × weekdaysunday	-0.06 [-0.10, -0.02]	0.02	-2.88	.004	-0.09 [-0.13, -0.05]	0.02	-4.30	< .001
Sleep duration × weekdaythursday	0.00 [-0.04, 0.04]	0.02	0.06	.956	0.02 [-0.03, 0.08]	0.03	0.84	.429
Sleep duration × weekdaytuesday	0.00 [-0.05, 0.04]	0.02	-0.09	.928	0.00 [-0.04, 0.04]	0.02	-0.01	.992
Sleep duration × weekdaywednesday	-0.04 [-0.09, 0.00]	0.02	-1.86	.070	-0.01 [-0.05, 0.03]	0.02	-0.36	.722
Weekdaymonday × Sleep duration <sup>2</sup>	-0.01 [-0.03, 0.01]	0.01	-0.76	.449	0.00 [-0.02, 0.02]	0.01	0.03	.974
Weekdaysaturday × Sleep duration <sup>2</sup>	0.00 [-0.02, 0.02]	0.01	0.05	.958	0.00 [-0.03, 0.02]	0.01	-0.28	.783
Weekdaysunday × Sleep duration <sup>2</sup>	-0.01 [-0.03, 0.01]	0.01	-0.59	.556	-0.01 [-0.03, 0.01]	0.01	-0.67	.508
Weekdaythursday × Sleep duration <sup>2</sup>	0.01 [-0.02, 0.04]	0.02	0.57	.587	0.02 [0.00, 0.04]	0.01	1.73	.089
Weekdaytuesday × Sleep duration <sup>2</sup>	0.01 [-0.01, 0.03]	0.01	0.73	.467	0.02 [0.00, 0.04]	0.01	1.74	.082

Table 13 continued

TITLE

Term	Physical activity volume (z)				Physical activity intensity (z)			
	$\beta$ [95% CI]	SE	t	p	$\beta$ [95% CI]	SE	t	p
Weekdaywednesday × Sleep duration <sup>2</sup>	0.00 [-0.02, 0.02]	0.01	0.27	.784	0.01 [-0.01, 0.03]	0.01	1.33	.184
Sleep efficiency (z)								
(Intercept)	1.39 [1.00, 1.78]	0.20	7.01	< .001	1.35 [1.11, 1.58]	0.12	11.09	< .001
Sleep efficiency	-0.02 [-0.06, 0.02]	0.02	-1.16	.259	-0.01 [-0.05, 0.02]	0.02	-0.76	.448
Weekdaymonday	-0.18 [-0.22, -0.15]	0.02	-9.46	< .001	-0.11 [-0.15, -0.08]	0.02	-6.08	< .001
Weekdaysaturday	-0.10 [-0.13, -0.06]	0.02	-5.02	< .001	-0.11 [-0.14, -0.07]	0.02	-5.90	< .001
Weekdaysunday	-0.20 [-0.23, -0.16]	0.02	-10.18	< .001	-0.21 [-0.25, -0.18]	0.02	-11.49	< .001
Weekdaythursday	-0.05 [-0.09, -0.01]	0.02	-2.44	.015	-0.02 [-0.05, 0.02]	0.02	-0.95	.341
Weekdaytuesday	-0.06 [-0.10, -0.02]	0.02	-3.10	.002	-0.05 [-0.09, -0.01]	0.02	-2.61	.009
Weekdaywednesday	-0.05 [-0.09, -0.01]	0.02	-2.48	.014	-0.02 [-0.06, 0.02]	0.02	-1.00	.318
Sleep efficiency <sup>2</sup>	-0.01 [-0.02, 0.00]	0.01	-1.98	.051	-0.01 [-0.02, 0.01]	0.01	-0.84	.408
Age	-0.02 [-0.03, -0.01]	0.00	-4.65	.016	-0.02 [-0.03, -0.01]	0.00	-5.42	.015
Sleep efficiency × weekdaymonday	0.01 [-0.03, 0.06]	0.02	0.62	.535	0.03 [-0.02, 0.08]	0.03	1.03	.314
Sleep efficiency × weekdaysaturday	0.00 [-0.04, 0.05]	0.02	0.09	.931	0.02 [-0.03, 0.07]	0.02	0.70	.485
Sleep efficiency × weekdaysunday	0.06 [0.01, 0.11]	0.03	2.39	.021	0.06 [0.01, 0.10]	0.02	2.38	.020
Sleep efficiency × weekdaythursday	0.02 [-0.03, 0.08]	0.03	0.91	.369	0.00 [-0.04, 0.05]	0.02	0.20	.838
Sleep efficiency × weekdaytuesday	0.01 [-0.04, 0.07]	0.03	0.43	.674	0.02 [-0.03, 0.07]	0.03	0.77	.447
Sleep efficiency × weekdaywednesday	0.01 [-0.05, 0.07]	0.03	0.31	.765	0.00 [-0.05, 0.05]	0.03	-0.19	.853
Weekdaymonday × Sleep efficiency <sup>2</sup>	0.01 [-0.01, 0.02]	0.01	0.82	.414	0.00 [-0.01, 0.02]	0.01	0.61	.546
Weekdaysaturday × Sleep efficiency <sup>2</sup>	0.01 [-0.01, 0.03]	0.01	1.12	.265	0.00 [-0.01, 0.02]	0.01	0.60	.551
Weekdaysunday × Sleep efficiency <sup>2</sup>	0.02 [0.00, 0.04]	0.01	2.36	.018	0.01 [-0.01, 0.03]	0.01	1.17	.245
Weekdaythursday × Sleep efficiency <sup>2</sup>	0.01 [0.00, 0.03]	0.01	1.58	.123	0.01 [0.00, 0.02]	0.01	1.28	.201
Weekdaytuesday × Sleep efficiency <sup>2</sup>	0.01 [-0.01, 0.03]	0.01	1.13	.262	0.01 [-0.01, 0.02]	0.01	1.09	.281

Table 13 continued

TITLE

Term	Physical activity volume (z)				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, 0.02]	0.01	0.45	.656	0.00	[-0.02, 0.02]	0.01	0.08	.933
Sleep onset (z)										
(Intercept)	1.39	[1.00, 1.78]	0.20	7.00	< .001	1.34	[1.10, 1.58]	0.12	10.99	< .001
Sleep onset	-0.02	[-0.05, 0.02]	0.02	-1.08	.291	-0.03	[-0.06, 0.00]	0.02	-1.76	.084
Weekdaymonday	-0.18	[-0.22, -0.13]	0.02	-7.75	< .001	-0.11	[-0.15, -0.07]	0.02	-5.21	< .001
Weekdaysaturday	-0.10	[-0.14, -0.06]	0.02	-4.56	< .001	-0.11	[-0.16, -0.07]	0.02	-4.99	< .001
Weekdaysunday	-0.19	[-0.24, -0.14]	0.02	-7.63	< .001	-0.20	[-0.25, -0.16]	0.02	-9.46	< .001
Weekdaythursday	-0.05	[-0.10, 0.00]	0.02	-2.02	.046	-0.03	[-0.07, 0.02]	0.02	-1.11	.269
Weekdaytuesday	-0.06	[-0.11, -0.01]	0.02	-2.55	.013	-0.04	[-0.08, 0.00]	0.02	-1.91	.056
Weekdaywednesday	-0.06	[-0.10, -0.01]	0.02	-2.51	.012	-0.03	[-0.07, 0.02]	0.02	-1.08	.280
Sleep onset <sup>2</sup>	-0.02	[-0.04, 0.01]	0.01	-1.45	.149	0.00	[-0.02, 0.02]	0.01	-0.12	.904
Age	-0.02	[-0.03, -0.01]	0.00	-4.65	.016	-0.02	[-0.03, -0.01]	0.00	-5.47	.015
Sleep onset × weekdaymonday	0.02	[-0.02, 0.06]	0.02	1.05	.293	0.05	[0.02, 0.09]	0.02	2.92	.004
Sleep onset × weekdaysaturday	0.02	[-0.02, 0.06]	0.02	0.76	.451	0.05	[0.01, 0.09]	0.02	2.52	.015
Sleep onset × weekdaysunday	0.05	[0.01, 0.09]	0.02	2.63	.010	0.10	[0.05, 0.14]	0.02	4.49	< .001
Sleep onset × weekdaythursday	0.01	[-0.04, 0.05]	0.02	0.31	.761	-0.01	[-0.06, 0.04]	0.02	-0.48	.645
Sleep onset × weekdaytuesday	-0.01	[-0.05, 0.03]	0.02	-0.55	.583	0.02	[-0.02, 0.05]	0.02	0.84	.404
Sleep onset × weekdaywednesday	0.01	[-0.03, 0.05]	0.02	0.60	.548	-0.01	[-0.05, 0.03]	0.02	-0.37	.715
Weekdaymonday × Sleep onset <sup>2</sup>	0.00	[-0.02, 0.03]	0.01	0.20	.839	0.00	[-0.02, 0.03]	0.01	0.11	.913
Weekdaysaturday × Sleep onset <sup>2</sup>	0.01	[-0.01, 0.04]	0.01	0.98	.326	0.01	[-0.02, 0.04]	0.02	0.57	.578
Weekdaysunday × Sleep onset <sup>2</sup>	0.01	[-0.02, 0.04]	0.02	0.76	.457	-0.01	[-0.03, 0.02]	0.01	-0.40	.690
Weekdaythursday × Sleep onset <sup>2</sup>	0.01	[-0.02, 0.05]	0.02	0.92	.361	0.02	[-0.01, 0.05]	0.02	1.02	.318
Weekdaytuesday × Sleep onset <sup>2</sup>	0.01	[-0.02, 0.04]	0.02	0.56	.579	0.00	[-0.03, 0.03]	0.01	0.14	.892

Table 13 continued

TITLE

Term	Physical activity volume (z)				Physical activity intensity (z)					
	$\beta$	[95% CI]	SE	t	p	$\beta$	[95% CI]	SE	t	p
Weekdaywednesday $\times$ Sleep onset <sup>2</sup>	0.01	[-0.02, 0.04]	0.01	0.83	.405	0.01	[-0.03, 0.04]	0.02	0.35	.726
Sleep regularity (z)										
(Intercept)	1.35	[0.96, 1.74]	0.20	6.79	< .001	1.34	[1.10, 1.58]	0.12	10.98	< .001
Sleep regularity	0.07	[0.04, 0.10]	0.02	4.05	< .001	0.03	[-0.01, 0.07]	0.02	1.65	.130
Weekdaymonday	-0.16	[-0.20, -0.12]	0.02	-7.07	< .001	-0.12	[-0.17, -0.07]	0.03	-4.76	< .001
Weekdaysaturday	-0.07	[-0.12, -0.01]	0.03	-2.39	.033	-0.12	[-0.17, -0.07]	0.03	-4.52	< .001
Weekdaysunday	-0.15	[-0.20, -0.10]	0.03	-5.80	< .001	-0.21	[-0.26, -0.17]	0.02	-9.73	< .001
Weekdaythursday	-0.03	[-0.08, 0.01]	0.02	-1.41	.159	-0.03	[-0.08, 0.02]	0.03	-1.01	.322
Weekdaytuesday	-0.05	[-0.10, -0.01]	0.02	-2.18	.029	-0.05	[-0.10, 0.00]	0.03	-2.12	.044
Weekdaywednesday	-0.06	[-0.10, -0.01]	0.02	-2.40	.017	-0.02	[-0.07, 0.03]	0.03	-0.90	.376
Sleep regularity <sup>2</sup>	0.00	[-0.03, 0.02]	0.01	-0.36	.721	-0.02	[-0.04, 0.01]	0.01	-1.51	.157
Age	-0.02	[-0.03, -0.01]	0.00	-4.71	.015	-0.02	[-0.03, -0.01]	0.00	-5.47	.015
Sleep regularity $\times$ weekdaymonday	-0.04	[-0.08, 0.01]	0.02	-1.65	.105	-0.01	[-0.07, 0.05]	0.03	-0.36	.728
Sleep regularity $\times$ weekdaysaturday	-0.03	[-0.07, 0.01]	0.02	-1.41	.162	-0.01	[-0.05, 0.04]	0.02	-0.29	.777
Sleep regularity $\times$ weekdaysunday	0.01	[-0.03, 0.05]	0.02	0.47	.641	0.03	[-0.02, 0.08]	0.03	1.05	.325
Sleep regularity $\times$ weekdaythursday	-0.03	[-0.07, 0.01]	0.02	-1.58	.116	-0.03	[-0.08, 0.02]	0.02	-1.17	.264
Sleep regularity $\times$ weekdaytuesday	-0.02	[-0.06, 0.02]	0.02	-1.10	.273	-0.02	[-0.06, 0.02]	0.02	-1.04	.305
Sleep regularity $\times$ weekdaywednesday	-0.01	[-0.05, 0.04]	0.02	-0.32	.753	-0.02	[-0.07, 0.04]	0.03	-0.67	.525
Weekdaymonday $\times$ Sleep regularity <sup>2</sup>	0.00	[-0.03, 0.03]	0.02	-0.12	.904	0.02	[-0.01, 0.06]	0.02	1.16	.279
Weekdaysaturday $\times$ Sleep regularity <sup>2</sup>	-0.01	[-0.05, 0.03]	0.02	-0.56	.595	0.02	[-0.02, 0.06]	0.02	1.05	.333
Weekdaysunday $\times$ Sleep regularity <sup>2</sup>	-0.01	[-0.05, 0.04]	0.02	-0.28	.787	0.02	[-0.01, 0.05]	0.01	1.53	.136
Weekdaythursday $\times$ Sleep regularity <sup>2</sup>	0.00	[-0.03, 0.04]	0.02	0.25	.805	0.02	[-0.01, 0.06]	0.02	1.29	.225
Weekdaytuesday $\times$ Sleep regularity <sup>2</sup>	0.01	[-0.02, 0.04]	0.02	0.45	.656	0.02	[-0.02, 0.05]	0.02	1.00	.345

Table 13 continued

Term	Physical activity volume (z)			Physical activity intensity (z)				
	$\beta$ [95% CI]	SE	t	p	$\beta$ [95% CI]	SE	t	p
Weekdaywednesday $\times$ Sleep regularity <sup>2</sup>	0.01 [-0.02, 0.04]	0.02	0.70	.490	0.01 [-0.03, 0.04]	0.02	0.45	.663

*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 (z)				Physical activity intensity (z)			
	$\beta$ [95% CI]	SE	t	p	$\beta$ [95% CI]	SE	t	p
Sleep duration (z)								
(Intercept)	0.25 [0.02, 0.48]	0.12	2.16	.031	0.23 [0.02, 0.45]	0.11	2.11	.035
Physical activity	0.14 [0.09, 0.18]	0.02	5.74	< .001	0.10 [0.06, 0.14]	0.02	4.99	< .001
Seasonspring	-0.06 [-0.13, 0.01]	0.04	-1.72	.085	-0.03 [-0.10, 0.05]	0.04	-0.72	.474
Seasonsummer	-0.13 [-0.21, -0.06]	0.04	-3.57	< .001	-0.09 [-0.17, -0.01]	0.04	-2.20	.028
Seasonwinter	0.05 [-0.02, 0.12]	0.04	1.32	.185	0.06 [-0.01, 0.14]	0.04	1.65	.099
Physical activity <sup>2</sup>	-0.02 [-0.03, -0.01]	0.01	-3.04	.003	0.01 [-0.02, 0.04]	0.01	0.74	.458
Age	0.00 [-0.01, 0.00]	0.00	-2.00	.050	0.00 [-0.01, 0.00]	0.00	-2.13	.037
Physical activity × seasonspring	-0.07 [-0.14, -0.01]	0.03	-2.13	.033	-0.04 [-0.08, 0.01]	0.02	-1.41	.159
Physical activity × seasonsummer	-0.01 [-0.08, 0.07]	0.04	-0.22	.827	-0.05 [-0.11, 0.00]	0.03	-1.93	.054
Physical activity × seasonwinter	-0.06 [-0.13, 0.00]	0.03	-1.95	.051	-0.04 [-0.09, 0.01]	0.03	-1.59	.113
Seasonspring × Physical activity <sup>2</sup>	0.02 [0.00, 0.04]	0.01	1.99	.046	-0.01 [-0.04, 0.03]	0.02	-0.47	.637
Seasonsummer × Physical activity <sup>2</sup>	-0.01 [-0.04, 0.02]	0.01	-0.68	.495	-0.05 [-0.09, -0.01]	0.02	-2.62	.009
Seasonwinter × Physical activity <sup>2</sup>	0.01 [-0.01, 0.03]	0.01	1.33	.184	0.00 [-0.04, 0.03]	0.02	-0.01	.991
Sleep efficiency (z)								
(Intercept)	0.22 [-0.02, 0.46]	0.12	1.79	.073	0.22 [-0.03, 0.46]	0.13	1.74	.082
Physical activity	0.10 [0.05, 0.16]	0.03	3.94	< .001	0.05 [0.01, 0.09]	0.02	2.72	.007
Seasonspring	0.04 [-0.04, 0.11]	0.04	1.02	.306	0.06 [-0.01, 0.14]	0.04	1.59	.111
Seasonsummer	-0.03 [-0.11, 0.05]	0.04	-0.74	.460	0.00 [-0.08, 0.08]	0.04	0.00	> .999
Seasonwinter	0.07 [-0.01, 0.14]	0.04	1.80	.072	0.09 [0.01, 0.16]	0.04	2.23	.026
Physical activity <sup>2</sup>	-0.02 [-0.03, -0.01]	0.01	-3.10	.002	0.00 [-0.02, 0.03]	0.01	0.15	.879
Age	0.00 [0.00, 0.01]	0.00	1.36	.173	0.00 [0.00, 0.01]	0.00	1.15	.249

Table 14 continued

TITLE

Term	Physical activity volume (z)				Physical activity intensity (z)			
	$\beta$ [95% CI]	SE	t	p	$\beta$ [95% CI]	SE	t	p
Physical activity $\times$ seasonspring	-0.09 [-0.16, -0.02]	0.03	-2.65	.008	-0.07 [-0.12, -0.02]	0.03	-2.65	.008
Physical activity $\times$ seasonsummer	-0.05 [-0.13, 0.03]	0.04	-1.27	.205	-0.08 [-0.13, -0.02]	0.03	-2.76	.006
Physical activity $\times$ seasonwinter	-0.06 [-0.13, 0.01]	0.04	-1.55	.124	-0.02 [-0.08, 0.03]	0.03	-0.92	.356
Seasonspring $\times$ Physical activity <sup>2</sup>	0.02 [0.00, 0.04]	0.01	1.50	.135	-0.01 [-0.04, 0.03]	0.02	-0.30	.763
Seasonsummer $\times$ Physical activity <sup>2</sup>	0.00 [-0.03, 0.03]	0.01	0.02	.984	-0.03 [-0.07, 0.01]	0.02	-1.48	.139
Seasonwinter $\times$ Physical activity <sup>2</sup>	0.01 [-0.01, 0.03]	0.01	1.19	.235	-0.01 [-0.04, 0.03]	0.02	-0.47	.640
Sleep onset (z)								
(Intercept)	-0.08 [-0.37, 0.20]	0.15	-0.57	.572	-0.04 [-0.32, 0.25]	0.14	-0.26	.792
Physical activity	-0.05 [-0.08, -0.02]	0.02	-2.98	.003	-0.06 [-0.09, -0.03]	0.01	-4.08	< .001
Seasonspring	0.01 [-0.05, 0.06]	0.03	0.19	.849	0.00 [-0.06, 0.05]	0.03	-0.09	.926
Seasonsummer	0.05 [-0.01, 0.10]	0.03	1.59	.112	0.02 [-0.04, 0.08]	0.03	0.65	.514
Seasonwinter	0.02 [-0.04, 0.07]	0.03	0.54	.589	0.01 [-0.05, 0.07]	0.03	0.33	.739
Physical activity <sup>2</sup>	0.01 [0.00, 0.02]	0.00	1.46	.149	0.00 [-0.02, 0.01]	0.01	-0.51	.612
Age	0.00 [0.00, 0.00]	0.00	1.23	.220	0.00 [0.00, 0.00]	0.00	0.73	.465
Physical activity $\times$ seasonspring	-0.03 [-0.08, 0.02]	0.02	-1.32	.186	-0.02 [-0.06, 0.02]	0.02	-1.09	.275
Physical activity $\times$ seasonsummer	0.00 [-0.06, 0.05]	0.03	-0.04	.968	-0.01 [-0.05, 0.03]	0.02	-0.46	.643
Physical activity $\times$ seasonwinter	0.01 [-0.04, 0.06]	0.02	0.42	.677	-0.02 [-0.06, 0.02]	0.02	-1.06	.291
Seasonspring $\times$ Physical activity <sup>2</sup>	0.01 [0.00, 0.03]	0.01	1.58	.114	0.02 [-0.01, 0.04]	0.01	1.39	.165
Seasonsummer $\times$ Physical activity <sup>2</sup>	0.00 [-0.02, 0.02]	0.01	0.18	.859	0.02 [0.00, 0.05]	0.01	1.66	.097
Seasonwinter $\times$ Physical activity <sup>2</sup>	-0.01 [-0.02, 0.00]	0.01	-1.20	.232	0.00 [-0.02, 0.02]	0.01	-0.03	.980
Sleep regularity (z)								
(Intercept)	0.47 [0.27, 0.67]	0.10	4.59	< .001	0.57 [0.34, 0.80]	0.12	4.93	< .001
Physical activity	0.22 [0.17, 0.28]	0.03	8.32	< .001	0.13 [0.07, 0.19]	0.03	4.41	.002

Table 14 continued

Term	Physical activity volume (z)				Physical activity intensity (z)			
	$\beta$ [95% CI]	SE	t	p	$\beta$ [95% CI]	SE	t	p
Seasonspring	-0.04 [-0.13, 0.04]	0.04	-1.05	.302	-0.07 [-0.16, 0.02]	0.05	-1.50	.146
Seasonsummer	0.02 [-0.06, 0.10]	0.04	0.48	.630	0.02 [-0.06, 0.11]	0.04	0.55	.583
Seasonwinter	-0.04 [-0.12, 0.04]	0.04	-1.05	.294	-0.03 [-0.12, 0.05]	0.04	-0.70	.487
Physical activity <sup>2</sup>	-0.04 [-0.05, -0.03]	0.01	-5.91	< .001	-0.04 [-0.07, -0.01]	0.01	-2.56	.011
Age	0.00 [0.00, 0.00]	0.00	0.94	.345	0.00 [0.00, 0.00]	0.00	0.54	.586
Physical activity × seasonspring	0.01 [-0.06, 0.08]	0.04	0.20	.841	-0.06 [-0.12, -0.01]	0.03	-2.15	.035
Physical activity × seasonsummer	0.07 [-0.03, 0.16]	0.05	1.36	.186	0.00 [-0.10, 0.09]	0.05	-0.08	.937
Physical activity × seasonwinter	-0.01 [-0.08, 0.07]	0.04	-0.20	.839	-0.04 [-0.11, 0.03]	0.04	-1.04	.324
Seasonspring × Physical activity <sup>2</sup>	-0.01 [-0.04, 0.01]	0.01	-0.86	.396	0.02 [-0.02, 0.06]	0.02	0.80	.423
Seasonsummer × Physical activity <sup>2</sup>	-0.03 [-0.06, 0.01]	0.02	-1.56	.128	-0.02 [-0.08, 0.04]	0.03	-0.59	.568
Seasonwinter × Physical activity <sup>2</sup>	0.01 [-0.01, 0.03]	0.01	1.06	.288	0.00 [-0.04, 0.04]	0.02	-0.02	.985

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 (z)				Physical activity intensity (z)			
	$\beta$ [95% CI]	SE	t	p	$\beta$ [95% CI]	SE	t	p
Sleep duration (z)								
(Intercept)	1.32 [0.93, 1.72]	0.20	6.59	< .001	1.28 [1.04, 1.52]	0.12	10.41	< .001
Sleep duration	0.00 [-0.02, 0.03]	0.01	0.33	.740	0.03 [0.00, 0.05]	0.01	2.36	.019
Seasonspring	0.01 [-0.05, 0.07]	0.03	0.35	.730	-0.01 [-0.07, 0.05]	0.03	-0.42	.676
Seasonsummer	-0.07 [-0.13, 0.00]	0.03	-1.97	.050	-0.08 [-0.14, -0.02]	0.03	-2.52	.012
Seasonwinter	-0.01 [-0.07, 0.06]	0.03	-0.27	.788	0.01 [-0.05, 0.07]	0.03	0.32	.750
Sleep duration <sup>2</sup>	-0.01 [-0.03, 0.00]	0.01	-1.89	.072	0.01 [-0.01, 0.02]	0.01	0.83	.410
Age	-0.02 [-0.03, -0.01]	0.00	-4.67	.016	-0.02 [-0.03, -0.01]	0.00	-5.47	.015
Sleep duration × seasonspring	-0.04 [-0.07, 0.00]	0.02	-1.98	.050	-0.03 [-0.07, 0.01]	0.02	-1.38	.187
Sleep duration × seasonsummer	-0.03 [-0.07, 0.01]	0.02	-1.31	.196	-0.03 [-0.07, 0.01]	0.02	-1.59	.112
Sleep duration × seasonwinter	0.02 [-0.02, 0.05]	0.02	0.87	.386	-0.02 [-0.05, 0.02]	0.02	-0.85	.399
Seasonspring × Sleep duration <sup>2</sup>	-0.01 [-0.03, 0.01]	0.01	-1.30	.195	-0.01 [-0.03, 0.00]	0.01	-1.82	.075
Seasonsummer × Sleep duration <sup>2</sup>	0.00 [-0.02, 0.02]	0.01	0.10	.922	-0.02 [-0.04, 0.00]	0.01	-1.85	.067
Seasonwinter × Sleep duration <sup>2</sup>	-0.01 [-0.03, 0.01]	0.01	-0.69	.502	-0.01 [-0.03, 0.00]	0.01	-1.68	.094
Sleep efficiency (z)								
(Intercept)	1.31 [0.92, 1.70]	0.20	6.57	< .001	1.29 [1.05, 1.53]	0.12	10.48	< .001
Sleep efficiency	0.03 [0.00, 0.06]	0.01	1.95	.052	0.02 [-0.01, 0.04]	0.01	1.14	.253
Seasonspring	0.01 [-0.06, 0.07]	0.03	0.19	.846	-0.03 [-0.09, 0.03]	0.03	-1.02	.308
Seasonsummer	-0.07 [-0.13, -0.01]	0.03	-2.15	.031	-0.10 [-0.16, -0.04]	0.03	-3.42	< .001
Seasonwinter	-0.01 [-0.07, 0.05]	0.03	-0.30	.764	0.00 [-0.06, 0.05]	0.03	-0.14	.890
Sleep efficiency <sup>2</sup>	0.00 [-0.01, 0.01]	0.00	0.09	.929	0.00 [-0.01, 0.01]	0.00	0.40	.688
Age	-0.02 [-0.03, -0.01]	0.00	-4.68	.015	-0.02 [-0.03, -0.01]	0.00	-5.48	.015

Table 15 continued

## TITLE

Term	Physical activity volume (z)					Physical activity intensity (z)			
	$\beta$ [95% CI]	SE	t	p	$\beta$ [95% CI]	SE	t	p	
Sleep efficiency $\times$ seasonspring	-0.05 [-0.10, -0.01]	0.02	-2.39	.021	-0.01 [-0.05, 0.03]	0.02	-0.63	.532	
Sleep efficiency $\times$ seasonsummer	-0.01 [-0.06, 0.03]	0.02	-0.58	.562	0.00 [-0.04, 0.05]	0.02	0.21	.837	
Sleep efficiency $\times$ seasonwinter	-0.05 [-0.10, 0.00]	0.02	-2.13	.047	-0.02 [-0.06, 0.02]	0.02	-1.04	.301	
Seasonspring $\times$ Sleep efficiency <sup>2</sup>	-0.01 [-0.02, 0.00]	0.01	-1.23	.224	0.00 [-0.01, 0.01]	0.01	-0.19	.851	
Seasonsummer $\times$ Sleep efficiency <sup>2</sup>	0.01 [-0.01, 0.02]	0.01	0.76	.450	0.00 [-0.01, 0.02]	0.01	0.77	.441	
Seasonwinter $\times$ Sleep efficiency <sup>2</sup>	-0.01 [-0.02, 0.00]	0.01	-1.33	.185	0.00 [-0.02, 0.01]	0.01	-0.39	.702	
Sleep onset (z)									
(Intercept)	1.34 [0.94, 1.74]	0.20	6.55	< .001	1.30 [1.05, 1.54]	0.13	10.25	< .001	
Sleep onset	0.01 [-0.02, 0.04]	0.01	0.85	.395	-0.01 [-0.05, 0.02]	0.02	-0.61	.555	
Seasonspring	-0.04 [-0.10, 0.03]	0.03	-1.05	.296	-0.04 [-0.10, 0.02]	0.03	-1.43	.152	
Seasonsummer	-0.09 [-0.17, -0.02]	0.04	-2.55	.012	-0.11 [-0.17, -0.05]	0.03	-3.57	< .001	
Seasonwinter	-0.03 [-0.10, 0.03]	0.03	-0.94	.347	-0.01 [-0.07, 0.06]	0.03	-0.18	.858	
Sleep onset <sup>2</sup>	-0.03 [-0.05, 0.00]	0.01	-2.29	.040	0.00 [-0.02, 0.01]	0.01	-0.48	.641	
Age	-0.02 [-0.03, -0.01]	0.00	-4.61	.017	-0.02 [-0.03, -0.01]	0.00	-5.44	.015	
Sleep onset $\times$ seasonspring	-0.03 [-0.07, 0.01]	0.02	-1.42	.157	0.01 [-0.03, 0.05]	0.02	0.56	.579	
Sleep onset $\times$ seasonsummer	-0.02 [-0.06, 0.03]	0.02	-0.66	.508	0.03 [-0.01, 0.07]	0.02	1.36	.176	
Sleep onset $\times$ seasonwinter	-0.06 [-0.11, 0.00]	0.03	-2.14	.061	-0.01 [-0.06, 0.03]	0.02	-0.56	.584	
Seasonspring $\times$ Sleep onset <sup>2</sup>	0.03 [0.01, 0.06]	0.01	2.35	.025	0.01 [-0.01, 0.03]	0.01	1.17	.243	
Seasonsummer $\times$ Sleep onset <sup>2</sup>	0.03 [-0.01, 0.06]	0.02	1.56	.148	0.02 [-0.01, 0.04]	0.01	1.16	.250	
Seasonwinter $\times$ Sleep onset <sup>2</sup>	0.01 [-0.02, 0.04]	0.01	0.74	.459	0.00 [-0.03, 0.02]	0.01	-0.07	.941	
Sleep regularity (z)									
(Intercept)	1.29 [0.90, 1.68]	0.20	6.54	< .001	1.27 [1.04, 1.51]	0.12	10.48	< .001	
Sleep regularity	0.06 [0.03, 0.08]	0.01	4.11	< .001	0.05 [0.03, 0.08]	0.01	4.33	< .001	

Table 15 continued

Term	Physical activity volume (z)				Physical activity intensity (z)			
	$\beta$ [95% CI]	SE	t	p	$\beta$ [95% CI]	SE	t	p
Seasonspring	0.00 [-0.06, 0.06]	0.03	-0.04	.965	-0.02 [-0.08, 0.04]	0.03	-0.70	.482
Seasonsummer	-0.08 [-0.15, -0.01]	0.03	-2.37	.018	-0.09 [-0.15, -0.02]	0.03	-2.64	.009
Seasonwinter	-0.02 [-0.08, 0.04]	0.03	-0.62	.538	-0.01 [-0.06, 0.05]	0.03	-0.17	.862
Sleep regularity <sup>2</sup>	-0.01 [-0.03, 0.01]	0.01	-1.11	.285	0.00 [-0.01, 0.02]	0.01	0.31	.760
Age	-0.02 [-0.03, -0.01]	0.00	-4.74	.014	-0.02 [-0.03, -0.01]	0.00	-5.54	.014
Sleep regularity $\times$ seasonspring	0.03 [-0.01, 0.08]	0.02	1.35	.213	-0.02 [-0.06, 0.02]	0.02	-0.97	.345
Sleep regularity $\times$ seasonsummer	0.00 [-0.04, 0.03]	0.02	-0.23	.818	-0.03 [-0.08, 0.02]	0.03	-1.28	.243
Sleep regularity $\times$ seasonwinter	0.00 [-0.06, 0.06]	0.03	-0.08	.942	-0.03 [-0.07, 0.01]	0.02	-1.40	.187
Seasonspring $\times$ Sleep regularity <sup>2</sup>	0.01 [-0.02, 0.03]	0.01	0.63	.535	-0.01 [-0.03, 0.01]	0.01	-0.62	.537
Seasonsummer $\times$ Sleep regularity <sup>2</sup>	0.02 [-0.01, 0.05]	0.01	1.28	.223	-0.01 [-0.04, 0.03]	0.02	-0.41	.698
Seasonwinter $\times$ Sleep regularity <sup>2</sup>	0.01 [-0.02, 0.04]	0.02	0.54	.609	0.00 [-0.02, 0.02]	0.01	0.07	.942

*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 (z)			Physical activity intensity (z)				
	$\beta$ [95% CI]	SE	t	p	$\beta$ [95% CI]	SE	t	p
Sleep duration (z)								
(Intercept)	0.39 [0.12, 0.66]	0.14	2.84	.005	0.40 [0.14, 0.67]	0.13	3.01	.003
Physical activity	0.03 [-0.05, 0.11]	0.04	0.69	.492	0.02 [-0.07, 0.11]	0.05	0.47	.639
Regioneurope	-0.17 [-0.34, 0.01]	0.09	-1.88	.061	-0.18 [-0.36, 0.00]	0.09	-1.93	.053
Regionafrica	-0.22 [-0.43, -0.01]	0.11	-2.10	.036	-0.24 [-0.46, -0.03]	0.11	-2.22	.026
Regionasia	-0.38 [-0.63, -0.13]	0.13	-2.94	.003	-0.47 [-0.70, -0.24]	0.12	-3.99	< .001
Regionnorth america	-0.01 [-0.22, 0.20]	0.11	-0.07	.943	-0.06 [-0.27, 0.15]	0.11	-0.55	.583
Regionsouth america	-0.32 [-0.51, -0.13]	0.10	-3.34	< .001	-0.37 [-0.56, -0.17]	0.10	-3.66	< .001
Physical activity <sup>2</sup>	0.00 [-0.01, 0.02]	0.01	0.55	.580	0.03 [-0.01, 0.08]	0.02	1.56	.120
Age	0.00 [-0.01, 0.00]	0.00	-1.87	.066	0.00 [-0.01, 0.00]	0.00	-1.95	.055
Physical activity × regioneurope	0.07 [-0.01, 0.16]	0.04	1.67	.100	0.04 [-0.05, 0.14]	0.05	0.91	.363
Physical activity × regionafrica	0.01 [-0.14, 0.16]	0.07	0.14	.889	0.06 [-0.15, 0.27]	0.11	0.59	.558
Physical activity × regionasia	0.10 [-0.12, 0.32]	0.11	0.87	.386	0.16 [-0.04, 0.37]	0.11	1.54	.123
Physical activity × regionnorth america	0.08 [-0.06, 0.22]	0.07	1.08	.281	0.04 [-0.12, 0.20]	0.08	0.45	.652
Physical activity × regionsouth america	0.08 [-0.03, 0.20]	0.06	1.37	.177	0.01 [-0.11, 0.14]	0.06	0.17	.867
Regioneurope × Physical activity <sup>2</sup>	-0.02 [-0.04, 0.00]	0.01	-2.04	.049	-0.04 [-0.09, 0.00]	0.02	-1.81	.070
Regionafrica × Physical activity <sup>2</sup>	-0.04 [-0.15, 0.06]	0.05	-0.80	.424	-0.02 [-0.15, 0.11]	0.07	-0.36	.716
Regionasia × Physical activity <sup>2</sup>	-0.08 [-0.27, 0.11]	0.10	-0.82	.411	-0.08 [-0.25, 0.09]	0.09	-0.94	.346
Regionnorth america × Physical activity <sup>2</sup>	-0.01 [-0.05, 0.03]	0.02	-0.41	.684	0.02 [-0.08, 0.12]	0.05	0.38	.705
Regionsouth america × Physical activity <sup>2</sup>	-0.11 [-0.18, -0.04]	0.04	-2.96	.003	-0.04 [-0.12, 0.04]	0.04	-1.03	.303
Sleep efficiency (z)								
(Intercept)	0.32 [0.04, 0.59]	0.14	2.25	.024	0.37 [0.09, 0.65]	0.14	2.60	.009

Table 16 continued

TITLE

Term	Physical activity volume (z)			Physical activity intensity (z)				
	$\beta$ [95% CI]	SE	t	p	$\beta$ [95% CI]	SE	t	p
Physical activity	-0.05 [-0.12, 0.03]	0.04	-1.21	.226	-0.03 [-0.12, 0.06]	0.04	-0.66	.511
Regioneurope	-0.09 [-0.27, 0.09]	0.09	-1.00	.318	-0.13 [-0.32, 0.06]	0.10	-1.37	.171
Regionafrica	-0.07 [-0.29, 0.14]	0.11	-0.65	.514	-0.04 [-0.26, 0.19]	0.12	-0.32	.752
Regionasia	-0.41 [-0.67, -0.15]	0.13	-3.06	.002	-0.49 [-0.74, -0.25]	0.12	-3.98	< .001
Regionnorth america	0.14 [-0.08, 0.36]	0.11	1.22	.223	-0.05 [-0.27, 0.17]	0.11	-0.45	.655
Regionsouth america	-0.02 [-0.21, 0.18]	0.10	-0.16	.875	-0.19 [-0.39, 0.01]	0.10	-1.86	.063
Physical activity <sup>2</sup>	0.01 [-0.01, 0.02]	0.01	1.11	.269	0.00 [-0.04, 0.05]	0.02	0.16	.872
Age	0.00 [0.00, 0.01]	0.00	1.34	.180	0.00 [0.00, 0.01]	0.00	1.22	.222
Physical activity × regioneurope	0.09 [0.01, 0.17]	0.04	2.18	.029	0.05 [-0.05, 0.14]	0.05	0.98	.326
Physical activity × regionafrica	-0.01 [-0.15, 0.14]	0.07	-0.09	.927	-0.06 [-0.27, 0.15]	0.11	-0.53	.593
Physical activity × regionasia	0.01 [-0.22, 0.23]	0.11	0.08	.935	0.07 [-0.14, 0.28]	0.11	0.67	.504
Physical activity × regionnorth america	0.23 [0.09, 0.37]	0.07	3.14	.002	0.18 [0.02, 0.33]	0.08	2.23	.026
Physical activity × regionsouth america	0.23 [0.13, 0.34]	0.05	4.30	< .001	0.00 [-0.13, 0.12]	0.06	-0.03	.973
Regioneurope × Physical activity <sup>2</sup>	-0.02 [-0.03, 0.00]	0.01	-1.93	.054	-0.01 [-0.05, 0.04]	0.02	-0.34	.734
Regionafrica × Physical activity <sup>2</sup>	0.00 [-0.11, 0.11]	0.05	0.00	.996	0.03 [-0.10, 0.15]	0.07	0.39	.698
Regionasia × Physical activity <sup>2</sup>	-0.10 [-0.29, 0.09]	0.10	-1.01	.310	0.06 [-0.11, 0.22]	0.09	0.66	.509
Regionnorth america × Physical activity <sup>2</sup>	-0.08 [-0.12, -0.03]	0.02	-3.56	< .001	-0.04 [-0.14, 0.07]	0.05	-0.69	.488
Regionsouth america × Physical activity <sup>2</sup>	-0.21 [-0.29, -0.13]	0.04	-5.36	< .001	-0.01 [-0.11, 0.08]	0.05	-0.24	.811
Sleep onset (z)								
(Intercept)	-0.17 [-0.48, 0.14]	0.16	-1.08	.279	-0.10 [-0.40, 0.21]	0.16	-0.62	.537
Physical activity	-0.04 [-0.10, 0.01]	0.03	-1.48	.140	-0.09 [-0.16, -0.02]	0.04	-2.38	.021
Regioneurope	0.13 [-0.02, 0.27]	0.07	1.72	.086	0.10 [-0.05, 0.25]	0.08	1.35	.178
Regionafrica	0.09 [-0.07, 0.26]	0.08	1.09	.274	0.06 [-0.12, 0.23]	0.09	0.63	.532

Table 16 continued

TITLE

Term	Physical activity volume (z)			Physical activity intensity (z)				
	$\beta$ [95% CI]	SE	t	p	$\beta$ [95% CI]	SE	t	p
Regionasia	0.12 [-0.08, 0.32]	0.10	1.17	.243	0.11 [-0.08, 0.29]	0.09	1.15	.251
Regionnorth america	0.07 [-0.10, 0.24]	0.09	0.79	.431	-0.02 [-0.19, 0.15]	0.09	-0.27	.788
Regionsouth america	0.11 [-0.04, 0.27]	0.08	1.41	.158	0.04 [-0.12, 0.20]	0.08	0.52	.603
Physical activity <sup>2</sup>	0.00 [-0.01, 0.01]	0.01	-0.56	.574	-0.02 [-0.05, 0.01]	0.02	-1.37	.171
Age	0.00 [0.00, 0.00]	0.00	1.03	.304	0.00 [0.00, 0.00]	0.00	0.57	.568
Physical activity × regioneurope	-0.03 [-0.09, 0.03]	0.03	-1.05	.293	0.02 [-0.05, 0.09]	0.04	0.47	.638
Physical activity × regionafrica	0.03 [-0.07, 0.13]	0.05	0.60	.551	-0.02 [-0.17, 0.14]	0.08	-0.21	.834
Physical activity × regionasia	-0.10 [-0.26, 0.06]	0.08	-1.28	.202	-0.05 [-0.19, 0.10]	0.08	-0.59	.553
Physical activity × regionnorth america	0.08 [-0.02, 0.18]	0.05	1.54	.123	0.12 [0.00, 0.24]	0.06	2.00	.050
Physical activity × regionsouth america	0.02 [-0.06, 0.10]	0.04	0.55	.580	-0.02 [-0.11, 0.07]	0.05	-0.50	.616
Regioneurope × Physical activity <sup>2</sup>	0.02 [0.01, 0.03]	0.01	2.74	.006	0.03 [0.00, 0.06]	0.02	1.83	.067
Regionafrica × Physical activity <sup>2</sup>	0.00 [-0.08, 0.08]	0.04	0.00	.998	0.04 [-0.06, 0.13]	0.05	0.76	.444
Regionasia × Physical activity <sup>2</sup>	-0.03 [-0.16, 0.11]	0.07	-0.39	.693	0.08 [-0.04, 0.20]	0.06	1.30	.194
Regionnorth america × Physical activity <sup>2</sup>	0.02 [-0.01, 0.05]	0.02	1.04	.300	-0.02 [-0.10, 0.05]	0.04	-0.62	.537
Regionsouth america × Physical activity <sup>2</sup>	0.01 [-0.04, 0.07]	0.03	0.52	.607	0.09 [0.03, 0.16]	0.03	2.74	.011
Sleep regularity (z)								
(Intercept)	0.29 [0.05, 0.53]	0.12	2.35	.019	0.52 [0.26, 0.79]	0.14	3.84	< .001
Physical activity	0.21 [0.11, 0.31]	0.05	4.14	.001	0.10 [-0.01, 0.21]	0.06	1.85	.074
Regioneurope	0.25 [0.07, 0.42]	0.09	2.80	.005	0.10 [-0.09, 0.29]	0.10	1.03	.304
Regionafrica	0.43 [0.21, 0.64]	0.11	3.94	< .001	0.22 [0.00, 0.45]	0.12	1.92	.055
Regionasia	0.28 [0.02, 0.54]	0.13	2.11	.035	0.18 [-0.06, 0.42]	0.12	1.44	.151
Regionnorth america	0.15 [-0.08, 0.38]	0.12	1.26	.214	-0.12 [-0.36, 0.12]	0.12	-0.99	.328
Regionsouth america	0.11 [-0.08, 0.30]	0.10	1.16	.247	-0.08 [-0.28, 0.11]	0.10	-0.84	.403

Table 16 continued

TITLE

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Term	Physical activity volume (z)				Physical activity intensity (z)			
	$\beta$ [95% CI]	SE	t	p	$\beta$ [95% CI]	SE	t	p
Physical activity <sup>2</sup>	-0.03 [-0.04, -0.01]	0.01	-2.89	.006	-0.09 [-0.15, -0.04]	0.03	-3.56	< .001
Age	0.00 [0.00, 0.00]	0.00	0.61	.541	0.00 [0.00, 0.00]	0.00	-0.08	.934
Physical activity × regioneurope	0.03 [-0.09, 0.14]	0.06	0.46	.656	-0.01 [-0.14, 0.11]	0.06	-0.23	.824
Physical activity × regionafrica	-0.10 [-0.27, 0.08]	0.09	-1.06	.294	0.30 [0.06, 0.54]	0.12	2.42	.016
Physical activity × regionasia	-0.25 [-0.50, 0.00]	0.13	-1.95	.051	0.20 [-0.04, 0.43]	0.12	1.62	.107
Physical activity × regionnorth america	0.12 [-0.04, 0.29]	0.09	1.45	.153	0.22 [0.00, 0.44]	0.11	1.93	.078
Physical activity × regionsouth america	0.01 [-0.12, 0.14]	0.07	0.20	.846	0.12 [-0.01, 0.25]	0.07	1.78	.076
Regioneurope × Physical activity <sup>2</sup>	-0.02 [-0.04, 0.00]	0.01	-1.65	.110	0.07 [0.02, 0.13]	0.03	2.63	.012
Regionafrica × Physical activity <sup>2</sup>	-0.13 [-0.25, -0.01]	0.06	-2.09	.037	-0.09 [-0.25, 0.06]	0.08	-1.21	.230
Regionasia × Physical activity <sup>2</sup>	-0.17 [-0.38, 0.04]	0.11	-1.60	.110	-0.10 [-0.30, 0.09]	0.10	-1.06	.292
Regionnorth america × Physical activity <sup>2</sup>	-0.08 [-0.12, -0.03]	0.02	-3.32	< .001	-0.07 [-0.19, 0.06]	0.06	-1.04	.305
Regionsouth america × Physical activity <sup>2</sup>	-0.12 [-0.21, -0.04]	0.04	-2.86	.006	-0.03 [-0.13, 0.06]	0.05	-0.73	.468

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*

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)	1.68 [1.28, 2.08]	0.20	8.31	< .001	1.52 [1.28, 1.76]	0.12	12.34	< .001
Sleep duration	0.00 [-0.05, 0.06]	0.03	0.04	.968	0.01 [-0.04, 0.06]	0.02	0.43	.667
Regioneurope	-0.42 [-0.60, -0.23]	0.10	-4.39	< .001	-0.26 [-0.41, -0.11]	0.08	-3.35	< .001
Regionafrica	-0.35 [-0.57, -0.14]	0.11	-3.21	.002	-0.17 [-0.35, 0.01]	0.09	-1.83	.067
Regionasia	-0.64 [-0.87, -0.40]	0.12	-5.30	< .001	-0.56 [-0.76, -0.35]	0.10	-5.35	< .001
Regionnorth america	-0.61 [-0.83, -0.39]	0.11	-5.49	< .001	-0.38 [-0.56, -0.19]	0.09	-3.98	< .001
Regionsouth america	-0.48 [-0.68, -0.29]	0.10	-4.85	< .001	-0.42 [-0.58, -0.26]	0.08	-5.16	< .001
Sleep duration <sup>2</sup>	-0.02 [-0.05, 0.01]	0.02	-1.43	.230	0.00 [-0.01, 0.02]	0.01	0.22	.823
Age	-0.02 [-0.03, -0.01]	0.00	-4.74	.015	-0.02 [-0.03, -0.01]	0.00	-5.77	.013
Sleep duration × regioneurope	-0.02 [-0.07, 0.04]	0.03	-0.55	.593	0.00 [-0.04, 0.05]	0.02	0.17	.865
Sleep duration × regionafrica	0.04 [0.06, 0.14]	0.05	0.78	.451	-0.03 [-0.11, 0.06]	0.04	-0.60	.553
Sleep duration × regionasia	0.02 [-0.11, 0.16]	0.07	0.37	.716	0.05 [-0.08, 0.18]	0.07	0.74	.470
Sleep duration × regionnorth america	0.06 [-0.03, 0.16]	0.05	1.29	.224	0.03 [-0.07, 0.12]	0.05	0.53	.608
Sleep duration × regionsouth america	-0.02 [-0.10, 0.05]	0.04	-0.65	.526	-0.02 [-0.08, 0.04]	0.03	-0.68	.497
Regioneurope × Sleep duration <sup>2</sup>	0.00 [-0.03, 0.03]	0.02	0.09	.932	-0.01 [-0.03, 0.01]	0.01	-1.20	.233
Regionafrica × Sleep duration <sup>2</sup>	0.03 [-0.02, 0.08]	0.02	1.23	.250	-0.02 [-0.05, 0.02]	0.02	-1.10	.272
Regionasia × Sleep duration <sup>2</sup>	0.01 [-0.06, 0.07]	0.03	0.25	.807	0.02 [-0.04, 0.08]	0.03	0.72	.483
Regionnorth america × Sleep duration <sup>2</sup>	0.02 [-0.02, 0.07]	0.02	1.08	.305	0.00 [-0.03, 0.03]	0.02	0.06	.951
Regionsouth america × Sleep duration <sup>2</sup>	0.01 [-0.03, 0.05]	0.02	0.59	.581	-0.01 [-0.04, 0.02]	0.01	-0.65	.523
Sleep efficiency (z)								
(Intercept)	1.64 [1.24, 2.04]	0.20	8.06	< .001	1.53 [1.29, 1.77]	0.12	12.45	< .001

Table 17 continued

## TITLE

Term	Physical activity volume (z)				Physical activity intensity (z)			
	$\beta$ [95% CI]	SE	t	p	$\beta$ [95% CI]	SE	t	p
Sleep efficiency	-0.08 [-0.14, -0.03]	0.03	-3.01	.003	-0.02 [-0.07, 0.04]	0.03	-0.65	.519
Regioneurope	-0.40 [-0.58, -0.23]	0.09	-4.55	< .001	-0.27 [-0.41, -0.12]	0.07	-3.63	< .001
Regionafrica	-0.28 [-0.47, -0.08]	0.10	-2.80	.005	-0.21 [-0.38, -0.04]	0.08	-2.48	.013
Regionasia	-0.58 [-0.79, -0.37]	0.11	-5.31	< .001	-0.51 [-0.69, -0.32]	0.09	-5.38	< .001
Regionnorth america	-0.51 [-0.70, -0.32]	0.10	-5.27	< .001	-0.35 [-0.51, -0.19]	0.08	-4.22	< .001
Regionsouth america	-0.45 [-0.63, -0.27]	0.09	-4.89	< .001	-0.45 [-0.60, -0.30]	0.08	-5.80	< .001
Sleep efficiency <sup>2</sup>	-0.02 [-0.03, 0.00]	0.01	-2.16	.035	0.00 [-0.02, 0.01]	0.01	-0.72	.471
Age	-0.02 [-0.03, -0.01]	0.00	-4.73	.015	-0.02 [-0.03, -0.01]	0.00	-5.79	.013
Sleep efficiency × regioneurope	0.09 [0.03, 0.14]	0.03	3.08	.002	0.03 [-0.03, 0.09]	0.03	0.98	.332
Sleep efficiency × regionafrica	0.07 [-0.03, 0.16]	0.05	1.31	.200	-0.03 [-0.12, 0.06]	0.05	-0.60	.549
Sleep efficiency × regionasia	0.11 [0.00, 0.23]	0.06	2.00	.051	0.10 [0.00, 0.20]	0.05	1.93	.055
Sleep efficiency × regionnorth america	0.09 [-0.02, 0.21]	0.06	1.57	.157	0.06 [-0.03, 0.15]	0.05	1.31	.203
Sleep efficiency × regionsouth america	0.09 [0.03, 0.16]	0.03	2.84	.005	0.01 [-0.06, 0.07]	0.03	0.26	.798
Regioneurope × Sleep efficiency <sup>2</sup>	0.02 [0.00, 0.03]	0.01	2.16	.031	0.01 [-0.01, 0.02]	0.01	0.81	.420
Regionafrica × Sleep efficiency <sup>2</sup>	0.01 [-0.02, 0.03]	0.01	0.64	.531	0.00 [-0.02, 0.02]	0.01	-0.30	.765
Regionasia × Sleep efficiency <sup>2</sup>	0.02 [-0.01, 0.04]	0.01	1.45	.149	0.02 [0.00, 0.05]	0.01	1.84	.067
Regionnorth america × Sleep efficiency <sup>2</sup>	0.01 [-0.01, 0.04]	0.01	1.22	.234	0.01 [-0.01, 0.03]	0.01	0.98	.334
Regionsouth america × Sleep efficiency <sup>2</sup>	0.01 [0.00, 0.03]	0.01	1.58	.120	0.00 [-0.01, 0.02]	0.01	0.61	.540
Sleep onset (z)								
(Intercept)	1.58 [1.11, 2.04]	0.24	6.65	< .001	1.45 [1.17, 1.72]	0.14	10.36	< .001
Sleep onset	-0.09 [-0.20, 0.02]	0.06	-1.54	.216	-0.07 [-0.14, 0.00]	0.03	-1.94	.091
Regioneurope	-0.32 [-0.55, -0.09]	0.12	-2.76	.013	-0.18 [-0.34, -0.02]	0.08	-2.20	.028
Regionafrica	-0.22 [-0.47, 0.03]	0.13	-1.74	.086	-0.15 [-0.35, 0.05]	0.10	-1.44	.151

Table 17 continued

TITLE

Term	Physical activity volume (z)				Physical activity intensity (z)			
	$\beta$ [95% CI]	SE	t	p	$\beta$ [95% CI]	SE	t	p
Regionasia	-0.48 [-0.75, -0.21]	0.14	-3.50	< .001	-0.38 [-0.61, -0.16]	0.11	-3.36	< .001
Regionnorth america	-0.48 [-0.76, -0.20]	0.14	-3.33	.005	-0.27 [-0.48, -0.06]	0.11	-2.56	.012
Regionsouth america	-0.38 [-0.62, -0.14]	0.12	-3.10	.006	-0.36 [-0.53, -0.19]	0.09	-4.09	< .001
Sleep onset <sup>2</sup>	0.00 [-0.04, 0.04]	0.02	0.08	.934	0.03 [-0.01, 0.06]	0.02	1.46	.162
Age	-0.02 [-0.03, -0.01]	0.00	-4.52	.019	-0.02 [-0.03, -0.01]	0.00	-5.72	.013
Sleep onset × regioneurope	0.08 [-0.03, 0.19]	0.06	1.51	.216	0.07 [0.01, 0.14]	0.03	2.11	.057
Sleep onset × regionafrica	0.12 [-0.06, 0.29]	0.09	1.32	.218	0.04 [-0.14, 0.22]	0.09	0.43	.681
Sleep onset × regionasia	0.10 [-0.13, 0.32]	0.12	0.85	.406	0.02 [-0.16, 0.21]	0.10	0.25	.800
Sleep onset × regionnorth america	0.06 [-0.10, 0.23]	0.08	0.79	.450	0.11 [-0.01, 0.24]	0.07	1.73	.094
Sleep onset × regionsouth america	0.08 [-0.05, 0.21]	0.07	1.17	.314	0.07 [-0.01, 0.15]	0.04	1.73	.101
Regioneurope × Sleep onset <sup>2</sup>	-0.01 [-0.05, 0.03]	0.02	-0.60	.560	-0.03 [-0.06, 0.01]	0.02	-1.51	.140
Regionafrica × Sleep onset <sup>2</sup>	0.03 [-0.07, 0.13]	0.05	0.62	.537	-0.02 [-0.14, 0.10]	0.06	-0.31	.765
Regionasia × Sleep onset <sup>2</sup>	-0.03 [-0.18, 0.12]	0.08	-0.41	.680	-0.11 [-0.29, 0.06]	0.09	-1.26	.225
Regionnorth america × Sleep onset <sup>2</sup>	0.01 [-0.09, 0.10]	0.05	0.14	.890	0.01 [-0.07, 0.09]	0.04	0.29	.774
Regionsouth america × Sleep onset <sup>2</sup>	-0.01 [-0.05, 0.03]	0.02	-0.44	.658	-0.02 [-0.06, 0.02]	0.02	-0.92	.359
Sleep regularity (z)								
(Intercept)	1.63 [1.23, 2.03]	0.21	7.92	< .001	1.51 [1.26, 1.76]	0.13	11.93	< .001
Sleep regularity	0.08 [0.00, 0.16]	0.04	1.98	.141	0.01 [-0.04, 0.05]	0.02	0.33	.747
Regioneurope	-0.43 [-0.61, -0.26]	0.09	-4.82	< .001	-0.27 [-0.41, -0.12]	0.07	-3.60	< .001
Regionafrica	-0.29 [-0.49, -0.09]	0.10	-2.90	.004	-0.21 [-0.38, -0.04]	0.09	-2.39	.017
Regionasia	-0.64 [-0.86, -0.42]	0.11	-5.79	< .001	-0.51 [-0.70, -0.33]	0.10	-5.36	< .001
Regionnorth america	-0.52 [-0.72, -0.33]	0.10	-5.19	< .001	-0.32 [-0.48, -0.15]	0.08	-3.76	< .001
Regionsouth america	-0.48 [-0.66, -0.30]	0.09	-5.17	< .001	-0.44 [-0.60, -0.29]	0.08	-5.60	< .001

Table 17 continued

## TITLE

Term	Physical activity volume (z)				Physical activity intensity (z)			
	$\beta$ [95% CI]	SE	t	p	$\beta$ [95% CI]	SE	t	p
Sleep regularity <sup>2</sup>	0.00 [-0.02, 0.03]	0.01	0.06	.952	0.00 [-0.03, 0.03]	0.01	-0.11	.912
Age	-0.02 [-0.03, -0.01]	0.00	-4.75	.015	-0.02 [-0.03, -0.01]	0.00	-5.77	.013
Sleep regularity × regioneurope	-0.03 [-0.10, 0.05]	0.04	-0.65	.556	0.02 [-0.02, 0.06]	0.02	0.87	.384
Sleep regularity × regionafrica	-0.09 [-0.19, 0.01]	0.05	-1.68	.128	0.04 [-0.05, 0.13]	0.05	0.82	.425
Sleep regularity × regionasia	0.01 [-0.13, 0.14]	0.07	0.08	.936	0.08 [-0.03, 0.20]	0.06	1.43	.173
Sleep regularity × regionnorth america	-0.01 [-0.11, 0.10]	0.05	-0.15	.887	0.06 [-0.03, 0.15]	0.04	1.35	.196
Sleep regularity × regionsouth america	0.02 [-0.07, 0.10]	0.04	0.39	.712	0.07 [0.02, 0.12]	0.03	2.55	.013
Regioneurope × Sleep regularity <sup>2</sup>	0.00 [-0.03, 0.02]	0.01	-0.27	.786	0.00 [-0.03, 0.03]	0.01	-0.03	.974
Regionafrica × Sleep regularity <sup>2</sup>	-0.04 [-0.09, 0.01]	0.03	-1.42	.172	0.01 [-0.04, 0.05]	0.02	0.23	.820
Regionasia × Sleep regularity <sup>2</sup>	0.02 [-0.05, 0.09]	0.04	0.49	.627	0.00 [-0.07, 0.07]	0.04	-0.03	.978
Regionnorth america × Sleep regularity <sup>2</sup>	-0.01 [-0.07, 0.04]	0.03	-0.41	.691	-0.02 [-0.06, 0.03]	0.02	-0.68	.501
Regionsouth america × Sleep regularity <sup>2</sup>	0.01 [-0.02, 0.05]	0.02	0.84	.401	0.02 [-0.01, 0.06]	0.02	1.33	.201

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.*

TITLE

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)	0.61 [0.35, 0.88]	0.13	4.58	< .001	0.55 [0.29, 0.81]	0.13	4.09	< .001
Physical activity	0.16 [0.02, 0.30]	0.07	2.26	.024	0.13 [0.02, 0.23]	0.05	2.31	.025
Daylight hours	-0.03 [-0.04, -0.02]	0.01	-5.56	< .001	-0.03 [-0.04, -0.01]	0.01	-4.23	< .001
Physical activity <sup>2</sup>	-0.03 [-0.07, 0.02]	0.02	-1.22	.222	0.05 [-0.02, 0.11]	0.03	1.48	.140
Age	0.00 [-0.01, 0.00]	0.00	-1.97	.054	0.00 [-0.01, 0.00]	0.00	-2.06	.044
Physical activity × daylight hours	-0.01 [-0.02, 0.01]	0.01	-0.90	.367	0.00 [-0.01, 0.00]	0.00	-1.11	.270
Daylight hours × Physical activity <sup>2</sup>	0.00 [0.00, 0.01]	0.00	0.69	.491	0.00 [-0.01, 0.00]	0.00	-1.56	.120
Sleep efficiency (z)								
(Intercept)	0.35 [0.08, 0.62]	0.14	2.50	.012	0.31 [0.03, 0.60]	0.15	2.15	.031
Physical activity	0.17 [0.03, 0.31]	0.07	2.38	.018	0.13 [0.04, 0.23]	0.05	2.69	.007
Daylight hours	-0.01 [-0.02, 0.00]	0.01	-1.52	.130	0.00 [-0.02, 0.01]	0.01	-0.73	.464
Physical activity <sup>2</sup>	-0.04 [-0.09, 0.00]	0.02	-1.81	.070	0.03 [-0.03, 0.10]	0.03	1.07	.286
Age	0.00 [0.00, 0.01]	0.00	1.39	.163	0.00 [0.00, 0.01]	0.00	1.20	.230
Physical activity × daylight hours	-0.01 [-0.02, 0.00]	0.01	-1.68	.094	-0.01 [-0.02, 0.00]	0.00	-2.50	.012
Daylight hours × Physical activity <sup>2</sup>	0.00 [0.00, 0.01]	0.00	1.27	.203	0.00 [-0.01, 0.00]	0.00	-1.28	.200
Sleep onset (z)								
(Intercept)	-0.16 [-0.47, 0.14]	0.16	-1.04	.299	-0.10 [-0.40, 0.20]	0.15	-0.66	.510
Physical activity	-0.07 [-0.16, 0.03]	0.05	-1.30	.194	-0.07 [-0.15, 0.00]	0.04	-1.98	.050
Daylight hours	0.01 [0.00, 0.02]	0.00	1.83	.067	0.01 [0.00, 0.01]	0.00	1.22	.224
Physical activity <sup>2</sup>	-0.02 [-0.05, 0.01]	0.02	-1.47	.142	-0.03 [-0.08, 0.01]	0.02	-1.36	.174
Age	0.00 [0.00, 0.00]	0.00	1.13	.259	0.00 [0.00, 0.00]	0.00	0.70	.487

Table 18 continued

Term	Physical activity volume (z)				Physical activity intensity (z)					
	$\beta$	[95% CI]	SE	t	p	$\beta$	[95% CI]	SE	t	p
Physical activity × daylight hours	0.00	[0.01, 0.01]	0.00	0.15	.881	0.00	[-0.01, 0.01]	0.00	0.06	.953
Daylight hours × Physical activity <sup>2</sup>	0.00	[0.00, 0.01]	0.00	1.91	.056	0.00	[0.00, 0.01]	0.00	1.59	.111
Sleep regularity (z)										
(Intercept)	0.43	[0.19, 0.67]	0.12	3.48	< .001	0.51	[0.24, 0.78]	0.14	3.76	< .001
Physical activity	0.25	[0.10, 0.40]	0.08	3.25	.001	0.17	[0.06, 0.29]	0.06	2.91	.006
Daylight hours	0.00	[-0.01, 0.01]	0.01	0.28	.782	0.00	[-0.01, 0.02]	0.01	0.33	.744
Physical activity <sup>2</sup>	0.01	[-0.04, 0.06]	0.03	0.31	.757	-0.01	[-0.08, 0.06]	0.03	-0.24	.812
Age	0.00	[0.00, 0.00]	0.00	0.97	.333	0.00	[0.00, 0.00]	0.00	0.59	.555
Physical activity × daylight hours	0.00	[-0.01, 0.01]	0.01	-0.24	.811	-0.01	[-0.02, 0.00]	0.00	-1.26	.216
Daylight hours × Physical activity <sup>2</sup>	0.00	[-0.01, 0.00]	0.00	-1.84	.070	0.00	[-0.01, 0.00]	0.00	-0.79	.429

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

*Sleep predicting physical activity controlling for SES, age, 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)	1.27 [0.86, 1.68]	0.21	6.12	< .001	1.38 [1.12, 1.64]	0.13	10.37	< .001
Sleep duration	0.05 [-0.02, 0.12]	0.04	1.36	.174	0.06 [-0.01, 0.13]	0.03	1.73	.084
Daylight hours	0.00 [-0.01, 0.01]	0.01	0.74	.459	-0.01 [-0.02, 0.00]	0.00	-1.92	.055
Sleep duration <sup>2</sup>	-0.01 [-0.05, 0.02]	0.02	-0.72	.470	0.02 [-0.01, 0.05]	0.02	1.22	.222
Age	-0.02 [-0.03, -0.01]	0.00	-4.67	.016	-0.02 [-0.03, -0.01]	0.00	-5.46	.015
Sleep duration × daylight hours	0.00 [-0.01, 0.00]	0.00	-1.59	.113	0.00 [-0.01, 0.00]	0.00	-1.41	.158
Daylight hours × Sleep duration <sup>2</sup>	0.00 [0.00, 0.00]	0.00	-0.28	.777	0.00 [0.00, 0.00]	0.00	-1.61	.108
<b>Sleep efficiency (z)</b>								
(Intercept)	1.26 [0.85, 1.66]	0.21	6.06	< .001	1.40 [1.15, 1.66]	0.13	10.82	< .001
Sleep efficiency	0.00 [-0.08, 0.08]	0.04	-0.06	.953	-0.01 [-0.09, 0.07]	0.04	-0.18	.857
Daylight hours	0.00 [-0.01, 0.01]	0.01	0.74	.462	-0.01 [0.02, 0.00]	0.00	-2.44	.015
Sleep efficiency <sup>2</sup>	-0.01 [-0.04, 0.02]	0.01	-0.65	.515	0.00 [-0.03, 0.02]	0.01	-0.32	.747
Age	-0.02 [-0.03, -0.01]	0.00	-4.67	.016	-0.02 [-0.03, -0.01]	0.00	-5.46	.015
Sleep efficiency × daylight hours	0.00 [-0.01, 0.01]	0.00	0.00	.999	0.00 [-0.01, 0.01]	0.00	0.38	.708
Daylight hours × Sleep efficiency <sup>2</sup>	0.00 [0.00, 0.00]	0.00	0.47	.640	0.00 [0.00, 0.00]	0.00	0.44	.658
<b>Sleep onset (z)</b>								
(Intercept)	1.30 [0.87, 1.73]	0.22	5.93	< .001	1.42 [1.16, 1.69]	0.14	10.47	< .001
Sleep onset	-0.03 [-0.13, 0.07]	0.05	-0.59	.565	-0.06 [-0.15, 0.03]	0.05	-1.26	.225
Daylight hours	0.00 [-0.01, 0.01]	0.01	0.11	.916	-0.01 [-0.02, 0.00]	0.00	-2.75	.006
Sleep onset <sup>2</sup>	-0.05 [-0.11, 0.01]	0.03	-1.59	.150	-0.02 [-0.06, 0.03]	0.02	-0.73	.465
Age	-0.02 [-0.03, -0.01]	0.00	-4.61	.017	-0.02 [-0.03, -0.01]	0.00	-5.42	.015

Term	Physical activity volume (z)				Physical activity intensity (z)			
	$\beta$ [95% CI]	SE	t	p	$\beta$ [95% CI]	SE	t	p
Sleep onset × daylight hours	0.00 [-0.01, 0.01]	0.00	0.34	.736	0.00 [0.00, 0.01]	0.00	1.27	.213
Daylight hours × Sleep onset <sup>2</sup>	0.00 [0.00, 0.01]	0.00	1.42	.191	0.00 [0.00, 0.01]	0.00	0.89	.375
Sleep regularity (z)								
(Intercept)	1.21 [0.79, 1.63]	0.21	5.67	< .001	1.38 [1.11, 1.64]	0.14	10.14	< .001
Sleep regularity	0.05 [-0.06, 0.15]	0.05	0.88	.421	0.06 [0.00, 0.13]	0.03	1.88	.065
Daylight hours	0.00 [-0.01, 0.02]	0.01	0.83	.405	-0.01 [-0.02, 0.00]	0.00	-2.13	.034
Sleep regularity <sup>2</sup>	0.00 [-0.05, 0.05]	0.02	0.12	.906	0.01 [-0.04, 0.05]	0.02	0.24	.810
Age	-0.02 [-0.03, -0.01]	0.00	-4.73	.014	-0.02 [-0.03, -0.01]	0.00	-5.53	.014
Sleep regularity × daylight hours	0.00 [-0.01, 0.01]	0.00	0.36	.731	0.00 [-0.01, 0.00]	0.00	-0.97	.334
Daylight hours × Sleep regularity <sup>2</sup>	0.00 [0.00, 0.00]	0.00	-0.22	.826	0.00 [0.00, 0.00]	0.00	-0.26	.798

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 (z)			Physical activity intensity (z)				
	$\beta$ [95% CI]	SE	t	p	$\beta$ [95% CI]	SE	t	p
<b>Sleep duration (z)</b>								
(Intercept)	0.72 [0.48, 0.97]	0.13	5.77	< .001	0.62 [0.38, 0.87]	0.13	4.93	< .001
Physical activity	0.13 [0.08, 0.17]	0.02	5.47	< .001	0.08 [0.04, 0.13]	0.02	3.46	< .001
Acc wear locwrst	-0.64 [-0.89, -0.39]	0.13	-5.06	< .001	-0.52 [-0.78, -0.27]	0.13	-4.04	< .001
Physical activity <sup>2</sup>	-0.04 [-0.08, 0.00]	0.02	-1.95	.051	0.02 [-0.02, 0.05]	0.02	0.99	.322
Age	0.00 [-0.01, 0.00]	0.00	-2.11	.038	0.00 [-0.01, 0.00]	0.00	-2.08	.040
Physical activity × acc wear locwrst	-0.04 [-0.10, 0.01]	0.03	-1.55	.121	-0.02 [-0.07, 0.03]	0.03	-0.72	.473
Acc wear locwrst × Physical activity <sup>2</sup>	0.03 [-0.01, 0.07]	0.02	1.54	.125	-0.02 [-0.05, 0.01]	0.02	-1.14	.252
<b>Sleep efficiency (z)</b>								
(Intercept)	-0.32 [-0.49, -0.15]	0.09	-3.65	< .001	-0.44 [-0.62, -0.27]	0.09	-4.94	< .001
Physical activity	0.16 [0.11, 0.20]	0.02	6.58	< .001	0.08 [0.04, 0.13]	0.02	3.68	< .001
Acc wear locwrst	0.79 [0.63, 0.95]	0.08	9.67	< .001	0.91 [0.74, 1.07]	0.08	10.85	< .001
Physical activity <sup>2</sup>	-0.10 [-0.14, -0.06]	0.02	-4.92	< .001	-0.02 [-0.05, 0.01]	0.02	-1.21	.229
Age	0.00 [0.00, 0.00]	0.00	0.20	.843	0.00 [0.00, 0.00]	0.00	0.33	.744
Physical activity × acc wear locwrst	-0.19 [-0.25, -0.13]	0.03	-6.37	< .001	-0.10 [-0.15, -0.05]	0.03	-3.79	< .001
Acc wear locwrst × Physical activity <sup>2</sup>	0.10 [0.06, 0.14]	0.02	4.97	< .001	0.01 [-0.03, 0.05]	0.02	0.60	.551
<b>Sleep onset (z)</b>								
(Intercept)	-0.83 [-1.22, -0.44]	0.20	-4.17	< .001	-0.81 [-1.20, -0.42]	0.20	-4.06	< .001
Physical activity	0.00 [-0.04, 0.03]	0.02	-0.31	.760	-0.03 [-0.06, 0.01]	0.02	-1.57	.122
Acc wear locwrst	1.02 [0.58, 1.45]	0.22	4.61	< .001	1.01 [0.58, 1.44]	0.22	4.58	< .001
Physical activity <sup>2</sup>	0.00 [-0.04, 0.03]	0.02	-0.21	.835	-0.01 [-0.03, 0.01]	0.01	-0.80	.426
Age	0.00 [0.00, 0.00]	0.00	0.67	.506	0.00 [0.00, 0.00]	0.00	0.32	.750

Table 20 continued

Term	Physical activity volume (z)				Physical activity intensity (z)			
	$\beta$ [95% CI]	SE	t	p	$\beta$ [95% CI]	SE	t	p
Physical activity $\times$ acc wear locwrist	-0.09 [-0.13, -0.05]	0.02	-4.21	< .001	-0.06 [-0.10, -0.03]	0.02	-3.28	.001
Acc wear locwrist $\times$ Physical activity <sup>2</sup>	0.02 [-0.02, 0.05]	0.02	0.99	.328	0.01 [-0.01, 0.04]	0.01	0.95	.342
Sleep regularity (z)								
(Intercept)	0.31 [0.05, 0.57]	0.13	2.34	.020	0.17 [-0.11, 0.44]	0.14	1.19	.233
Physical activity	0.21 [0.16, 0.26]	0.02	8.65	< .001	0.27 [0.21, 0.33]	0.03	9.36	< .001
Acc wear locwrist	0.24 [-0.04, 0.51]	0.14	1.71	.088	0.58 [0.29, 0.86]	0.15	3.95	< .001
Physical activity <sup>2</sup>	-0.17 [-0.22, -0.12]	0.03	-6.59	< .001	-0.11 [-0.14, -0.07]	0.02	-6.03	< .001
Age	0.00 [0.00, 0.00]	0.00	0.35	.724	0.00 [0.00, 0.00]	0.00	-0.83	.406
Physical activity $\times$ acc wear locwrist	0.00 [-0.06, 0.06]	0.03	0.07	.943	-0.22 [-0.29, -0.16]	0.03	-6.93	< .001
Acc wear locwrist $\times$ Physical activity <sup>2</sup>	0.14 [0.08, 0.19]	0.03	4.95	< .001	0.07 [0.03, 0.11]	0.02	3.54	< .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*

TITLE

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)	0.23 [-0.20, 0.66]	0.22	1.06	.289	1.00 [0.70, 1.30]	0.15	6.50	< .001
Sleep duration	0.03 [0.00, 0.05]	0.01	2.05	.044	0.03 [0.00, 0.05]	0.01	1.99	.056
Acc wear locwrst	1.44 [0.93, 1.94]	0.26	5.62	< .001	0.38 [0.02, 0.74]	0.18	2.09	.041
Sleep duration <sup>2</sup>	0.00 [-0.01, 0.01]	0.01	0.46	.646	0.00 [-0.01, 0.02]	0.01	0.09	.932
Age	-0.02 [-0.03, -0.01]	0.00	-4.93	.016	-0.02 [-0.03, -0.01]	0.00	-5.26	.019
Sleep duration × acc wear locwrist	-0.05 [-0.08, -0.01]	0.02	-2.76	.013	-0.02 [-0.05, 0.01]	0.02	-1.30	.202
Acc wear locwrst × Sleep duration <sup>2</sup>	-0.03 [-0.04, -0.01]	0.01	-3.95	< .001	-0.01 [-0.03, 0.01]	0.01	-1.06	.317
<b>Sleep efficiency (z)</b>								
(Intercept)	0.25 [-0.17, 0.68]	0.22	1.17	.243	1.02 [0.71, 1.32]	0.15	6.60	< .001
Sleep efficiency	0.03 [0.01, 0.06]	0.01	2.80	.005	0.03 [0.01, 0.05]	0.01	2.48	.013
Acc wear locwrst	1.40 [0.90, 1.89]	0.25	5.52	< .001	0.36 [-0.01, 0.73]	0.19	1.91	.063
Sleep efficiency <sup>2</sup>	0.00 [0.00, 0.01]	0.00	0.85	.395	0.00 [0.00, 0.01]	0.00	1.62	.107
Age	-0.02 [-0.03, -0.01]	0.00	-4.99	.015	-0.02 [-0.03, -0.01]	0.00	-5.27	.019
Sleep efficiency × acc wear locwrist	-0.06 [-0.09, -0.03]	0.02	-3.65	< .001	-0.03 [-0.06, -0.01]	0.02	-2.31	.021
Acc wear locwrst × Sleep efficiency <sup>2</sup>	-0.01 [-0.02, 0.00]	0.01	-1.16	.270	0.00 [-0.01, 0.00]	0.00	-0.94	.351
<b>Sleep onset (z)</b>								
(Intercept)	0.25 [-0.17, 0.68]	0.22	1.17	.243	1.01 [0.71, 1.31]	0.15	6.54	< .001
Sleep onset	0.02 [-0.03, 0.06]	0.02	0.72	.480	0.00 [-0.04, 0.04]	0.02	-0.08	.937
Acc wear locwrst	1.39 [0.90, 1.89]	0.25	5.51	< .001	0.36 [0.00, 0.73]	0.18	1.98	.053
Sleep onset <sup>2</sup>	0.00 [-0.03, 0.03]	0.02	-0.04	.965	0.00 [-0.02, 0.03]	0.01	0.17	.863
Age	-0.02 [-0.03, -0.01]	0.00	-4.92	.016	-0.02 [-0.03, -0.01]	0.00	-5.28	.019

Table 21 continued

Term	Physical activity volume (z)				Physical activity intensity (z)					
	$\beta$	[95% CI]	SE	t	p	$\beta$	[95% CI]	SE	t	p
Sleep onset × acc wear locwrist	-0.04	[-0.10, 0.01]	0.03	-1.46	.169	-0.01	[-0.05, 0.04]	0.02	-0.29	.776
Acc wear locwrist × Sleep onset <sup>2</sup>	0.00	[0.03, 0.03]	0.02	-0.17	.867	0.00	[-0.03, 0.03]	0.01	0.13	.898
Sleep regularity (z)										
(Intercept)	0.24	[-0.19, 0.66]	0.22	1.10	.270	1.01	[0.71, 1.31]	0.15	6.64	< .001
Sleep regularity	0.09	[0.06, 0.11]	0.01	6.66	< .001	0.09	[0.06, 0.11]	0.01	7.32	< .001
Acc wear locwrist	1.37	[0.87, 1.87]	0.25	5.40	< .001	0.35	[-0.02, 0.72]	0.19	1.84	.074
Sleep regularity <sup>2</sup>	0.00	[-0.02, 0.02]	0.01	0.08	.939	0.01	[-0.01, 0.02]	0.01	0.85	.404
Age	-0.02	[-0.03, -0.01]	0.00	-5.00	.014	-0.02	[-0.03, -0.01]	0.00	-5.27	.019
Sleep regularity × acc wear locwrist	-0.03	[-0.07, 0.00]	0.02	-1.87	.081	-0.08	[-0.12, -0.04]	0.02	-3.86	.008
Acc wear locwrist × Sleep regularity <sup>2</sup>	0.00	[-0.02, 0.02]	0.01	-0.25	.806	-0.01	[-0.02, 0.01]	0.01	-0.61	.546

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 (z)				Physical activity intensity (z)			
	$\beta$ [95% CI]	SE	t	p	$\beta$ [95% CI]	SE	t	p
<b>Sleep duration (z)</b>								
(Intercept)	0.25 [0.02, 0.48]	0.12	2.17	.030	0.27 [0.05, 0.49]	0.11	2.40	.017
Physical activity	0.08 [0.03, 0.13]	0.03	3.07	.002	0.08 [0.04, 0.12]	0.02	4.04	< .001
Pa mostactivehr	0.00 [0.00, 0.00]	0.00	-0.98	.326	0.00 [-0.01, 0.00]	0.00	-1.50	.134
Physical activity <sup>2</sup>	0.00 [-0.02, 0.01]	0.01	-0.33	.744	-0.01 [-0.03, 0.02]	0.01	-0.39	.700
Age	0.00 [-0.01, 0.00]	0.00	-2.05	.046	0.00 [-0.01, 0.00]	0.00	-2.11	.040
Physical activity × pa mostactivehr	0.00 [0.00, 0.01]	0.00	0.96	.338	0.00 [0.00, 0.00]	0.00	-0.52	.601
Pa mostactivehr × Physical activity <sup>2</sup>	0.00 [0.00, 0.00]	0.00	-1.59	.116	0.00 [0.00, 0.00]	0.00	0.44	.660
<b>Sleep efficiency (z)</b>								
(Intercept)	0.24 [0.00, 0.48]	0.12	1.97	.048	0.28 [0.03, 0.53]	0.13	2.21	.027
Physical activity	-0.04 [-0.09, 0.01]	0.03	-1.42	.155	0.01 [-0.03, 0.05]	0.02	0.54	.592
Pa mostactivehr	0.00 [0.00, 0.00]	0.00	0.57	.568	0.00 [0.00, 0.00]	0.00	-0.47	.638
Physical activity <sup>2</sup>	0.01 [0.00, 0.03]	0.01	1.86	.062	0.00 [-0.03, 0.02]	0.01	-0.17	.868
Age	0.00 [0.00, 0.01]	0.00	1.29	.199	0.00 [0.00, 0.01]	0.00	1.12	.261
Physical activity × pa mostactivehr	0.01 [0.00, 0.01]	0.00	4.21	< .001	0.00 [0.00, 0.00]	0.00	0.20	.844
Pa mostactivehr × Physical activity <sup>2</sup>	0.00 [0.00, 0.00]	0.00	-4.14	< .001	0.00 [0.00, 0.00]	0.00	-0.20	.842
<b>Sleep onset (z)</b>								
(Intercept)	-0.13 [-0.41, 0.16]	0.15	-0.87	.387	-0.10 [-0.39, 0.18]	0.14	-0.72	.472
Physical activity	-0.09 [-0.13, -0.06]	0.02	-5.14	< .001	-0.06 [-0.09, -0.04]	0.01	-4.48	< .001
Pa mostactivehr	0.00 [0.00, 0.01]	0.00	4.14	< .001	0.01 [0.00, 0.01]	0.00	4.23	< .001
Physical activity <sup>2</sup>	0.01 [0.00, 0.02]	0.00	2.31	.021	0.01 [-0.01, 0.03]	0.01	1.27	.205
Age	0.00 [0.00, 0.00]	0.00	1.19	.234	0.00 [0.00, 0.00]	0.00	0.79	.431

Table 22 continued

Term	Physical activity volume (z)				Physical activity intensity (z)			
	$\beta$ [95% CI]	SE	t	p	$\beta$ [95% CI]	SE	t	p
Physical activity × pa mostactivehr	0.00 [0.00, 0.01]	0.00	2.43	.015	0.00 [0.00, 0.00]	0.00	-0.73	.469
Pa mostactivehr × Physical activity <sup>2</sup>	0.00 [0.00, 0.00]	0.00	-0.94	.349	0.00 [0.00, 0.00]	0.00	-0.90	.366
Sleep regularity (z)								
(Intercept)	0.48 [0.28, 0.68]	0.10	4.69	< .001	0.61 [0.38, 0.83]	0.11	5.31	< .001
Physical activity	0.15 [0.09, 0.20]	0.03	5.20	< .001	0.06 [0.02, 0.10]	0.02	2.76	.006
Pa mostactivehr	0.00 [-0.01, 0.00]	0.00	-0.67	.507	-0.01 [-0.01, 0.00]	0.00	-2.05	.060
Physical activity <sup>2</sup>	-0.02 [-0.03, 0.00]	0.01	-2.08	.040	-0.06 [-0.09, -0.02]	0.02	-3.11	.007
Age	0.00 [0.00, 0.00]	0.00	0.82	.413	0.00 [0.00, 0.00]	0.00	0.47	.636
Physical activity × pa mostactivehr	0.01 [0.00, 0.01]	0.00	3.52	< .001	0.00 [0.00, 0.01]	0.00	1.94	.053
Pa mostactivehr × Physical activity <sup>2</sup>	0.00 [0.00, 0.00]	0.00	-3.30	.001	0.00 [0.00, 0.00]	0.00	1.32	.199

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 (z)				Physical activity intensity (z)			
	$\beta$ [95% CI]	SE	t	p	$\beta$ [95% CI]	SE	t	p
<b>Sleep duration (z)</b>								
(Intercept)	1.25 [0.86, 1.64]	0.20	6.32	< .001	1.24 [1.00, 1.48]	0.12	10.18	< .001
Sleep duration	0.02 [-0.01, 0.05]	0.02	1.28	.202	0.03 [0.00, 0.06]	0.01	1.95	.052
Pa mostactivehr	0.01 [0.00, 0.01]	0.00	4.01	< .001	0.00 [0.00, 0.01]	0.00	2.16	.032
Sleep duration <sup>2</sup>	-0.01 [-0.03, 0.00]	0.01	-2.00	.049	0.00 [-0.01, 0.01]	0.01	-0.04	.971
Age	-0.02 [-0.03, -0.01]	0.00	-4.67	.015	-0.02 [-0.03, -0.01]	0.00	-5.45	.015
Sleep duration × pa mostactivehr	0.00 [0.00, 0.00]	0.00	-1.81	.080	0.00 [0.00, 0.00]	0.00	-1.13	.263
Pa mostactivehr × Sleep duration <sup>2</sup>	0.00 [0.00, 0.00]	0.00	-0.32	.751	0.00 [0.00, 0.00]	0.00	-0.80	.425
<b>Sleep efficiency (z)</b>								
(Intercept)	1.25 [0.86, 1.64]	0.20	6.27	< .001	1.25 [1.00, 1.49]	0.12	10.09	< .001
Sleep efficiency	-0.03 [-0.07, 0.01]	0.02	-1.68	.107	-0.02 [-0.06, 0.02]	0.02	-1.16	.258
Pa mostactivehr	0.00 [0.00, 0.01]	0.00	3.56	< .001	0.00 [0.00, 0.00]	0.00	1.55	.121
Sleep efficiency <sup>2</sup>	-0.01 [-0.02, 0.00]	0.01	-1.96	.050	0.00 [-0.02, 0.01]	0.01	-0.89	.379
Age	-0.02 [-0.03, -0.01]	0.00	-4.68	.015	-0.02 [-0.03, -0.01]	0.00	-5.45	.015
Sleep efficiency × pa mostactivehr	0.00 [0.00, 0.01]	0.00	1.86	.070	0.00 [0.00, 0.01]	0.00	1.72	.103
Pa mostactivehr × Sleep efficiency <sup>2</sup>	0.00 [0.00, 0.00]	0.00	1.57	.116	0.00 [0.00, 0.00]	0.00	1.28	.210
<b>Sleep onset (z)</b>								
(Intercept)	1.24 [0.84, 1.64]	0.20	6.14	< .001	1.21 [0.97, 1.46]	0.13	9.56	< .001
Sleep onset	-0.04 [-0.08, 0.00]	0.02	-2.08	.066	-0.04 [-0.07, -0.01]	0.02	-2.74	.007
Pa mostactivehr	0.00 [0.00, 0.01]	0.00	3.61	< .001	0.00 [0.00, 0.01]	0.00	3.18	.002
Sleep onset <sup>2</sup>	-0.01 [-0.03, 0.01]	0.01	-1.02	.308	0.02 [0.00, 0.05]	0.01	1.96	.062
Age	-0.02 [-0.03, -0.01]	0.00	-4.60	.016	-0.02 [-0.03, -0.01]	0.00	-5.43	.015

Table 23 continued

Term	Physical activity volume (z)				Physical activity intensity (z)					
	$\beta$	[95% CI]	SE	t	p	$\beta$	[95% CI]	SE	t	p
Sleep onset × pa mostactivehr	0.00	[0.00, 0.01]	0.00	1.83	.088	0.00	[0.00, 0.01]	0.00	2.62	.013
Pa mostactivehr × Sleep onset <sup>2</sup>	0.00	[0.00, 0.00]	0.00	0.38	.703	0.00	[0.00, 0.00]	0.00	-2.12	.036
Sleep regularity (z)										
(Intercept)	1.20	[0.81, 1.59]	0.20	6.03	< .001	1.23	[0.99, 1.48]	0.12	9.88	< .001
Sleep regularity	0.04	[0.00, 0.08]	0.02	1.91	.094	-0.01	[-0.06, 0.04]	0.03	-0.40	.715
Pa mostactivehr	0.01	[0.00, 0.01]	0.00	4.15	< .001	0.00	[0.00, 0.00]	0.00	1.40	.162
Sleep regularity <sup>2</sup>	0.00	[-0.01, 0.02]	0.01	0.47	.642	-0.01	[-0.03, 0.01]	0.01	-0.63	.539
Age	-0.02	[-0.03, -0.01]	0.00	-4.72	.014	-0.02	[-0.03, -0.01]	0.00	-5.46	.015
Sleep regularity × pa mostactivehr	0.00	[0.00, 0.00]	0.00	1.78	.085	0.00	[0.00, 0.01]	0.00	2.15	.089
Pa mostactivehr × Sleep regularity <sup>2</sup>	0.00	[0.00, 0.00]	0.00	-0.72	.476	0.00	[0.00, 0.00]	0.00	0.76	.454

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

Table 24

*Physical activity predicting sleep controlling for SES, age, 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)	0.30 [0.07, 0.53]	0.12	2.51	.012	0.30 [0.07, 0.52]	0.11	2.58	.010
Physical activity	0.09 [0.06, 0.13]	0.02	5.23	< .001	0.07 [0.04, 0.10]	0.02	4.45	< .001
Ethnicitynon-white	-0.11 [-0.21, -0.01]	0.05	-2.08	.038	-0.18 [-0.28, -0.08]	0.05	-3.48	< .001
Ethnicityunclear	-0.08 [-0.17, 0.02]	0.05	-1.58	.115	-0.08 [-0.18, 0.01]	0.05	-1.71	.088
Physical activity <sup>2</sup>	-0.02 [-0.03, -0.01]	0.01	-3.16	.002	-0.02 [-0.03, 0.00]	0.01	-1.88	.060
Age	0.00 [-0.01, 0.00]	0.00	-2.05	.046	0.00 [-0.01, 0.00]	0.00	-2.04	.047
Physical activity × ethnicitynon-white	0.02 [-0.07, 0.10]	0.04	0.43	.667	0.06 [-0.01, 0.14]	0.04	1.71	.089
Physical activity × ethnicityunclear	-0.01 [-0.07, 0.05]	0.03	-0.32	.751	-0.01 [-0.05, 0.04]	0.02	-0.29	.770
Ethnicitynon-white × Physical activity <sup>2</sup>	-0.06 [-0.11, 0.00]	0.03	-2.01	.045	0.00 [-0.05, 0.06]	0.03	0.04	.970
Ethnicityunclear × Physical activity <sup>2</sup>	0.01 [0.00, 0.03]	0.01	1.59	.113	0.04 [0.01, 0.06]	0.01	2.87	.004
<b>Sleep efficiency (z)</b>								
(Intercept)	0.25 [0.00, 0.49]	0.12	1.98	.048	0.25 [0.00, 0.50]	0.13	1.97	.049
Physical activity	0.05 [0.02, 0.09]	0.02	2.77	.006	0.01 [-0.02, 0.04]	0.01	0.62	.535
Ethnicitynon-white	-0.09 [-0.20, 0.02]	0.06	-1.65	.099	-0.13 [-0.24, -0.02]	0.05	-2.42	.016
Ethnicityunclear	0.02 [-0.08, 0.12]	0.05	0.47	.639	0.04 [-0.06, 0.15]	0.05	0.82	.411
Physical activity <sup>2</sup>	-0.01 [-0.03, 0.00]	0.01	-2.69	.008	0.00 [-0.02, 0.02]	0.01	-0.23	.822
Age	0.00 [0.00, 0.01]	0.00	1.36	.174	0.00 [0.00, 0.01]	0.00	1.23	.218
Physical activity × ethnicitynon-white	0.06 [-0.03, 0.15]	0.05	1.26	.208	0.07 [0.00, 0.15]	0.04	1.95	.052
Physical activity × ethnicityunclear	-0.02 [-0.07, 0.04]	0.03	-0.65	.516	0.00 [-0.05, 0.04]	0.02	-0.04	.965
Ethnicitynon-white × Physical activity <sup>2</sup>	-0.05 [-0.10, 0.01]	0.03	-1.58	.115	-0.04 [-0.10, 0.01]	0.03	-1.48	.140
Ethnicityunclear × Physical activity <sup>2</sup>	0.01 [-0.01, 0.02]	0.01	1.21	.227	0.00 [-0.03, 0.02]	0.01	-0.14	.889

Table 24 continued

## TITLE

Term	Physical activity volume (z)			Physical activity intensity (z)				
	$\beta$ [95% CI]	SE	t	p	$\beta$ [95% CI]	SE	t	p
<b>Sleep onset (z)</b>								
(Intercept)	-0.11 [-0.40, 0.18]	0.15	-0.74	.458	-0.07 [-0.36, 0.22]	0.15	-0.47	.638
Physical activity	-0.07 [-0.09, -0.04]	0.01	-5.10	< .001	-0.06 [-0.08, -0.04]	0.01	-5.44	< .001
Ethnicitynon-white	0.03 [-0.05, 0.11]	0.04	0.67	.505	0.06 [-0.02, 0.14]	0.04	1.56	.120
Ethnicityunclear	0.06 [-0.02, 0.14]	0.04	1.54	.123	0.05 [-0.03, 0.13]	0.04	1.31	.189
Physical activity <sup>2</sup>	0.01 [0.00, 0.02]	0.00	2.16	.037	0.01 [-0.01, 0.02]	0.01	1.12	.264
Age	0.00 [0.00, 0.01]	0.00	1.25	.211	0.00 [0.00, 0.00]	0.00	0.76	.450
Physical activity × ethnicitynon-white	-0.01 [-0.07, 0.05]	0.03	-0.28	.780	-0.05 [-0.11, 0.00]	0.03	-1.97	.049
Physical activity × ethnicityunclear	0.04 [-0.01, 0.08]	0.02	1.72	.086	-0.03 [-0.06, 0.01]	0.02	-1.49	.138
Ethnicitynon-white × Physical activity <sup>2</sup>	0.03 [-0.01, 0.07]	0.02	1.37	.170	0.00 [-0.04, 0.04]	0.02	0.22	.823
Ethnicityunclear × Physical activity <sup>2</sup>	-0.01 [-0.02, 0.00]	0.01	-1.49	.139	-0.01 [-0.03, 0.01]	0.01	-0.68	.498
<b>Sleep regularity (z)</b>								
(Intercept)	0.50 [0.28, 0.71]	0.11	4.57	< .001	0.54 [0.31, 0.78]	0.12	4.62	< .001
Physical activity	0.24 [0.20, 0.28]	0.02	10.90	< .001	0.11 [0.07, 0.14]	0.02	6.23	< .001
Ethnicitynon-white	0.03 [-0.07, 0.14]	0.05	0.61	.543	0.00 [-0.10, 0.10]	0.05	0.00	.996
Ethnicityunclear	-0.06 [-0.16, 0.04]	0.05	-1.11	.271	0.00 [-0.10, 0.10]	0.05	0.07	.948
Physical activity <sup>2</sup>	-0.04 [-0.05, -0.03]	0.01	-7.41	< .001	-0.02 [-0.05, 0.00]	0.01	-1.73	.126
Age	0.00 [0.00, 0.00]	0.00	0.80	.421	0.00 [0.00, 0.00]	0.00	0.55	.581
Physical activity × ethnicitynon-white	0.02 [-0.08, 0.12]	0.05	0.39	.696	0.18 [0.11, 0.26]	0.04	4.58	< .001
Physical activity × ethnicityunclear	-0.04 [-0.11, 0.02]	0.03	-1.32	.192	-0.06 [-0.11, -0.01]	0.03	-2.36	.019
Ethnicitynon-white × Physical activity <sup>2</sup>	-0.08 [-0.14, -0.01]	0.03	-2.39	.018	-0.12 [-0.18, -0.06]	0.03	-3.83	< .001
Ethnicityunclear × Physical activity <sup>2</sup>	0.01 [0.00, 0.03]	0.01	1.55	.122	-0.02 [-0.05, 0.02]	0.02	-0.77	.463

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

Table 25

Sleep predicting physical activity controlling for SES, age, 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)	1.32 [0.92, 1.71]	0.20	6.57	< .001	1.31 [1.07, 1.56]	0.12	10.52	< .001
Sleep duration	0.00 [-0.02, 0.02]	0.01	-0.13	.900	0.03 [0.01, 0.04]	0.01	2.89	.004
Ethnicitynon-white	-0.11 [-0.20, -0.02]	0.05	-2.41	.016	-0.06 [-0.14, 0.02]	0.04	-1.43	.155
Ethnicityunclear	0.02 [-0.07, 0.11]	0.05	0.43	.667	-0.05 [-0.13, 0.03]	0.04	-1.28	.200
Sleep duration <sup>2</sup>	-0.01 [-0.03, 0.00]	0.01	-2.29	.048	0.00 [-0.01, 0.01]	0.01	0.19	.857
Age	-0.02 [-0.03, -0.01]	0.00	-4.68	.015	-0.02 [-0.03, -0.01]	0.00	-5.48	.015
Sleep duration × ethnicitynon-white	0.01 [-0.04, 0.05]	0.02	0.21	.830	-0.03 [-0.07, 0.02]	0.02	-1.09	.276
Sleep duration × ethnicityunclear	-0.02 [-0.05, 0.01]	0.01	-1.16	.247	-0.03 [-0.06, 0.00]	0.01	-2.15	.033
Ethnicitynon-white × Sleep duration <sup>2</sup>	-0.01 [-0.03, 0.02]	0.01	-0.61	.547	-0.01 [-0.04, 0.02]	0.01	-0.85	.417
Ethnicityunclear × Sleep duration <sup>2</sup>	-0.01 [-0.02, 0.01]	0.01	-0.93	.365	-0.01 [-0.03, 0.00]	0.01	-1.95	.066
<b>Sleep efficiency (z)</b>								
(Intercept)	1.31 [0.92, 1.71]	0.20	6.52	< .001	1.32 [1.08, 1.56]	0.12	10.70	< .001
Sleep efficiency	0.01 [-0.02, 0.03]	0.01	0.46	.647	0.01 [-0.01, 0.03]	0.01	1.16	.248
Ethnicitynon-white	-0.12 [-0.20, -0.03]	0.04	-2.76	.006	-0.08 [-0.15, 0.00]	0.04	-2.01	.044
Ethnicityunclear	0.00 [-0.09, 0.09]	0.05	-0.08	.935	-0.08 [-0.15, 0.00]	0.04	-1.93	.054
Sleep efficiency <sup>2</sup>	-0.01 [-0.01, 0.00]	0.00	-1.43	.152	0.00 [-0.01, 0.01]	0.00	0.51	.616
Age	-0.02 [-0.03, -0.01]	0.00	-4.68	.015	-0.02 [-0.03, -0.01]	0.00	-5.47	.015
Sleep efficiency × ethnicitynon-white	0.00 [-0.06, 0.05]	0.03	-0.14	.892	0.01 [-0.04, 0.05]	0.02	0.21	.836
Sleep efficiency × ethnicityunclear	-0.02 [-0.06, 0.02]	0.02	-0.96	.362	-0.01 [-0.05, 0.02]	0.02	-0.85	.396
Ethnicitynon-white × Sleep efficiency <sup>2</sup>	0.00 [-0.01, 0.01]	0.01	0.33	.742	0.00 [-0.01, 0.01]	0.01	0.12	.904
Ethnicityunclear × Sleep efficiency <sup>2</sup>	0.00 [-0.01, 0.01]	0.00	0.55	.586	0.00 [-0.01, 0.01]	0.01	-0.45	.654

Table 25 continued

## TITLE

Term	Physical activity volume (z)				Physical activity intensity (z)			
	$\beta$ [95% CI]	SE	t	p	$\beta$ [95% CI]	SE	t	p
<b>Sleep onset (z)</b>								
(Intercept)	1.32 [0.93, 1.71]	0.20	6.63	< .001	1.33 [1.09, 1.57]	0.12	10.81	< .001
Sleep onset	-0.01 [-0.03, 0.01]	0.01	-0.76	.453	-0.01 [-0.03, 0.02]	0.01	-0.53	.599
Ethnicitynon-white	-0.12 [-0.22, -0.02]	0.05	-2.40	.017	-0.05 [-0.13, 0.04]	0.04	-1.04	.300
Ethnicityunclear	-0.02 [-0.12, 0.07]	0.05	-0.47	.638	-0.10 [-0.18, -0.01]	0.04	-2.23	.026
Sleep onset <sup>2</sup>	-0.02 [-0.03, 0.00]	0.01	-2.56	.011	0.00 [-0.01, 0.01]	0.01	0.23	.822
Age	-0.02 [-0.03, -0.01]	0.00	-4.64	.016	-0.02 [-0.03, -0.01]	0.00	-5.48	.015
Sleep onset × ethnicitynon-white	0.01 [-0.04, 0.06]	0.03	0.45	.652	0.05 [0.00, 0.09]	0.02	1.90	.058
Sleep onset × ethnicityunclear	-0.01 [-0.06, 0.04]	0.02	-0.39	.710	-0.01 [-0.05, 0.03]	0.02	-0.51	.620
Ethnicitynon-white × Sleep onset <sup>2</sup>	0.01 [-0.02, 0.04]	0.02	0.53	.598	-0.01 [-0.04, 0.02]	0.02	-0.62	.541
Ethnicityunclear × Sleep onset <sup>2</sup>	0.02 [0.00, 0.04]	0.01	2.18	.031	0.01 [-0.01, 0.03]	0.01	0.87	.387
<b>Sleep regularity (z)</b>								
(Intercept)	1.27 [0.88, 1.67]	0.20	6.39	< .001	1.31 [1.06, 1.55]	0.13	10.35	< .001
Sleep regularity	0.05 [0.03, 0.08]	0.01	3.99	.008	0.03 [0.01, 0.06]	0.01	2.36	.068
Ethnicitynon-white	-0.12 [-0.20, -0.03]	0.04	-2.64	.008	-0.08 [-0.16, 0.00]	0.04	-1.94	.053
Ethnicityunclear	0.00 [-0.09, 0.09]	0.05	0.00	.997	-0.07 [-0.15, 0.01]	0.04	-1.75	.081
Sleep regularity <sup>2</sup>	-0.01 [-0.02, 0.00]	0.01	-1.17	.256	0.00 [-0.01, 0.01]	0.01	0.02	.987
Age	-0.02 [-0.03, -0.01]	0.00	-4.72	.014	-0.02 [-0.03, -0.01]	0.00	-5.53	.015
Sleep regularity × ethnicitynon-white	0.02 [-0.03, 0.07]	0.03	0.86	.390	0.02 [-0.04, 0.08]	0.03	0.60	.563
Sleep regularity × ethnicityunclear	0.03 [-0.02, 0.07]	0.02	1.22	.277	0.00 [-0.03, 0.03]	0.01	-0.13	.900
Ethnicitynon-white × Sleep regularity <sup>2</sup>	0.01 [-0.02, 0.03]	0.01	0.52	.605	0.00 [-0.02, 0.03]	0.01	0.28	.781
Ethnicityunclear × Sleep regularity <sup>2</sup>	0.01 [-0.01, 0.03]	0.01	1.21	.249	0.00 [-0.03, 0.02]	0.01	-0.26	.805

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

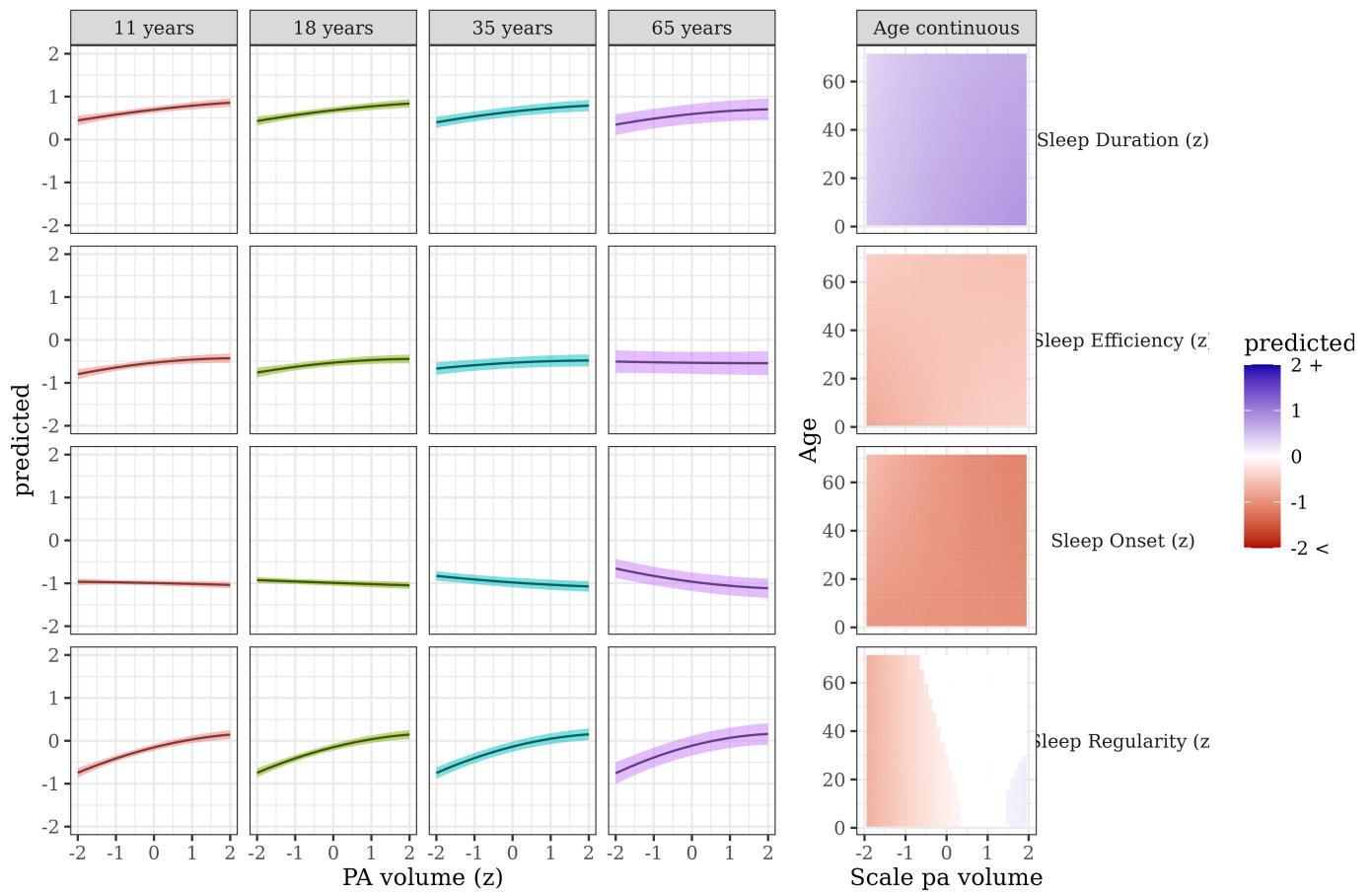


Figure 1. Sleep metrics on Physical activity volume

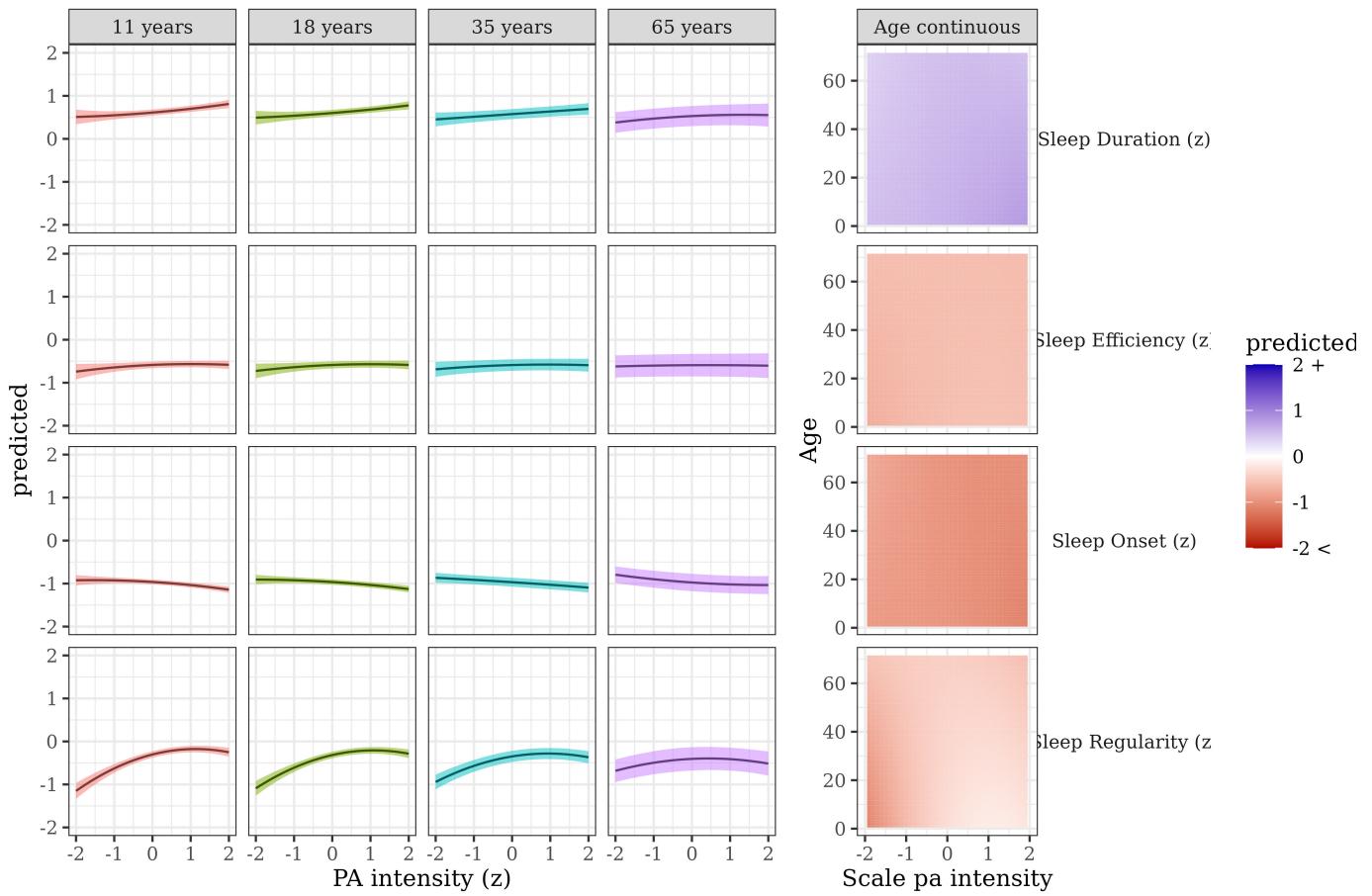


Figure 2. Sleep metrics on Physical activity intensity

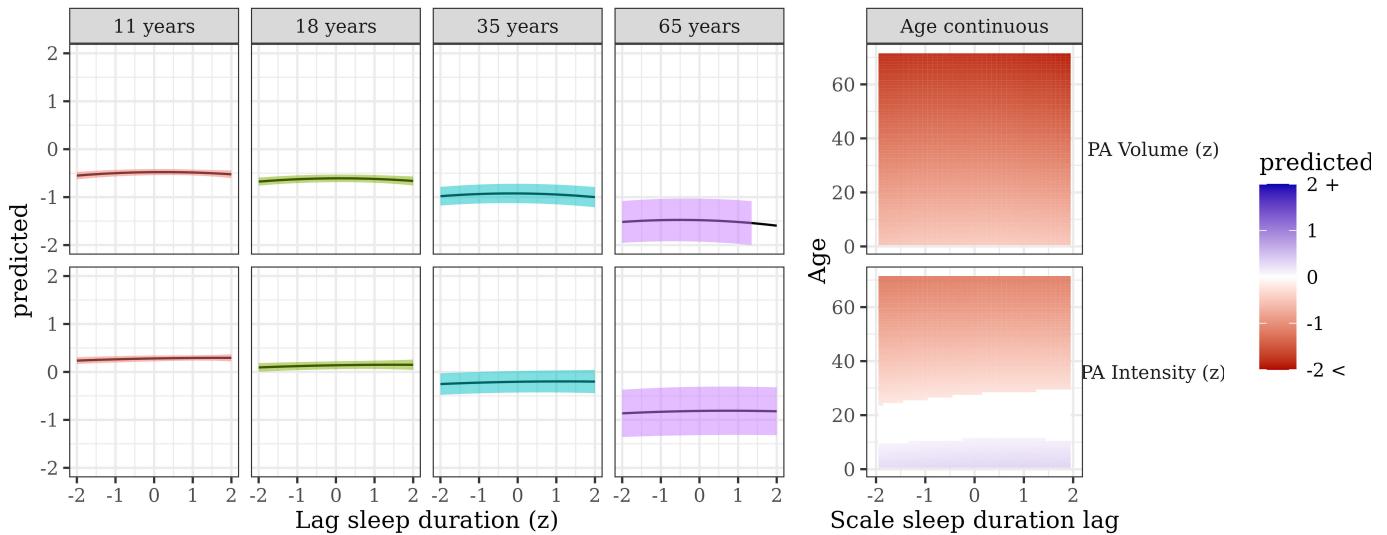


Figure 3. Physical activity by sleep duration

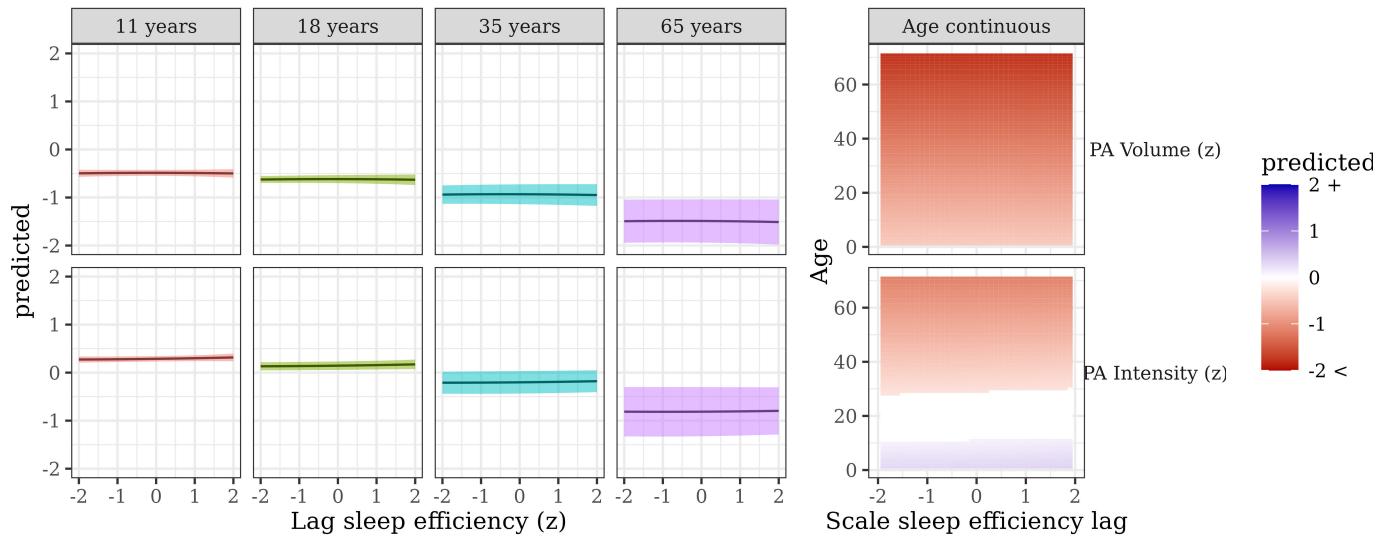


Figure 4. Physical activity by sleep efficiency

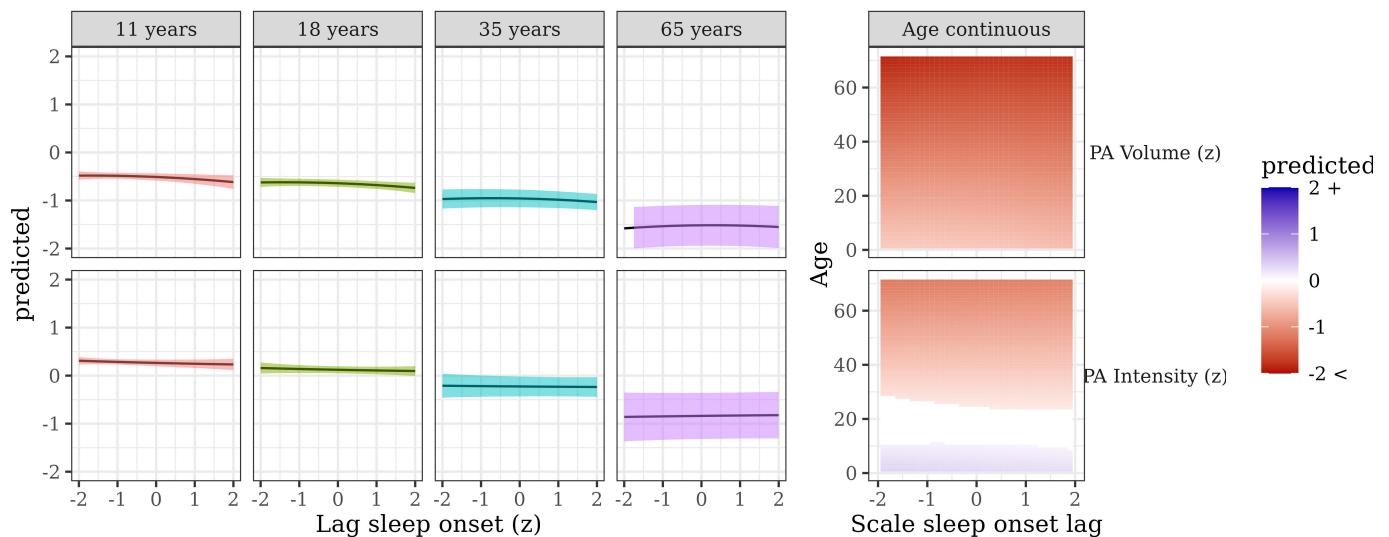


Figure 5. Physical activity by sleep onset

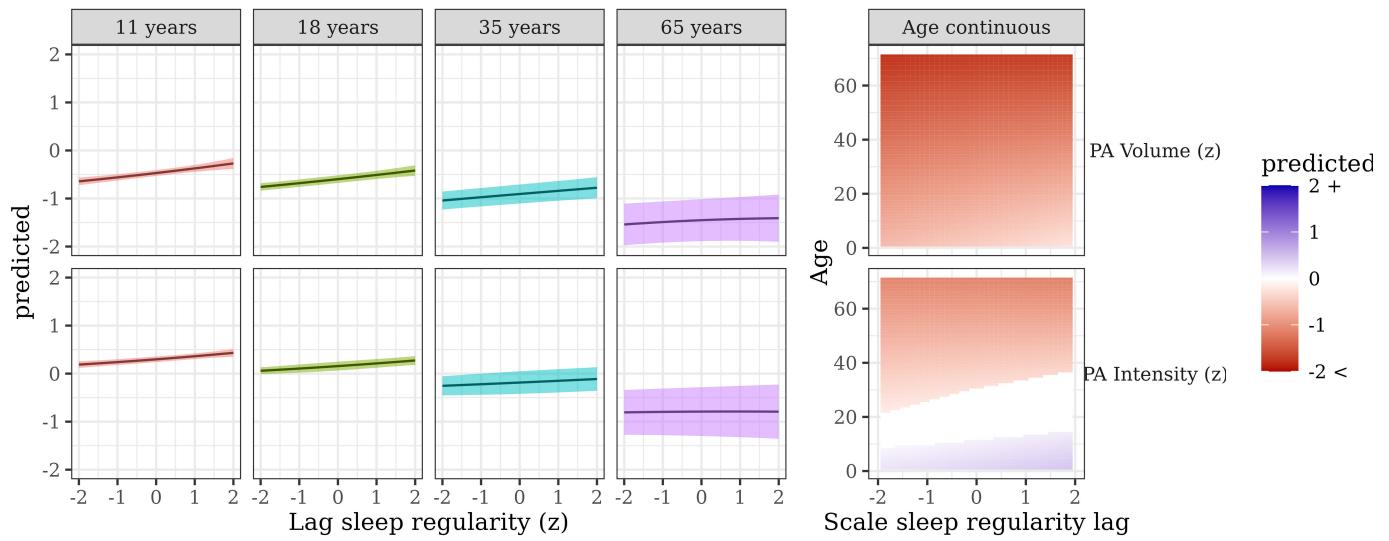


Figure 6. Physical activity by sleep regularity

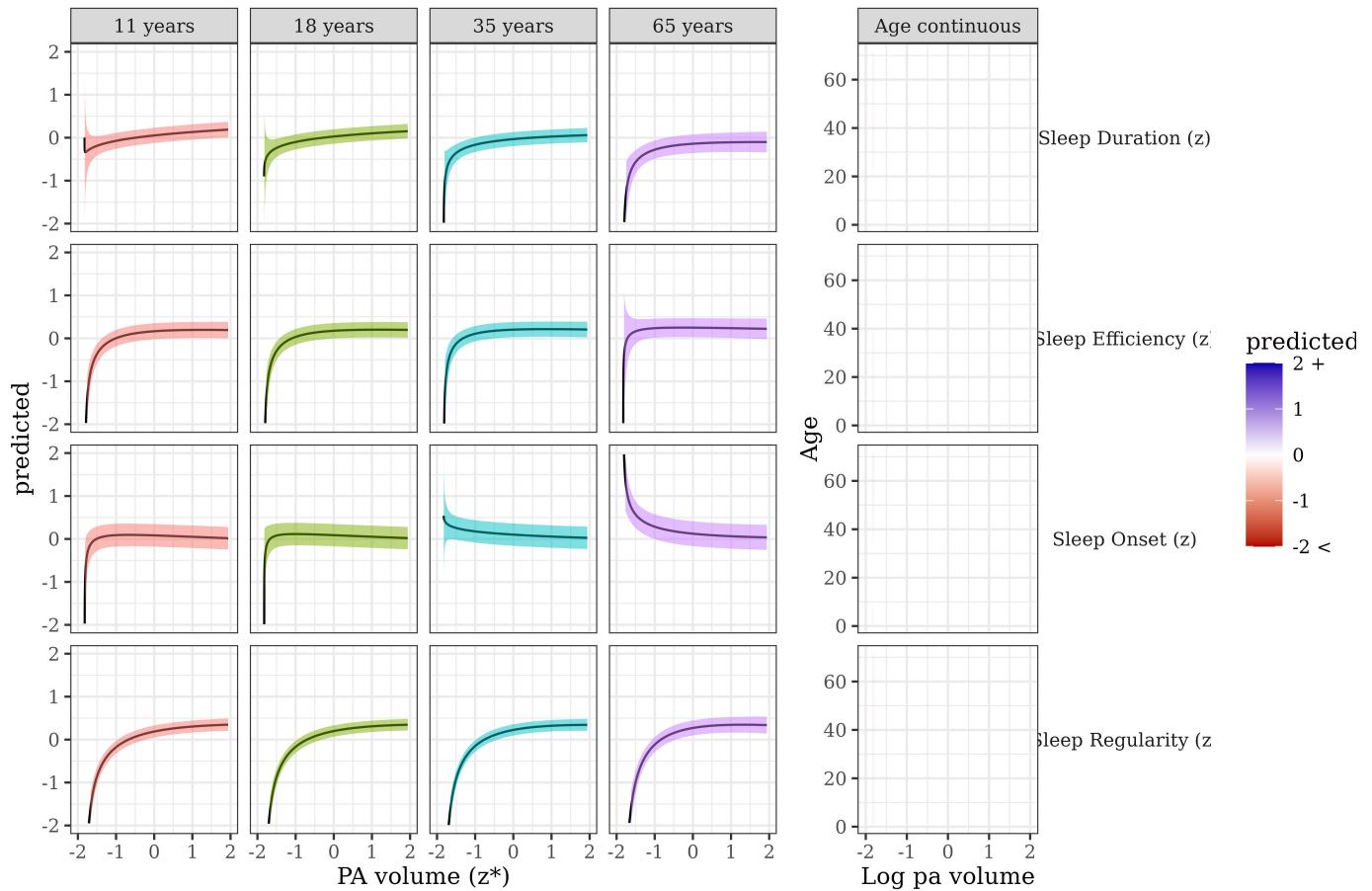


Figure 7. Sleep metrics on Physical activity volume

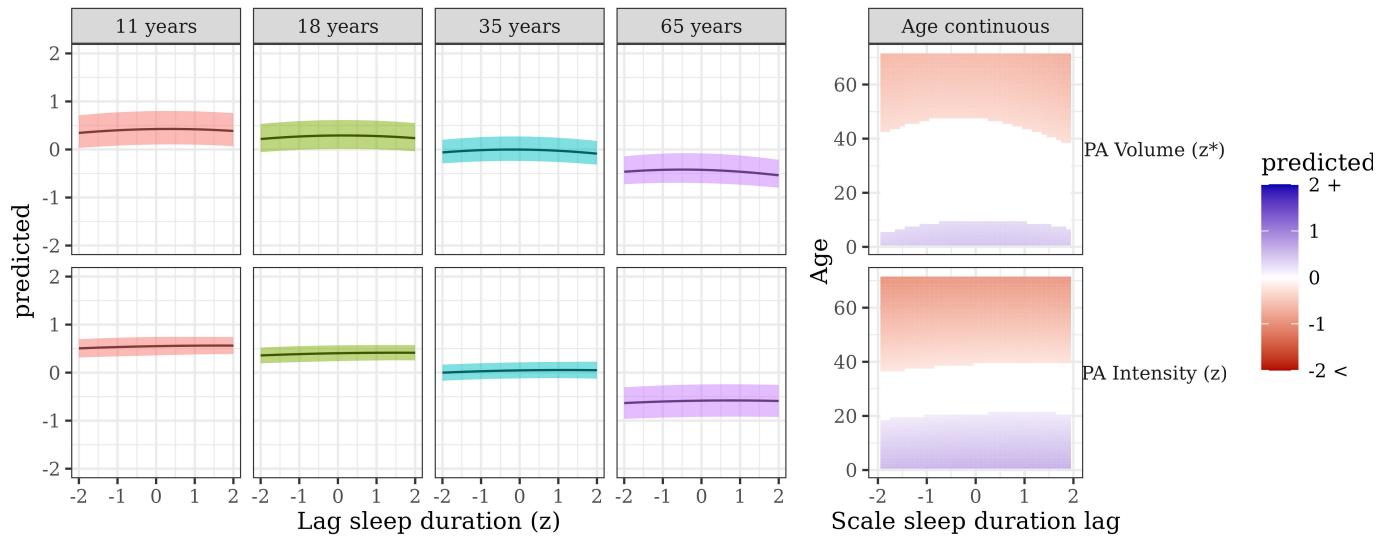


Figure 8. Physical activity by sleep duration

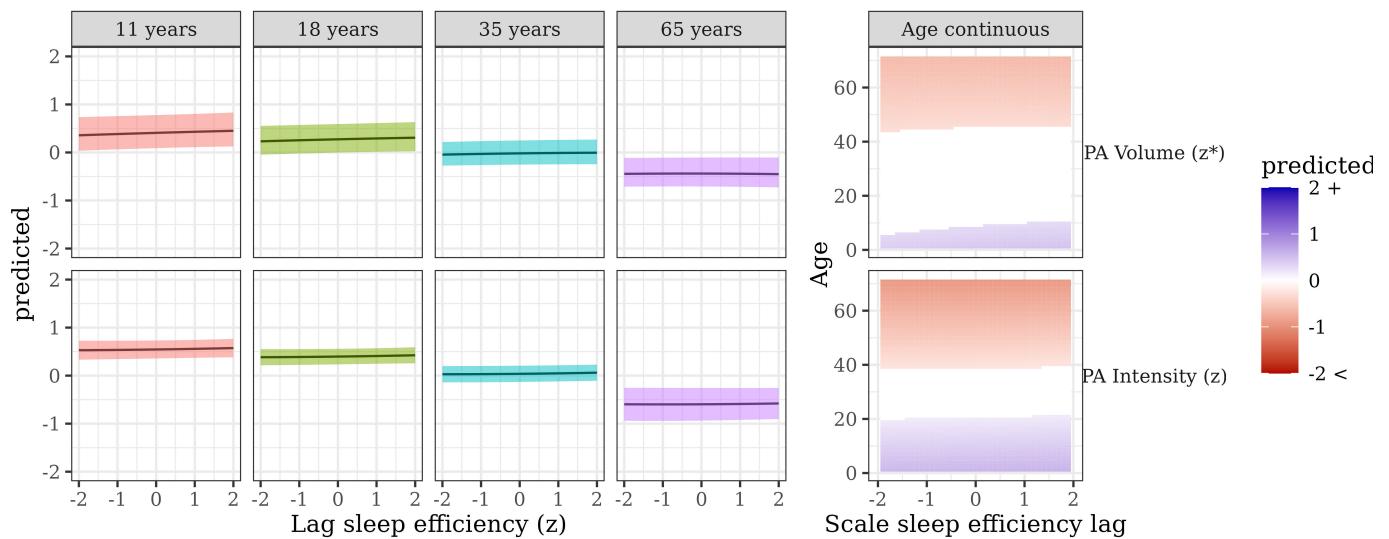


Figure 9. Physical activity by sleep efficiency

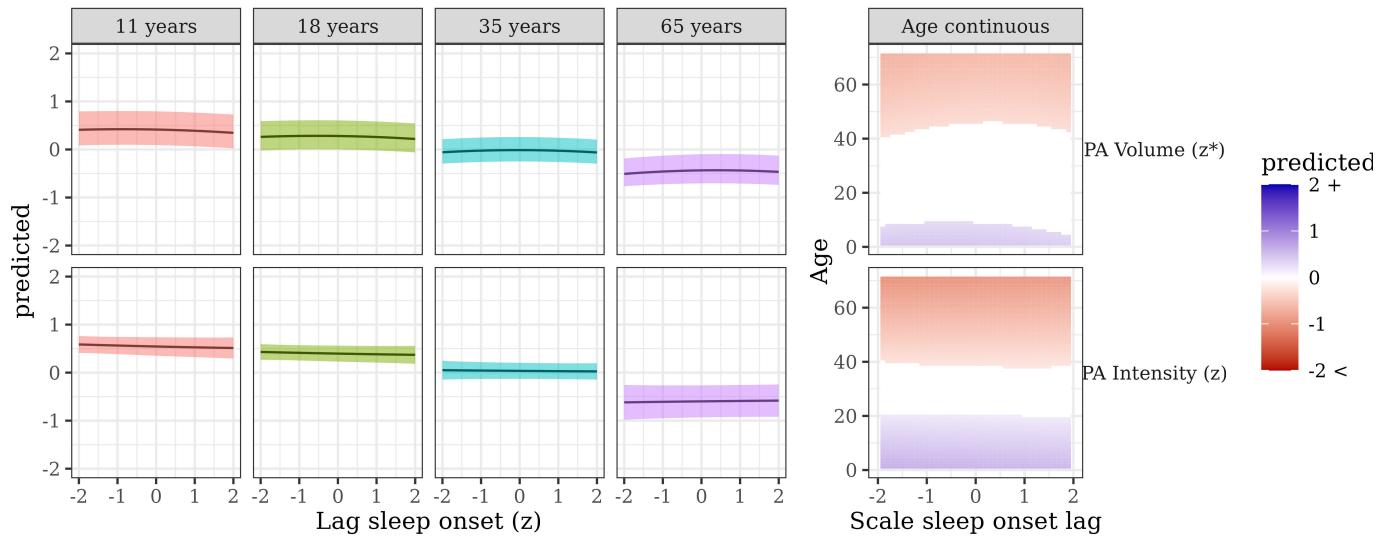


Figure 10. Physical activity by sleep onset

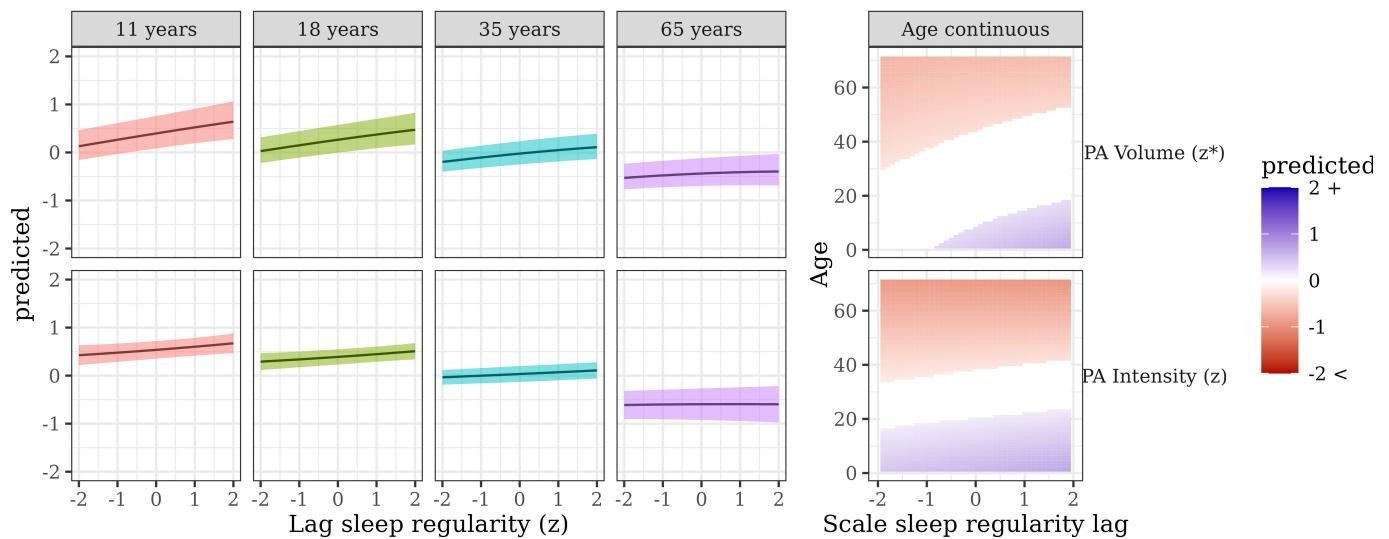


Figure 11. Physical activity by sleep regularity

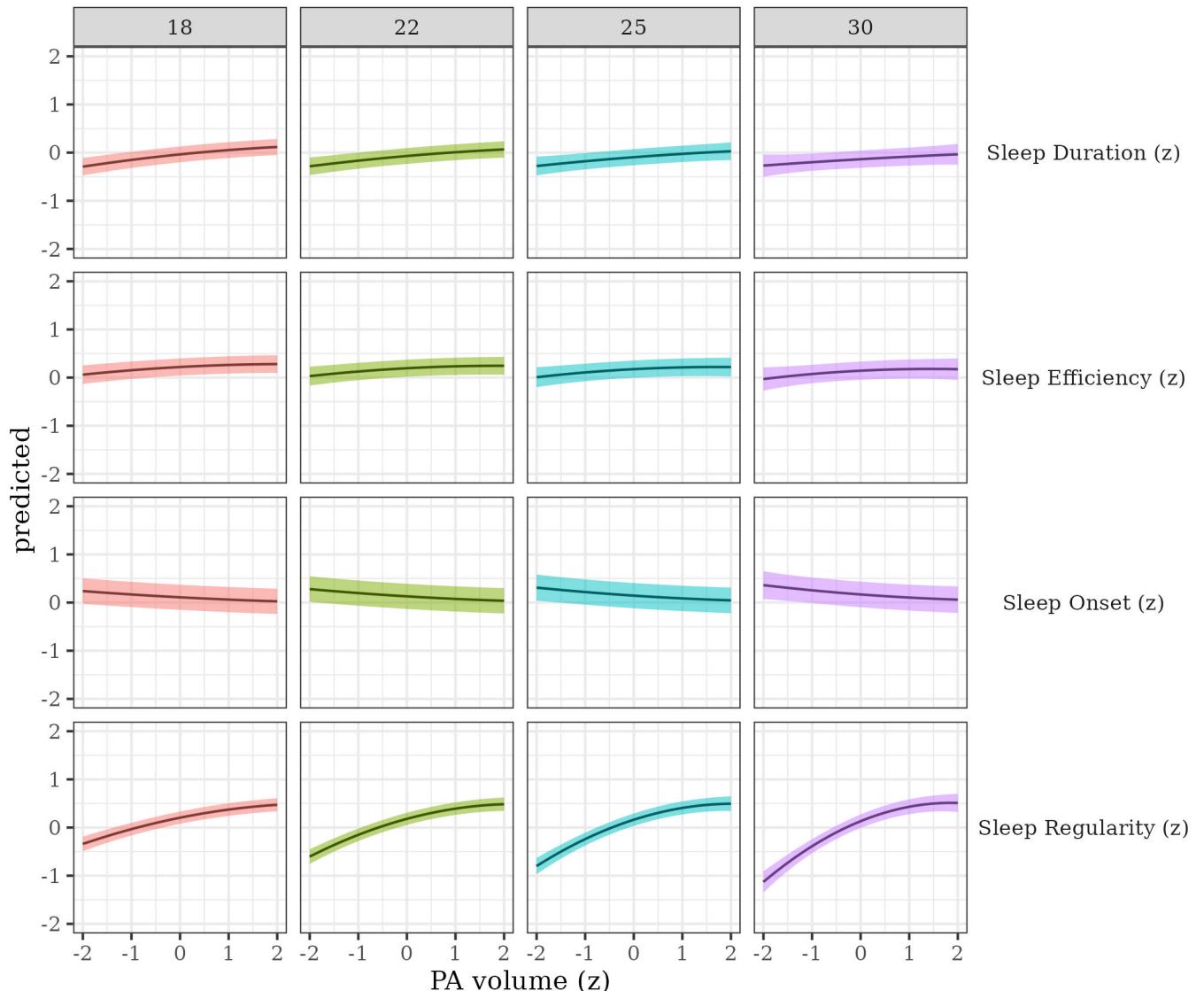


Figure 12. Sleep metrics on Physical activity volume by BMI

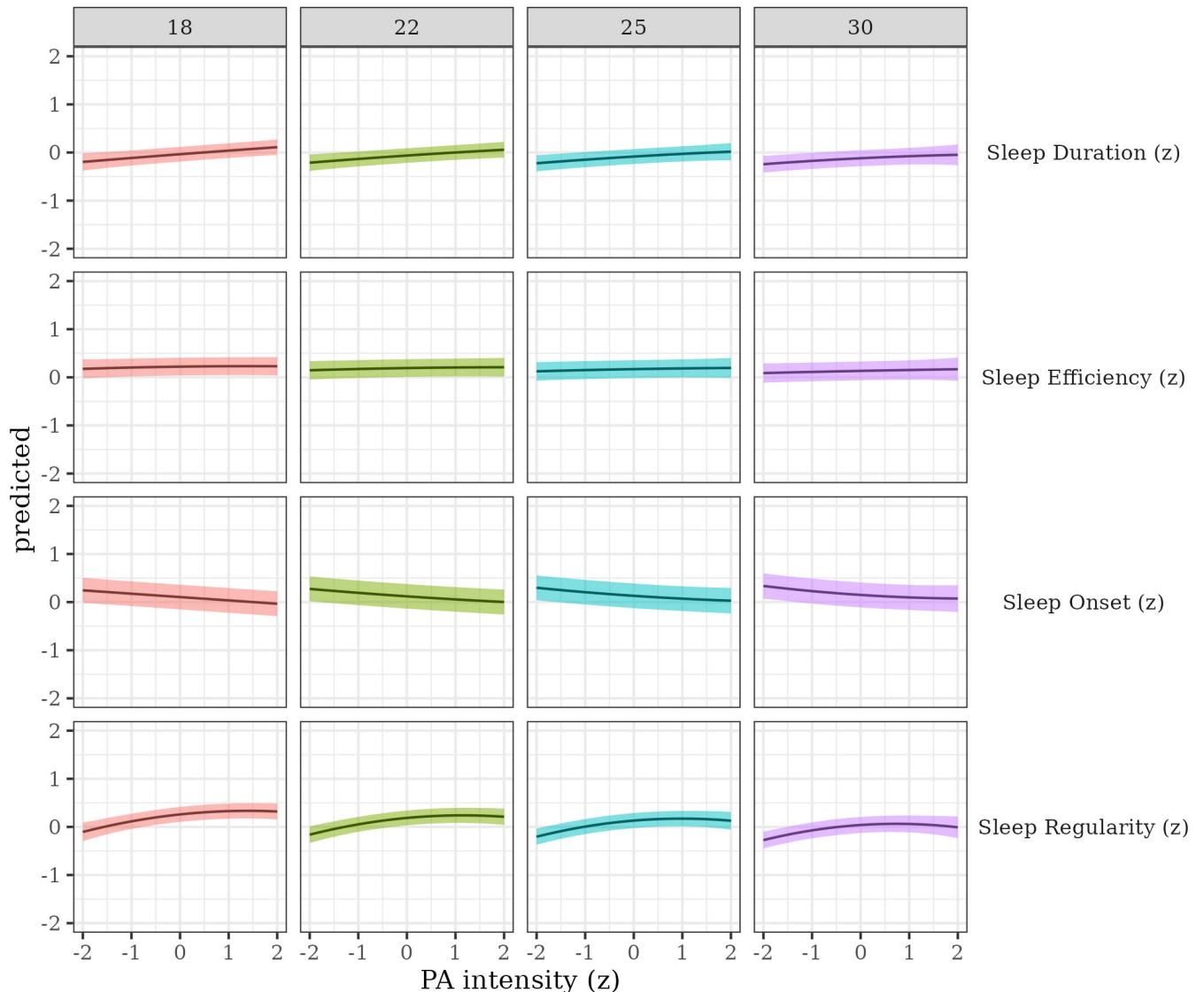


Figure 13. Sleep metrics on Physical activity intensity moderated by BMI

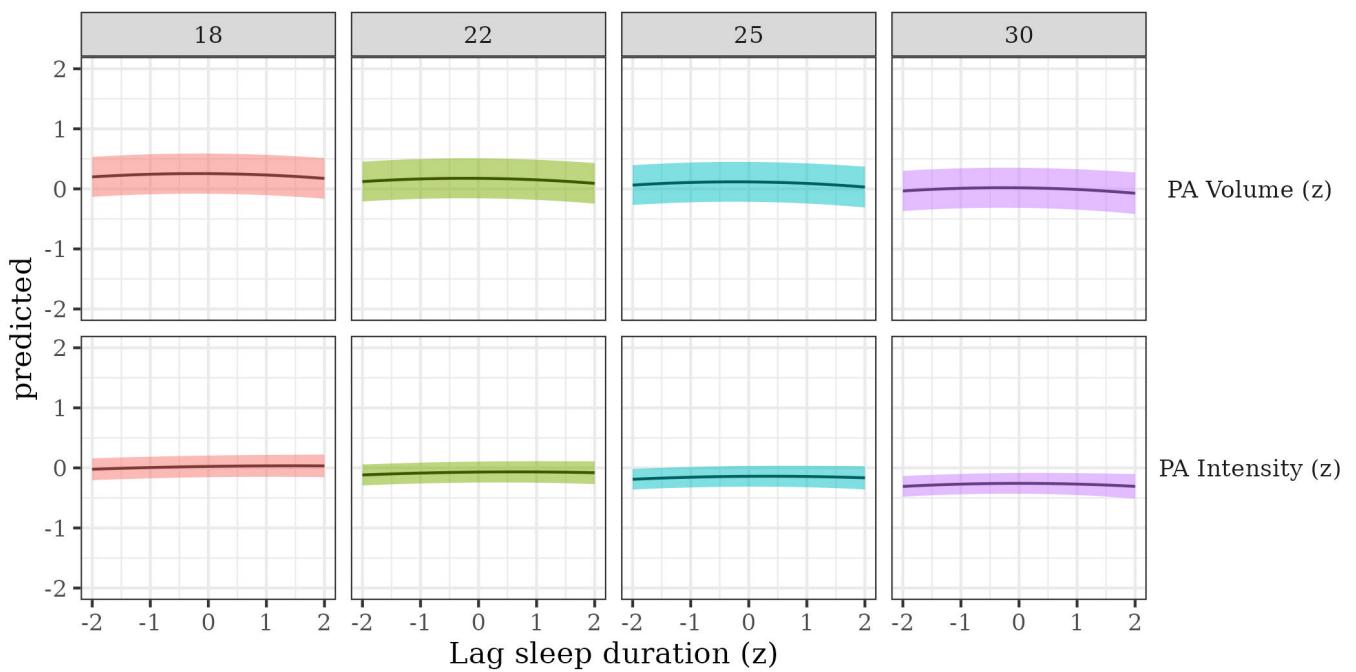


Figure 14. Physical activity by sleep duration moderated by BMI

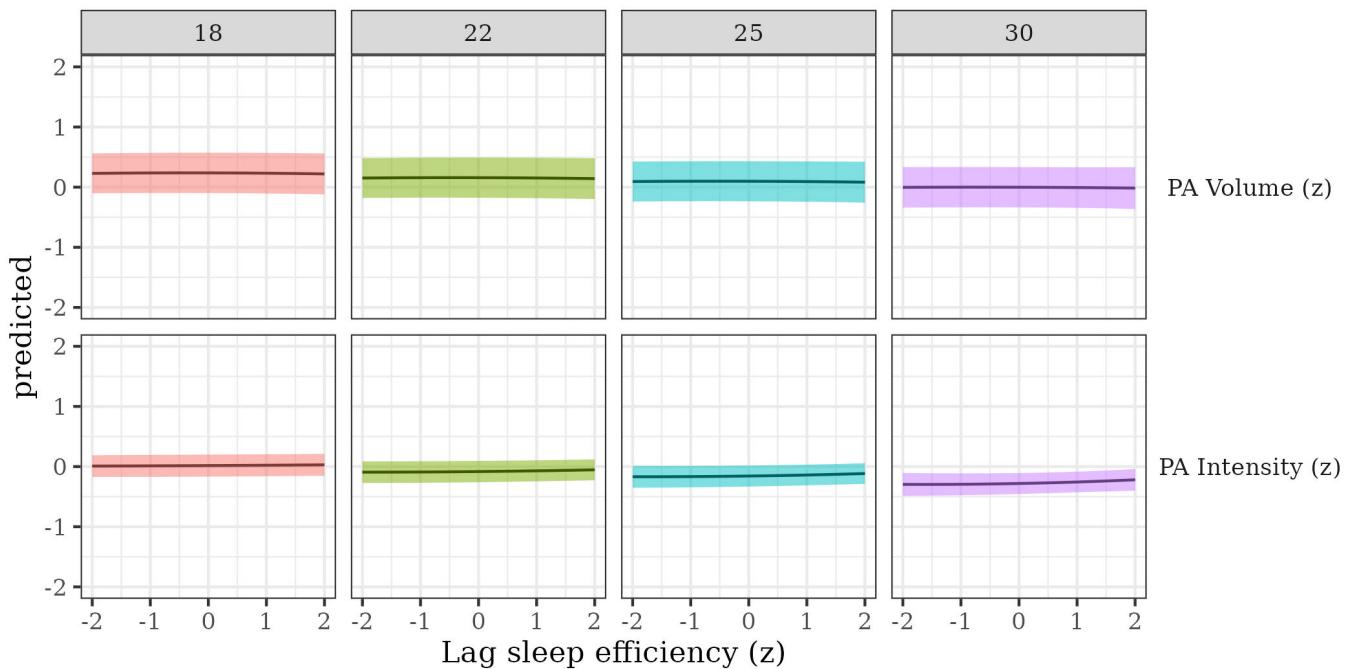


Figure 15. Physical activity by sleep efficiency moderated by BMI

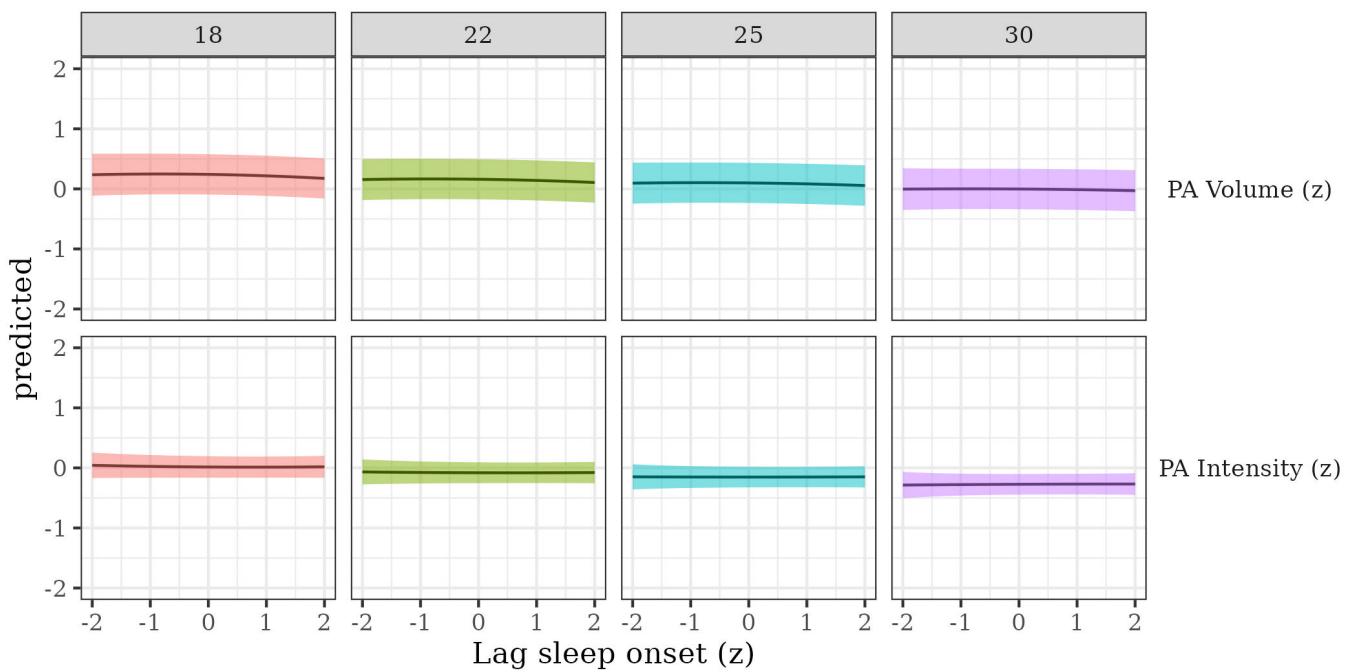


Figure 16. Physical activity by sleep onset moderated by BMI

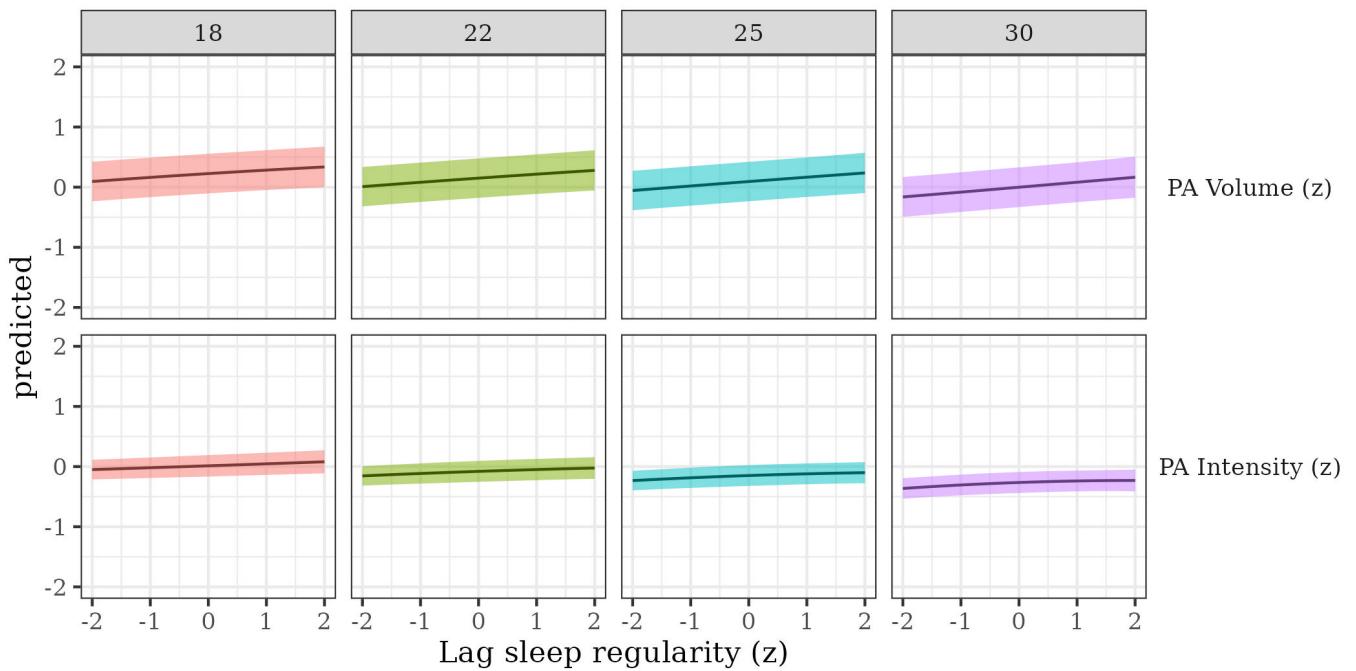


Figure 17. Physical activity by sleep regularity moderated by BMI

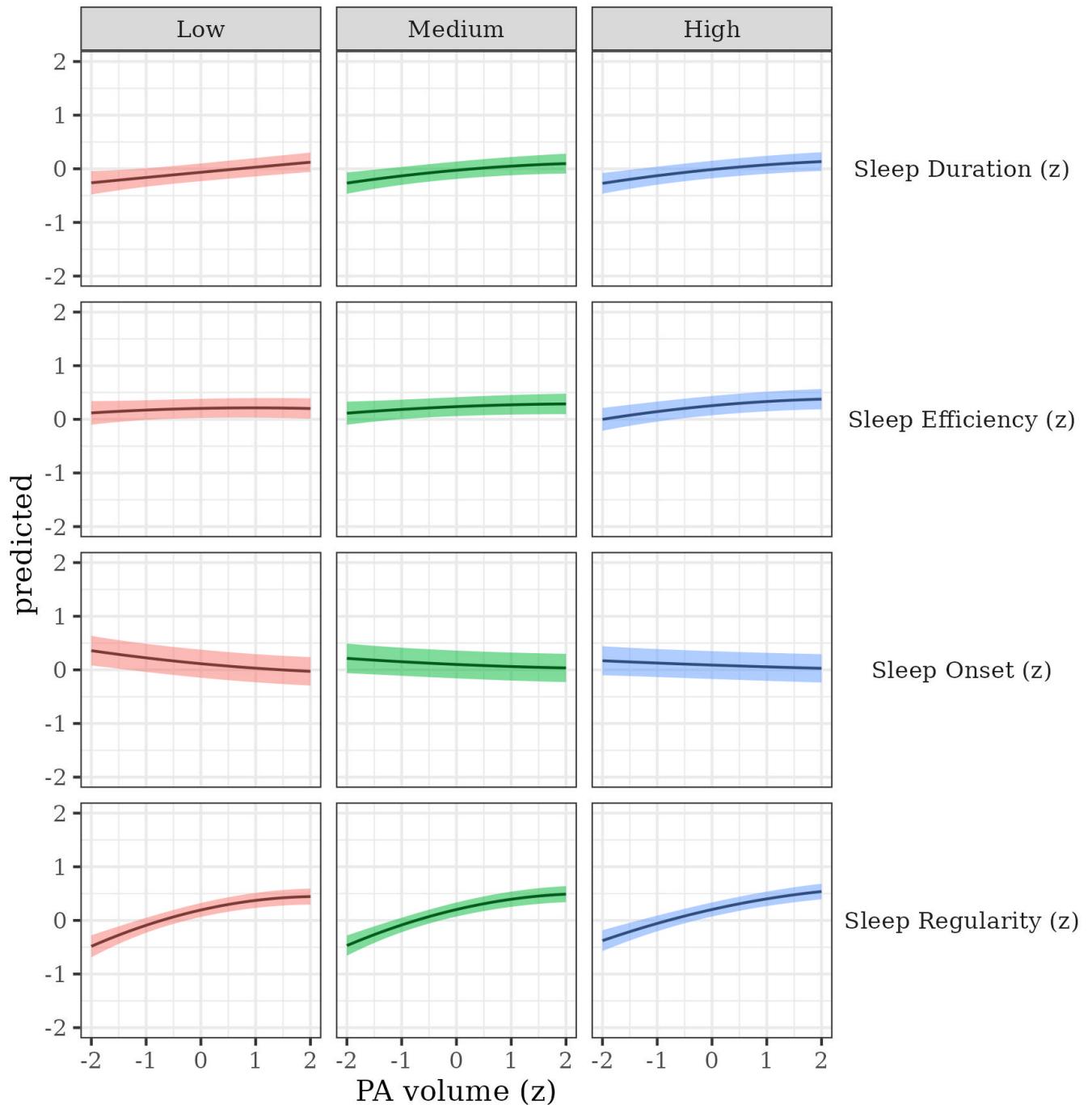


Figure 18. Sleep metrics on Physical activity volume by SES

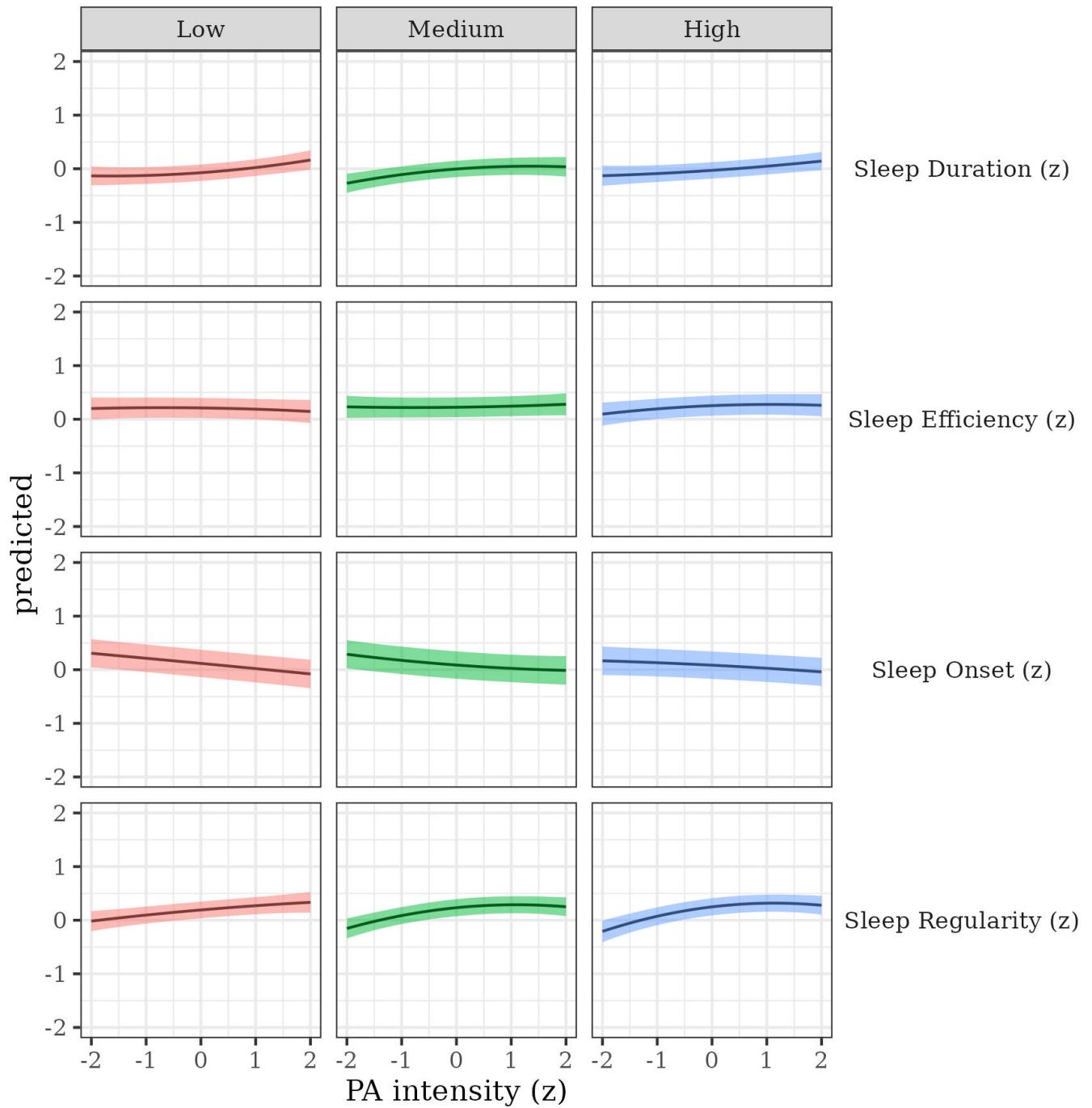


Figure 19. Sleep metrics on Physical activity intensity moderated by SES

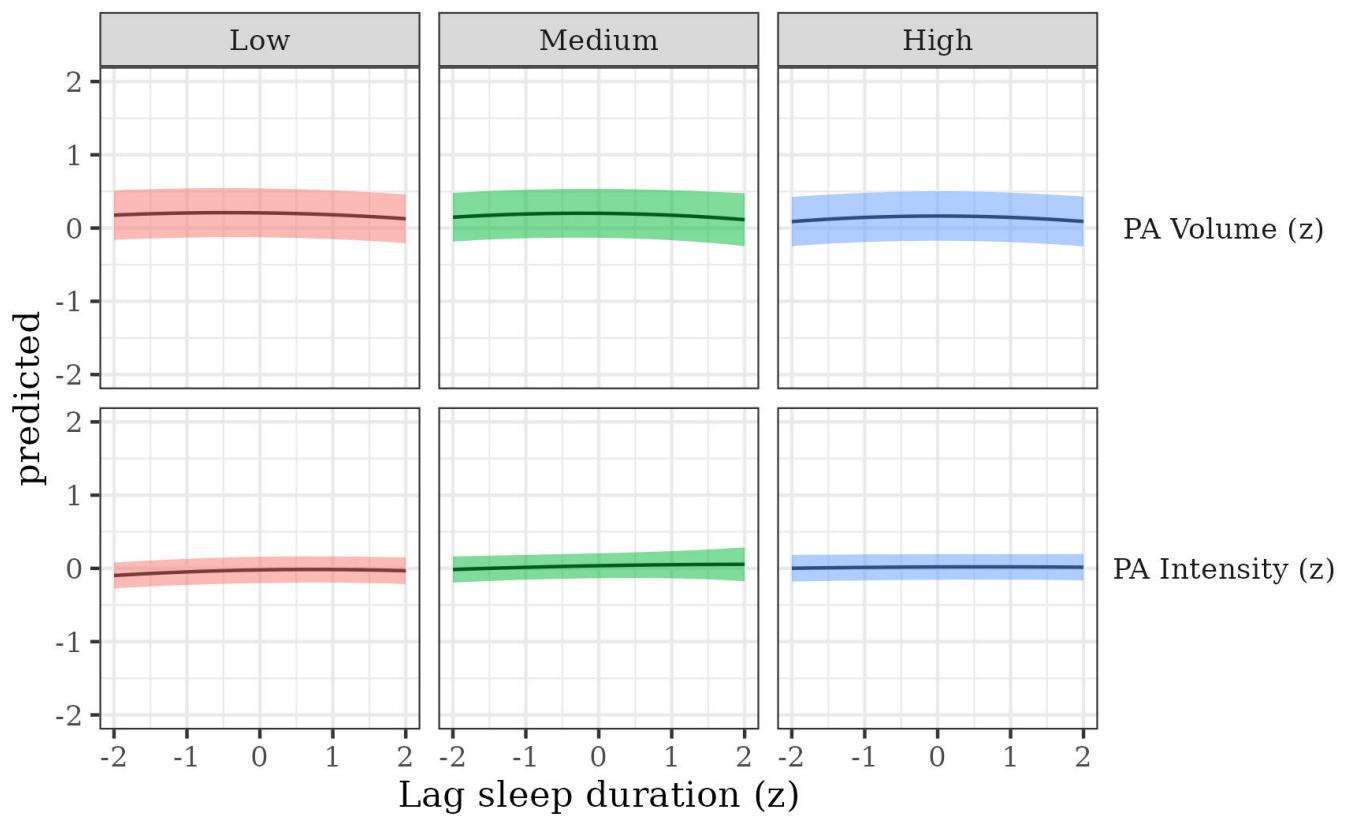


Figure 20. Physical activity by sleep duration moderated by SES

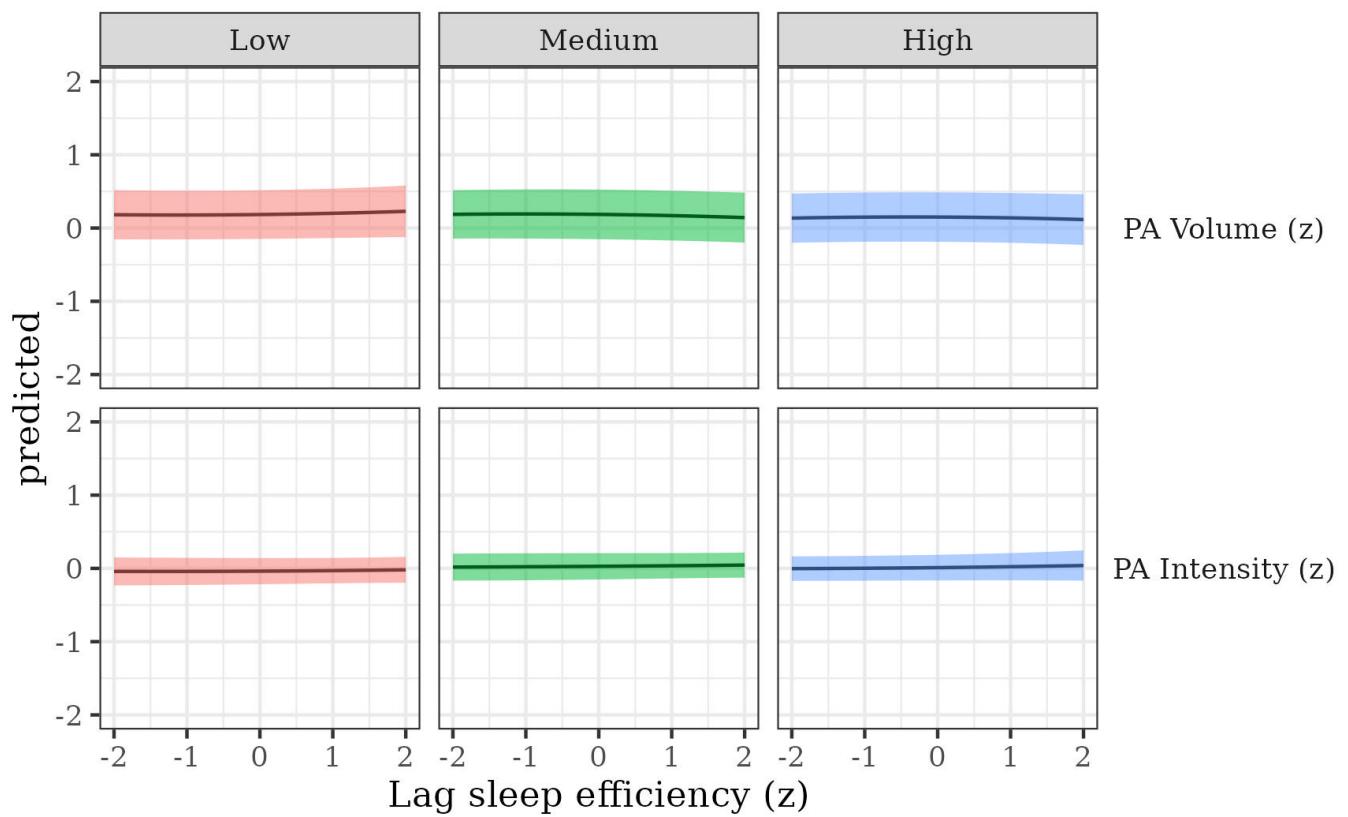


Figure 21. Physical activity by sleep efficiency moderated by SES

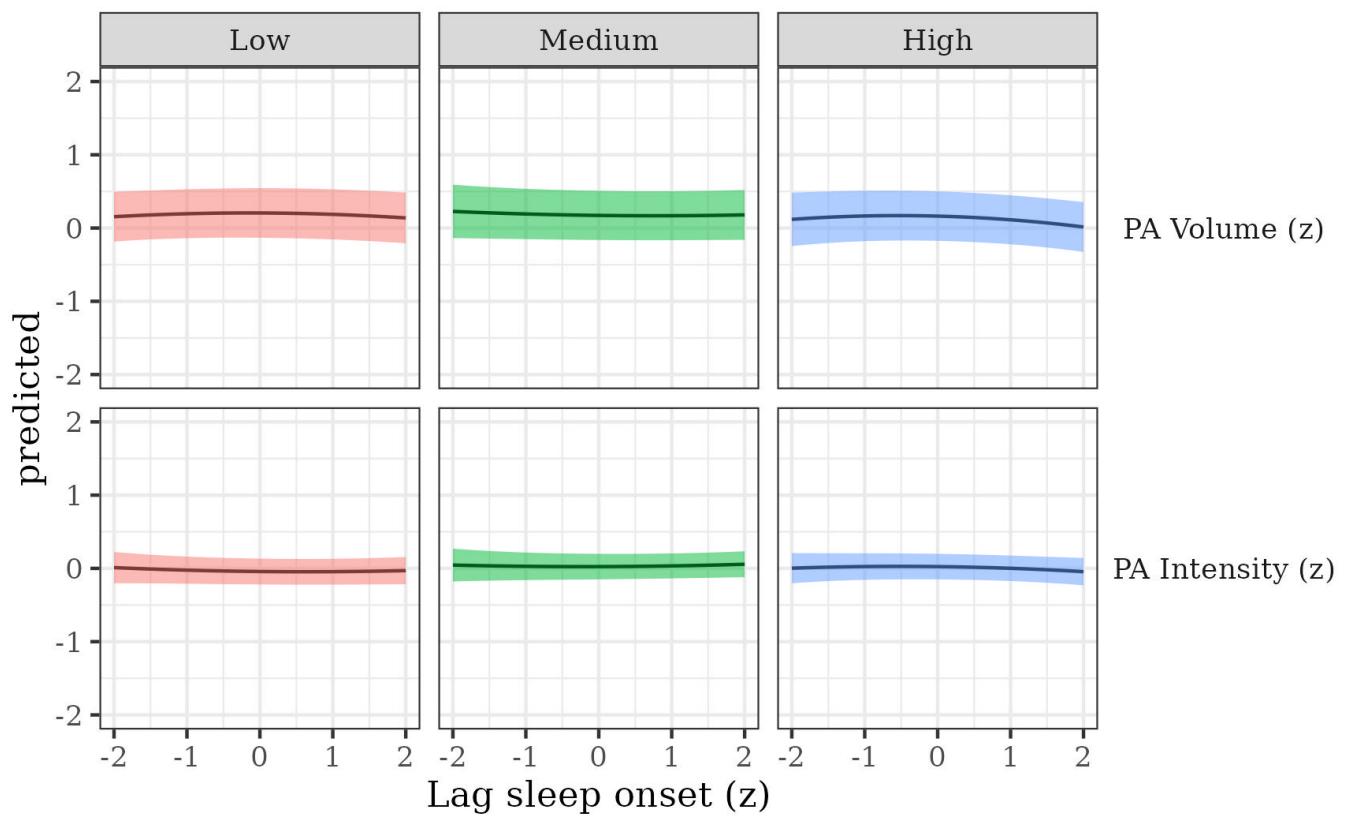


Figure 22. Physical activity by sleep onset moderated by SES

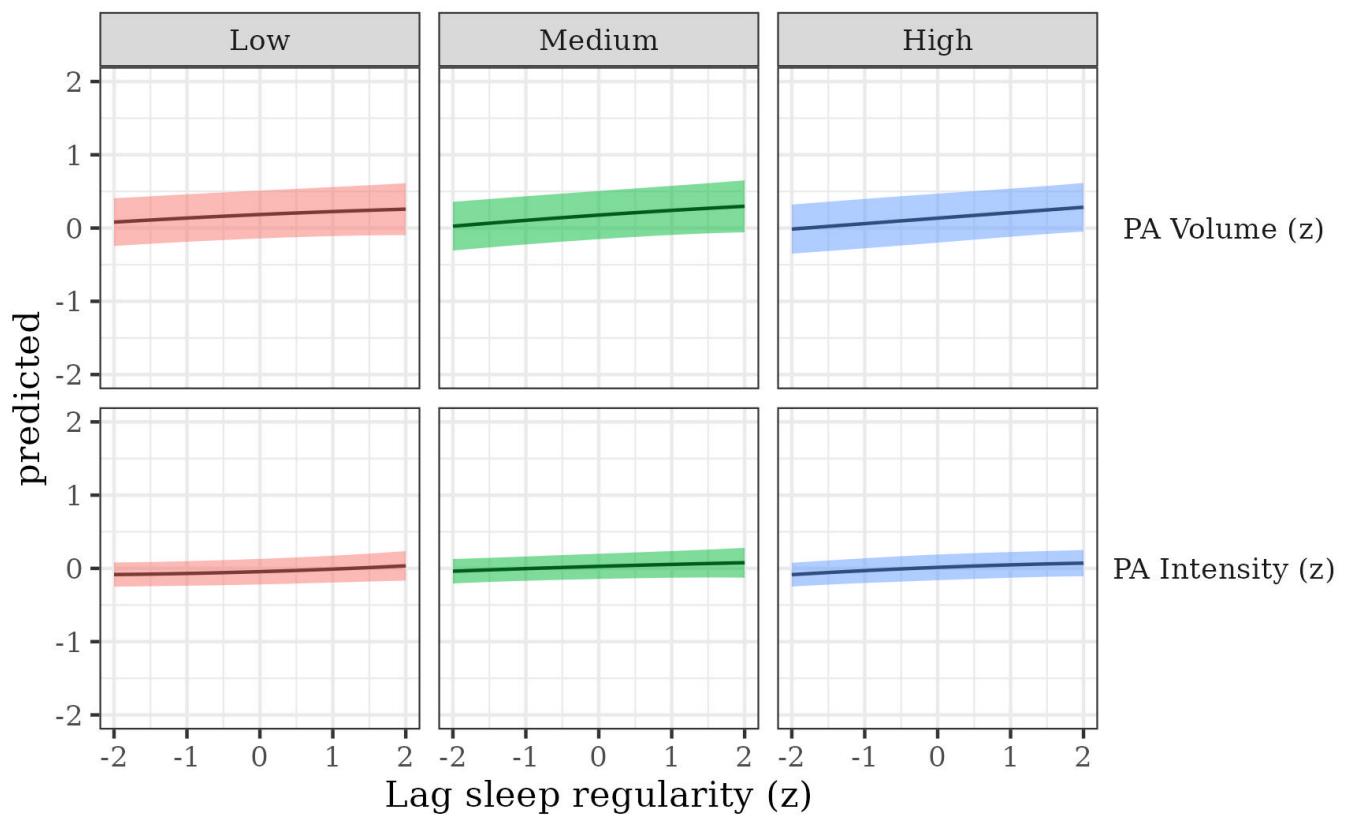


Figure 23. Physical activity by sleep regularity moderated by SES

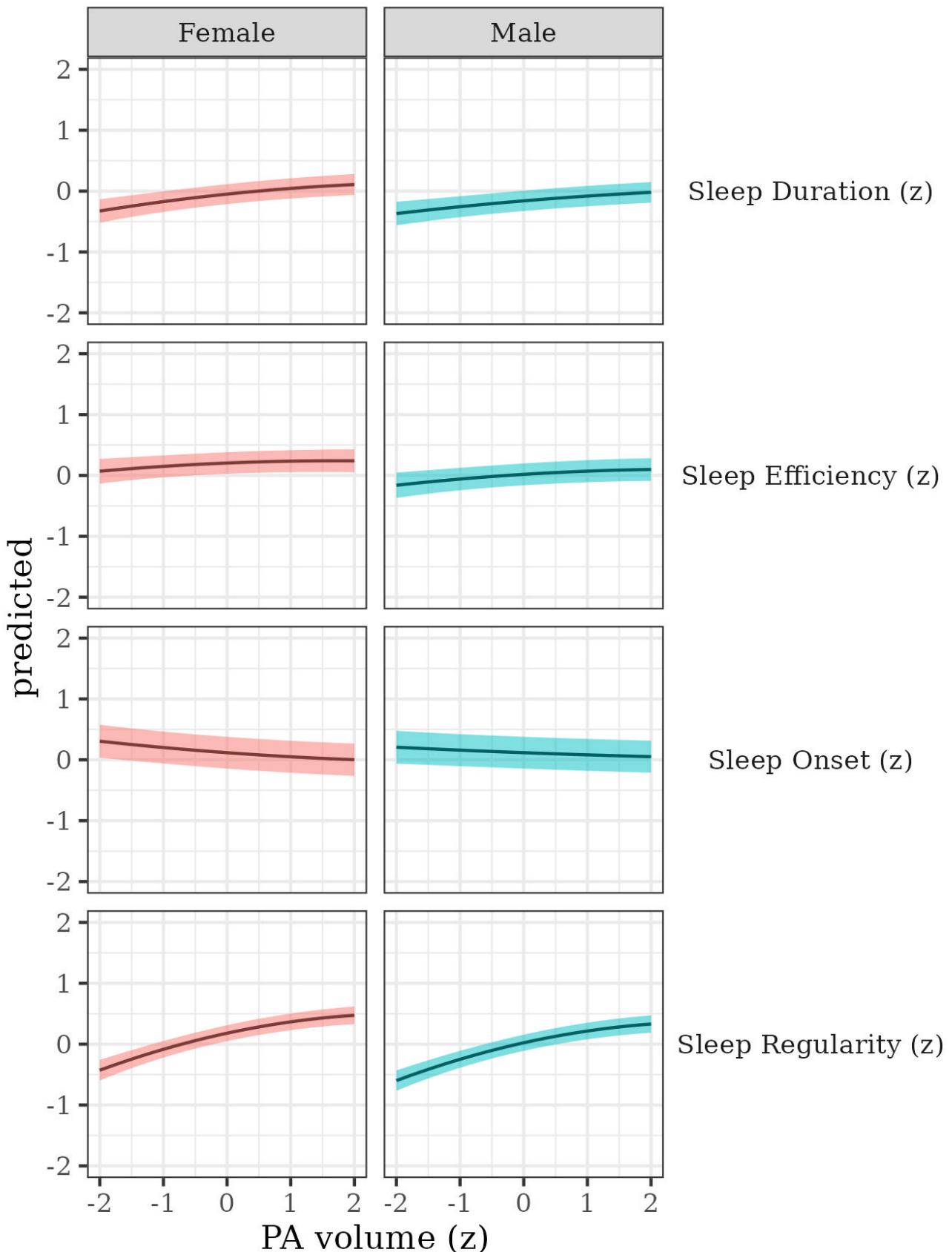


Figure 24. Sleep metrics on Physical activity volume by sex

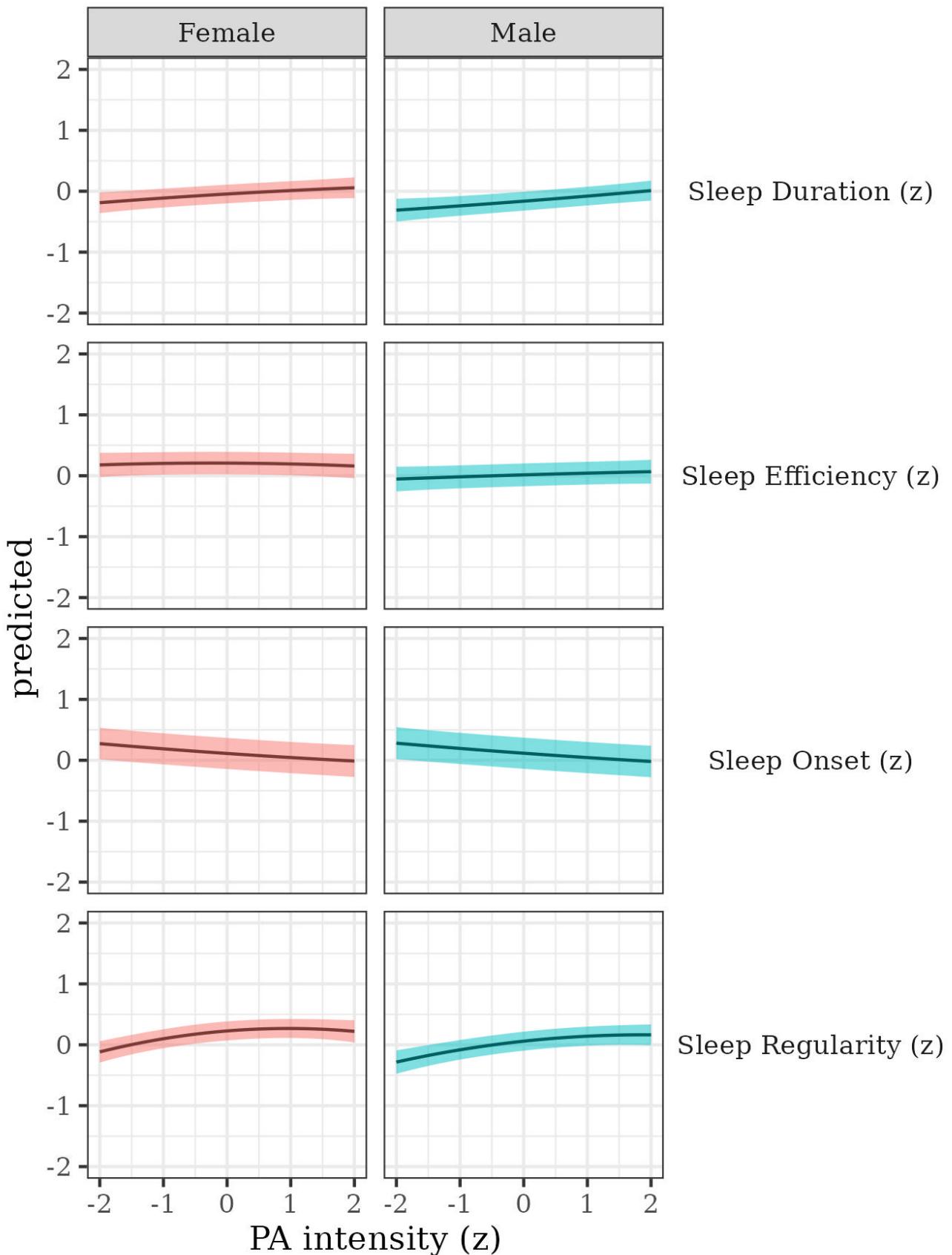


Figure 25. Sleep metrics on Physical activity intensity moderated by sex

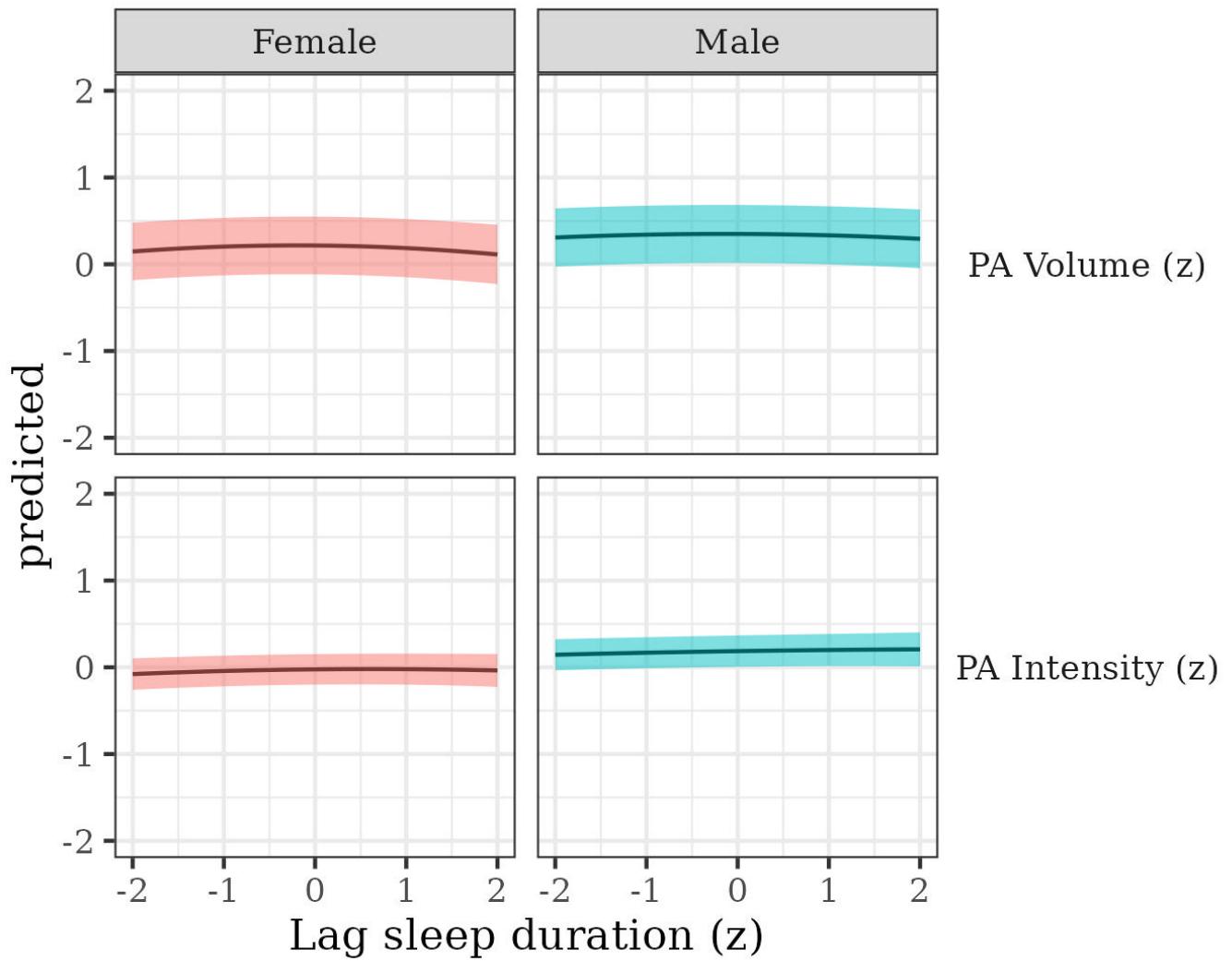


Figure 26. Physical activity by sleep duration moderated by sex

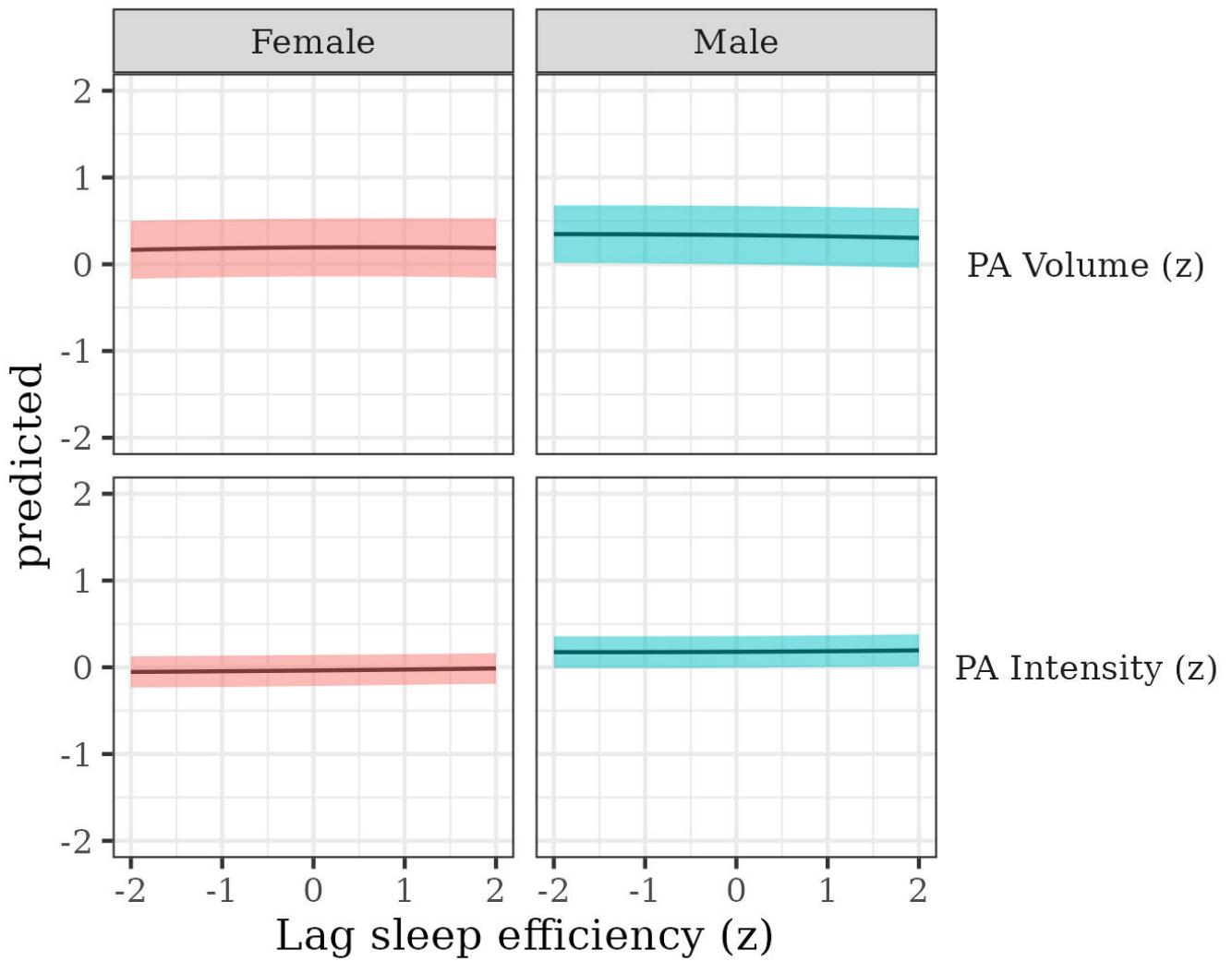


Figure 27. Physical activity by sleep efficiency moderated by sex

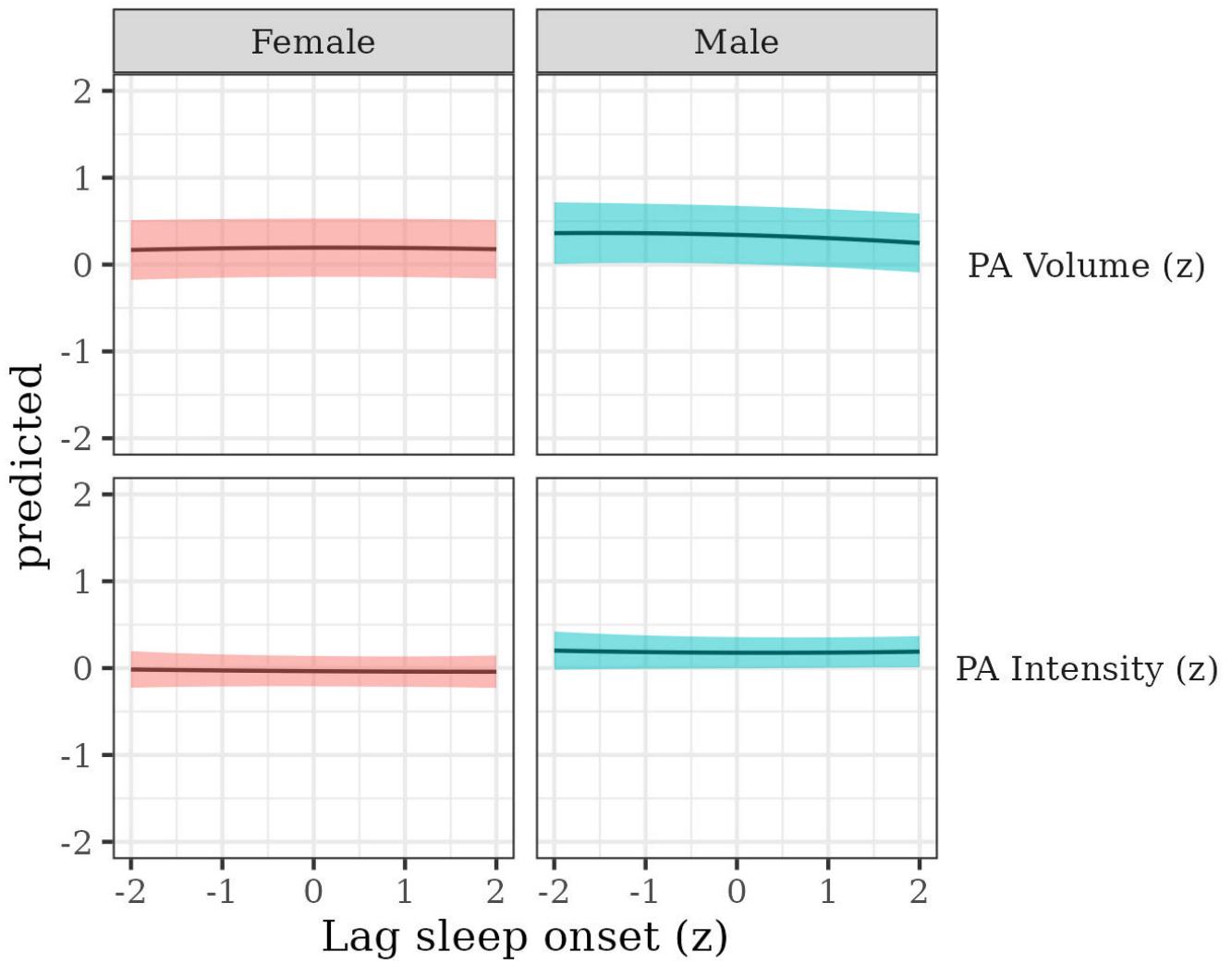


Figure 28. Physical activity by sleep onset moderated by sex

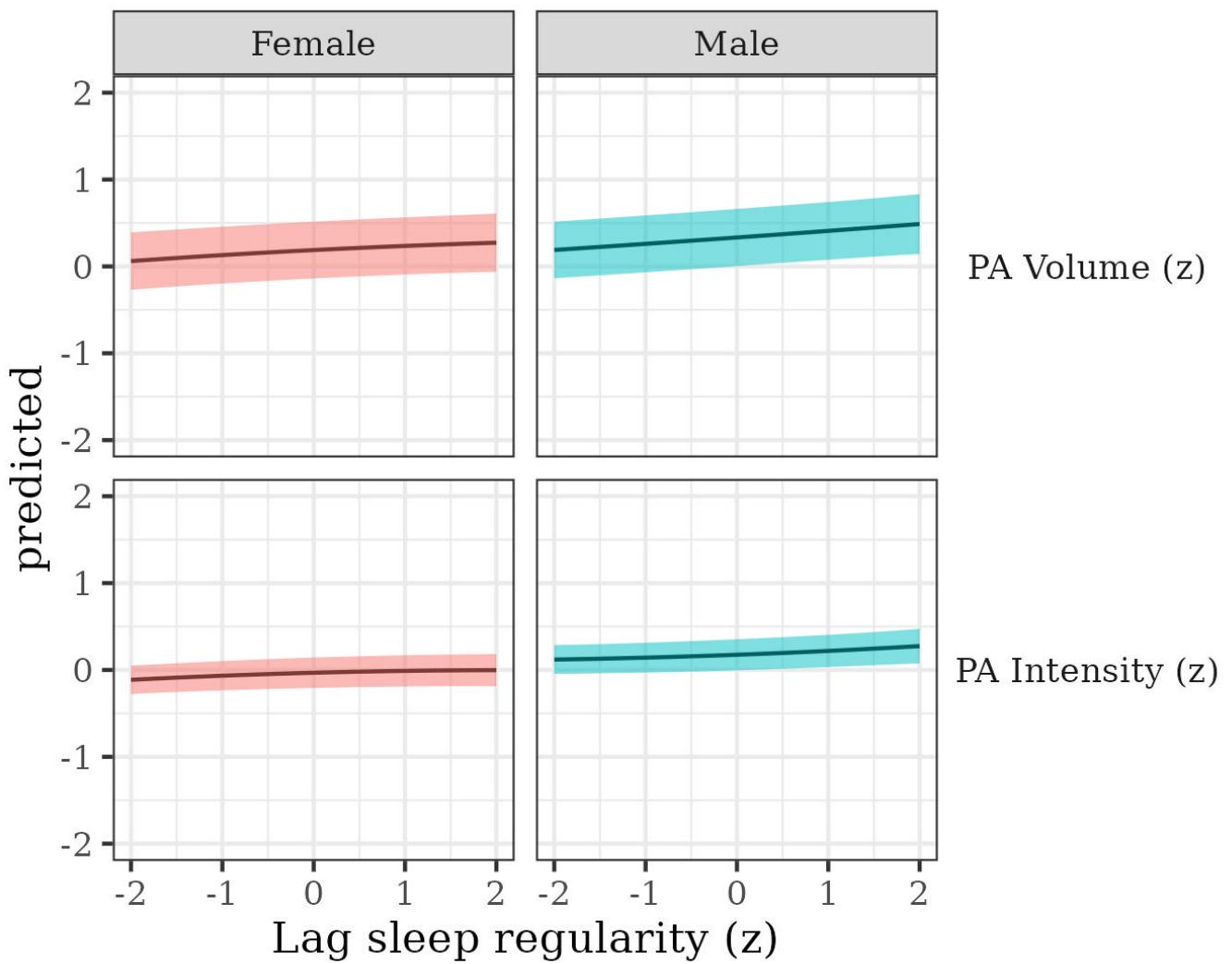


Figure 29. Physical activity by sleep regularity moderated by sex

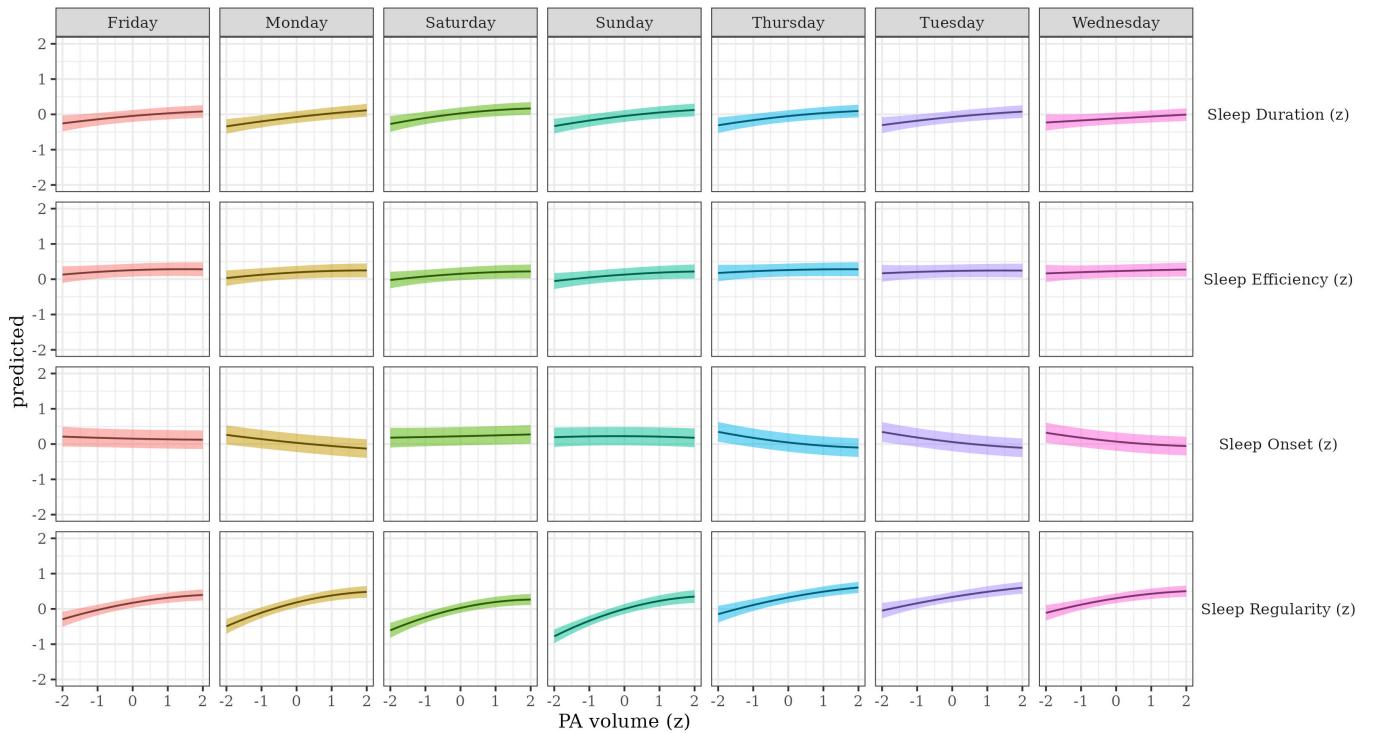


Figure 30. Sleep metrics on Physical activity volume by weekday

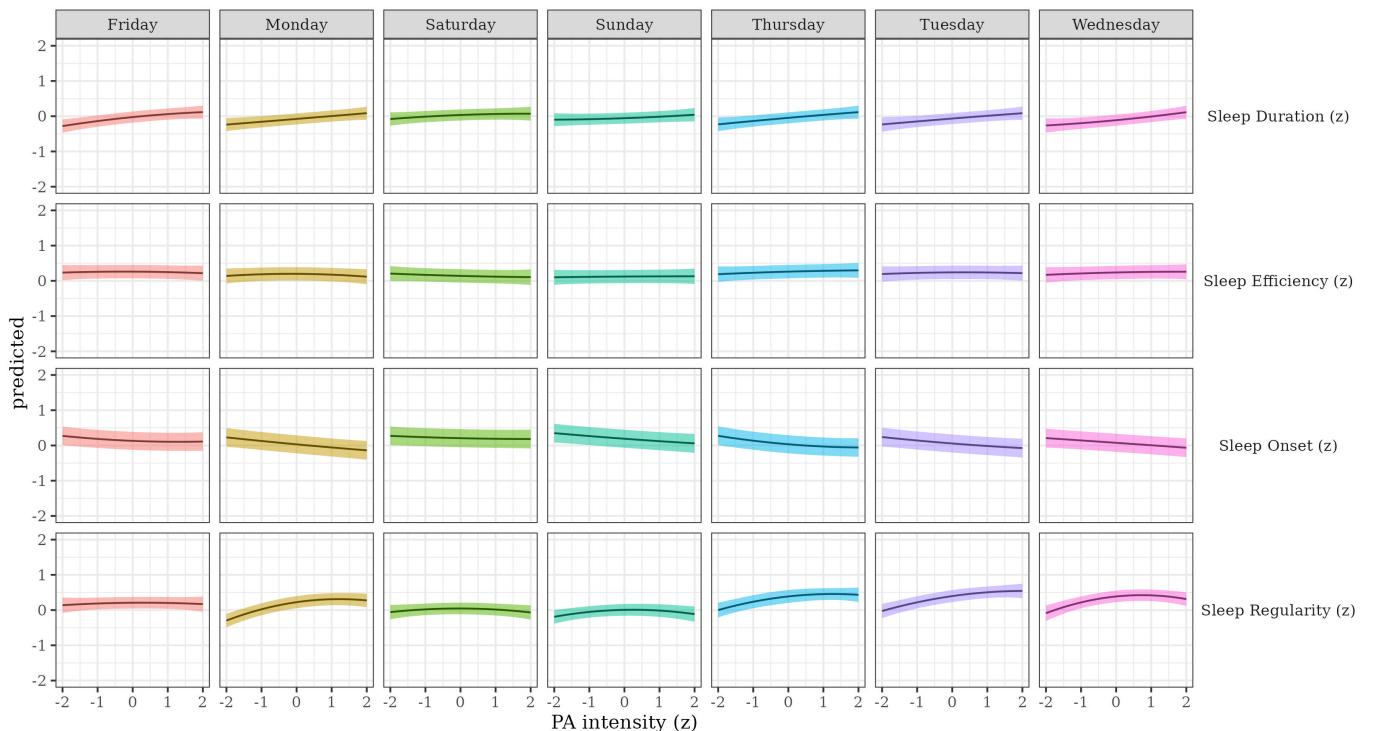


Figure 31. Sleep metrics on Physical activity intensity moderated by weekday

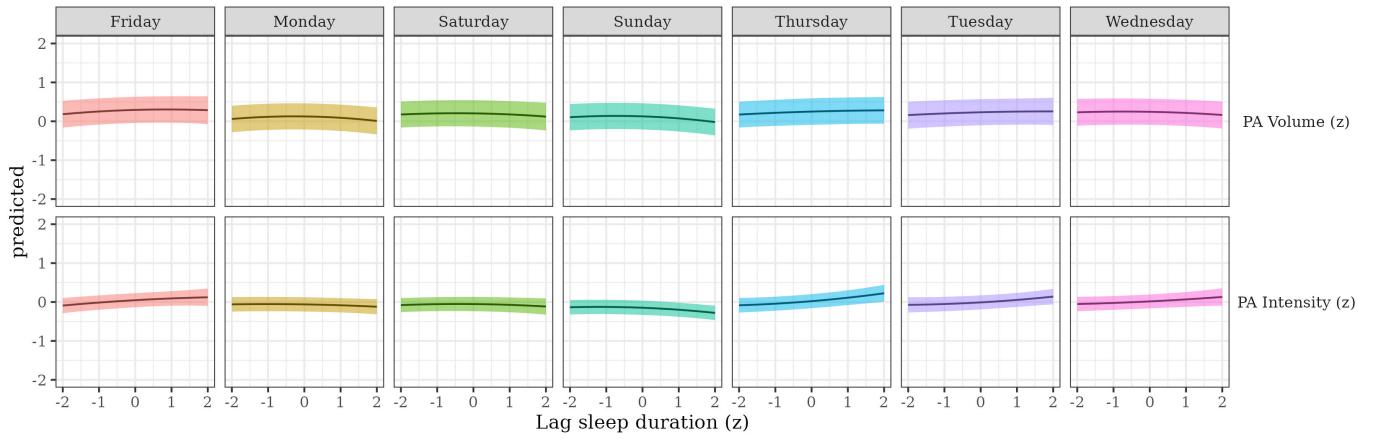


Figure 32. Physical activity by sleep duration moderated by weekday

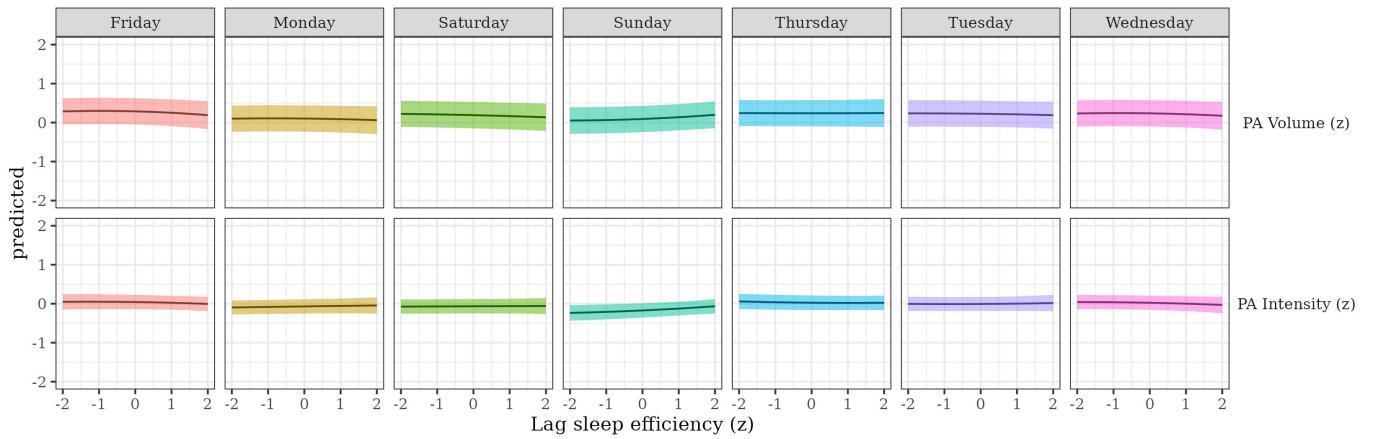


Figure 33. Physical activity by sleep efficiency moderated by weekday

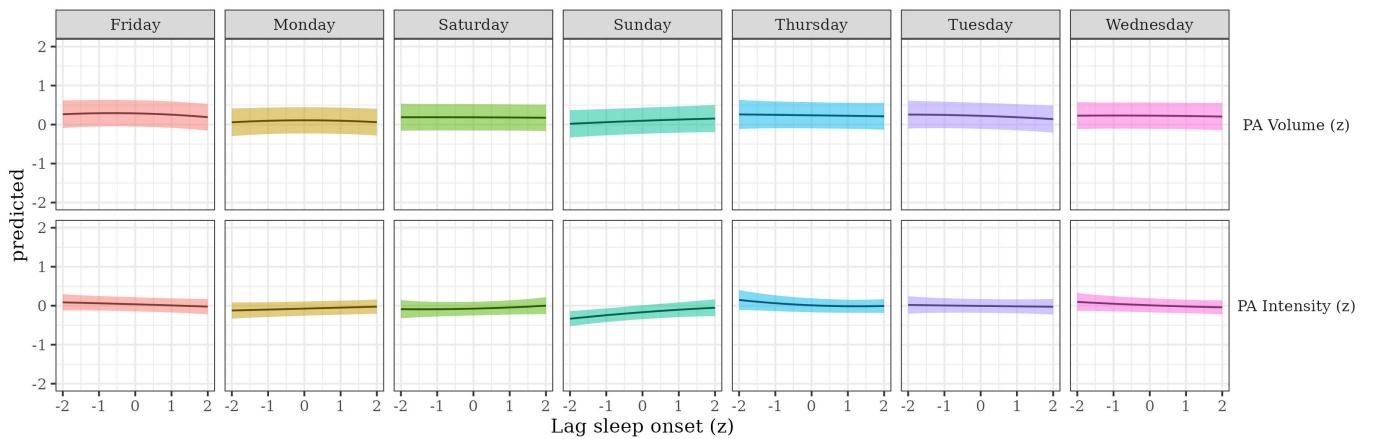


Figure 34. Physical activity by sleep onset moderated by weekday

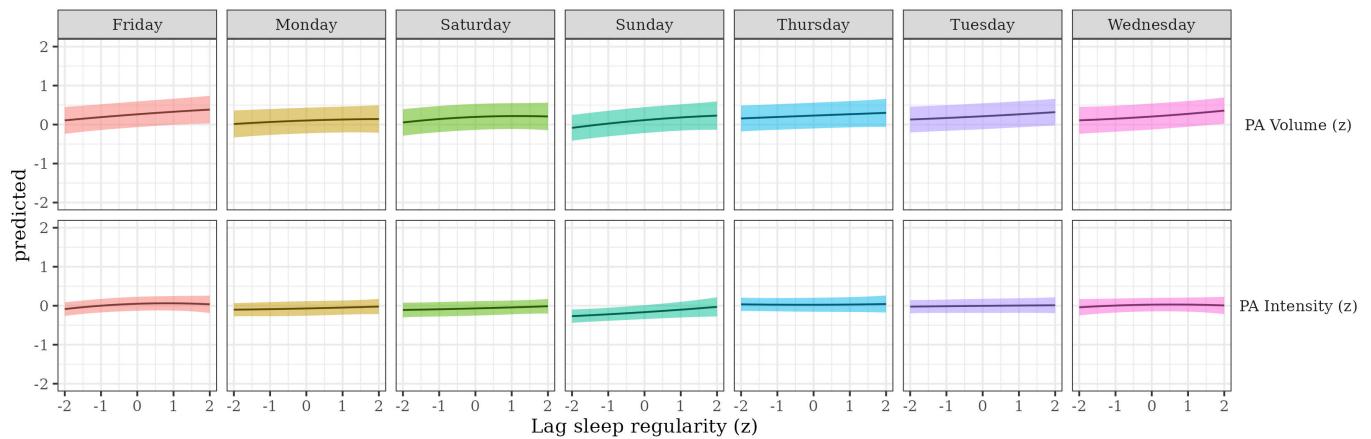


Figure 35. Physical activity by sleep regularity moderated by weekday

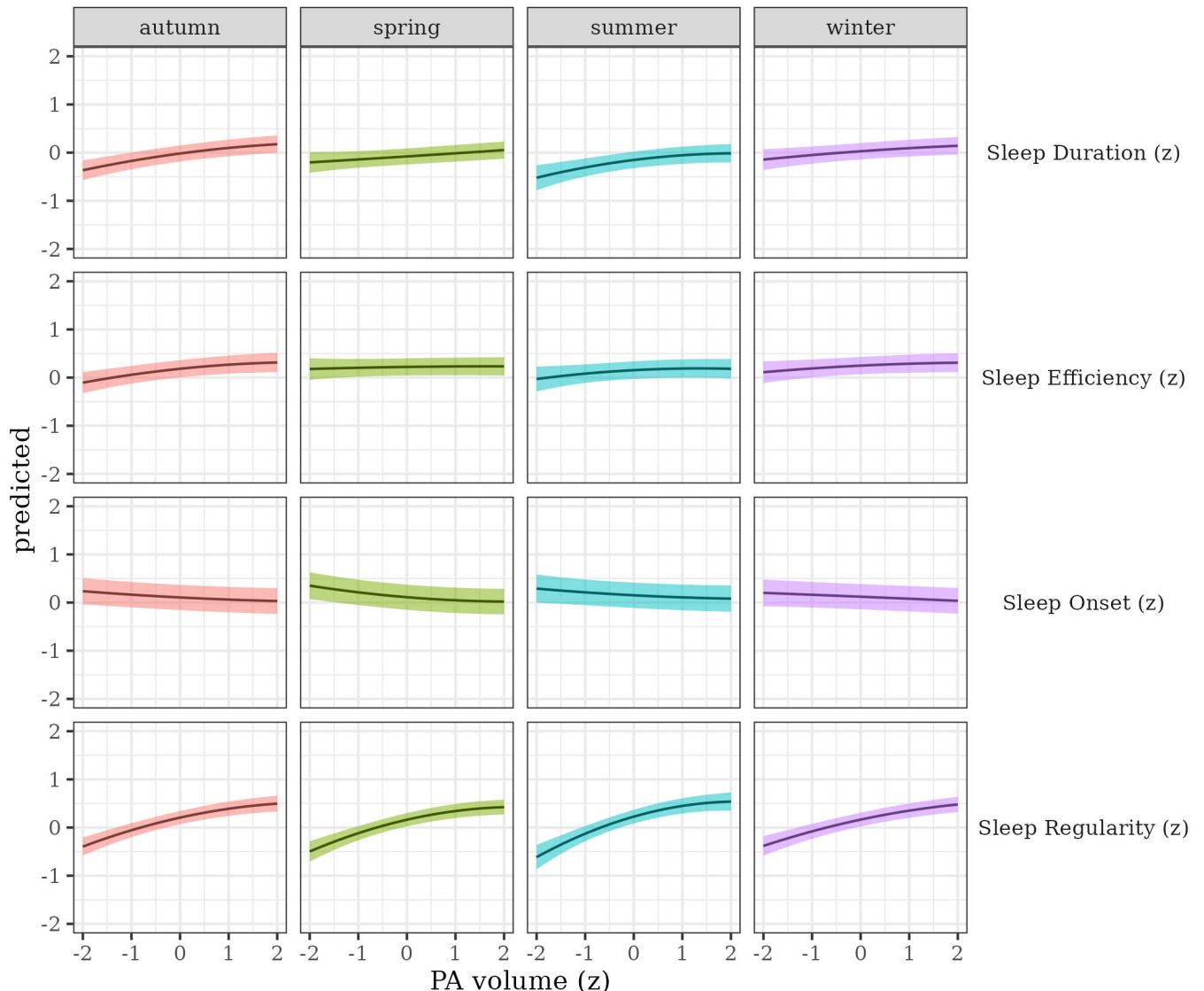


Figure 36. Sleep metrics on Physical activity volume by season

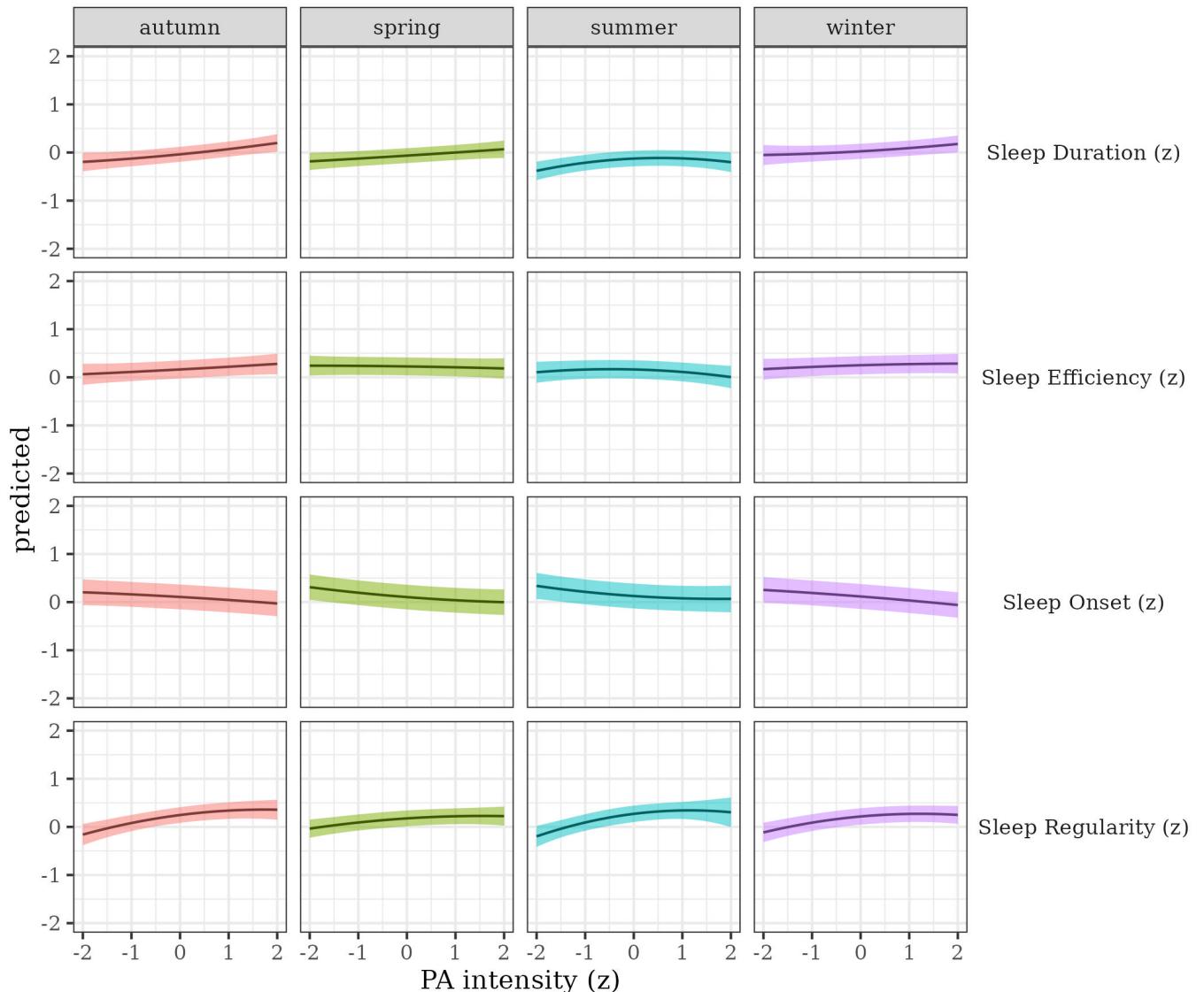


Figure 37. Sleep metrics on Physical activity intensity moderated by season

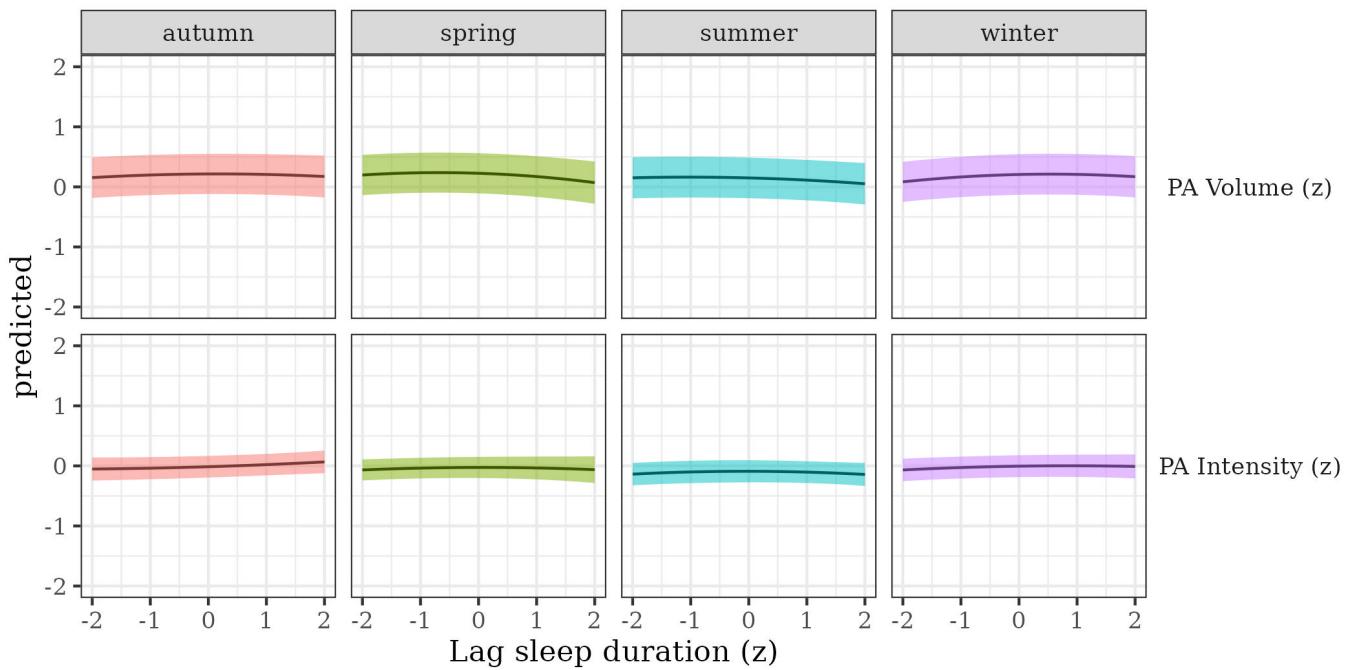


Figure 38. Physical activity by sleep duration moderated by season

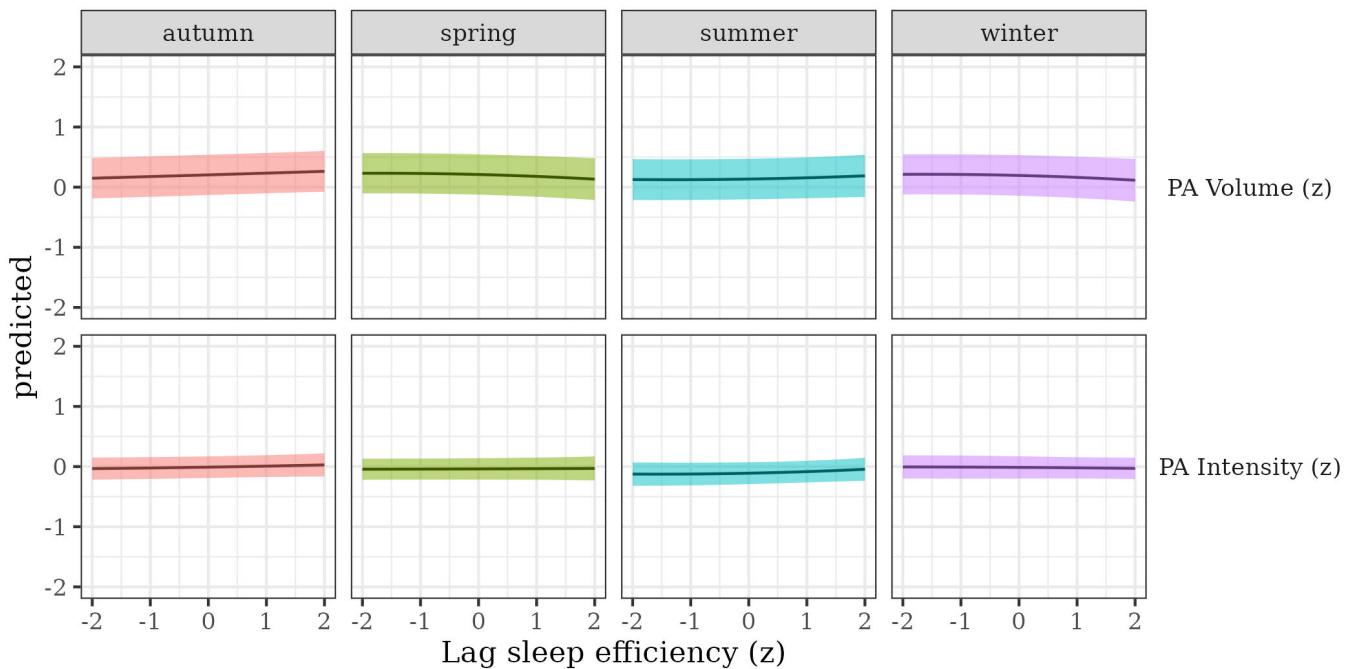


Figure 39. Physical activity by sleep efficiency moderated by season

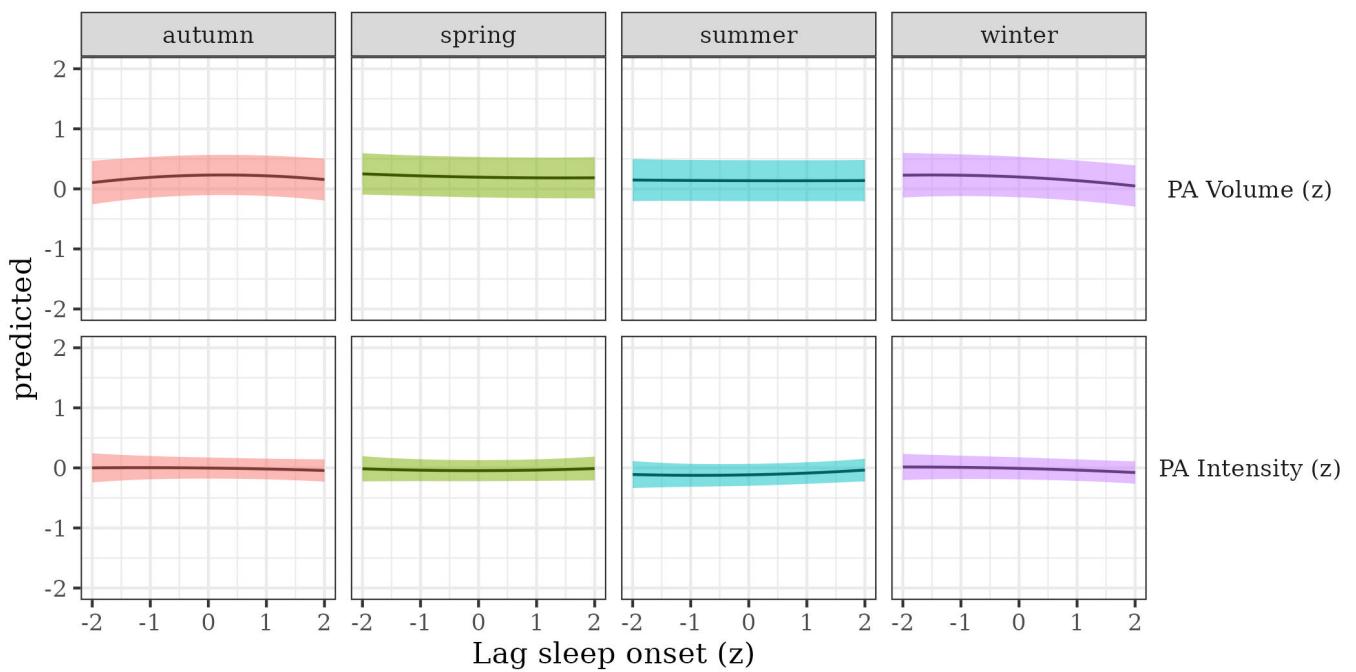


Figure 40. Physical activity by sleep onset moderated by season

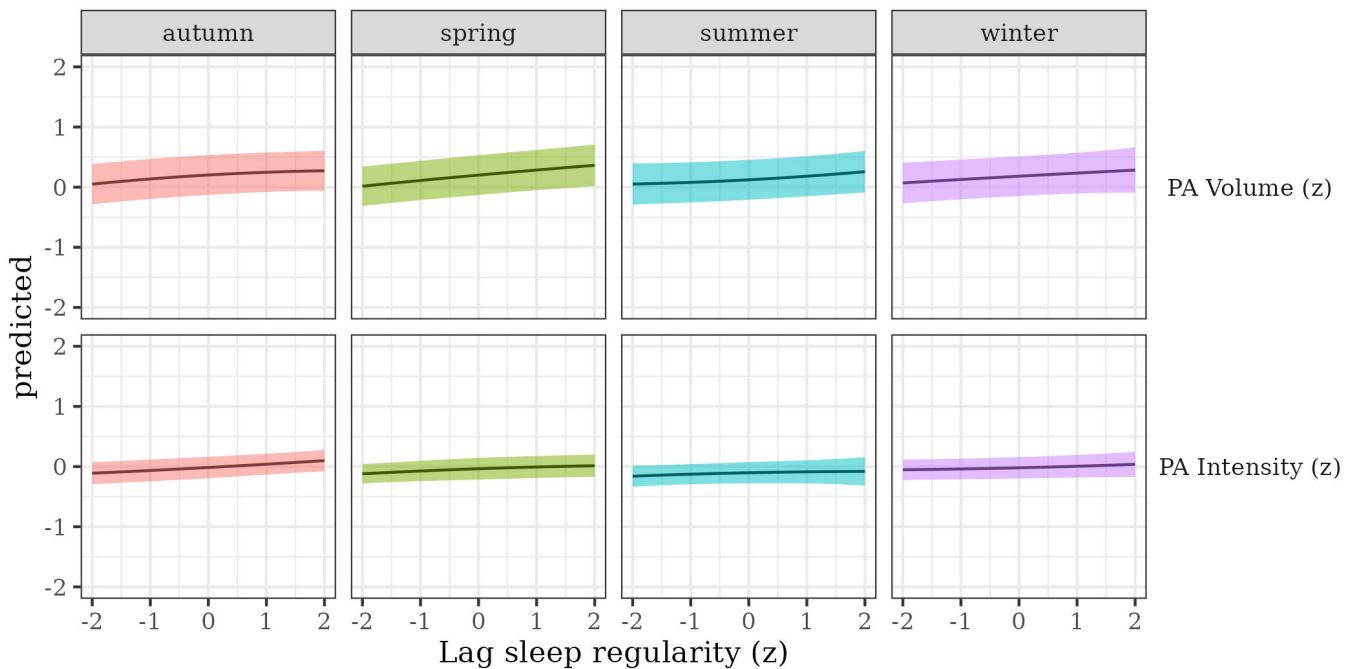


Figure 41. Physical activity by sleep regularity moderated by season

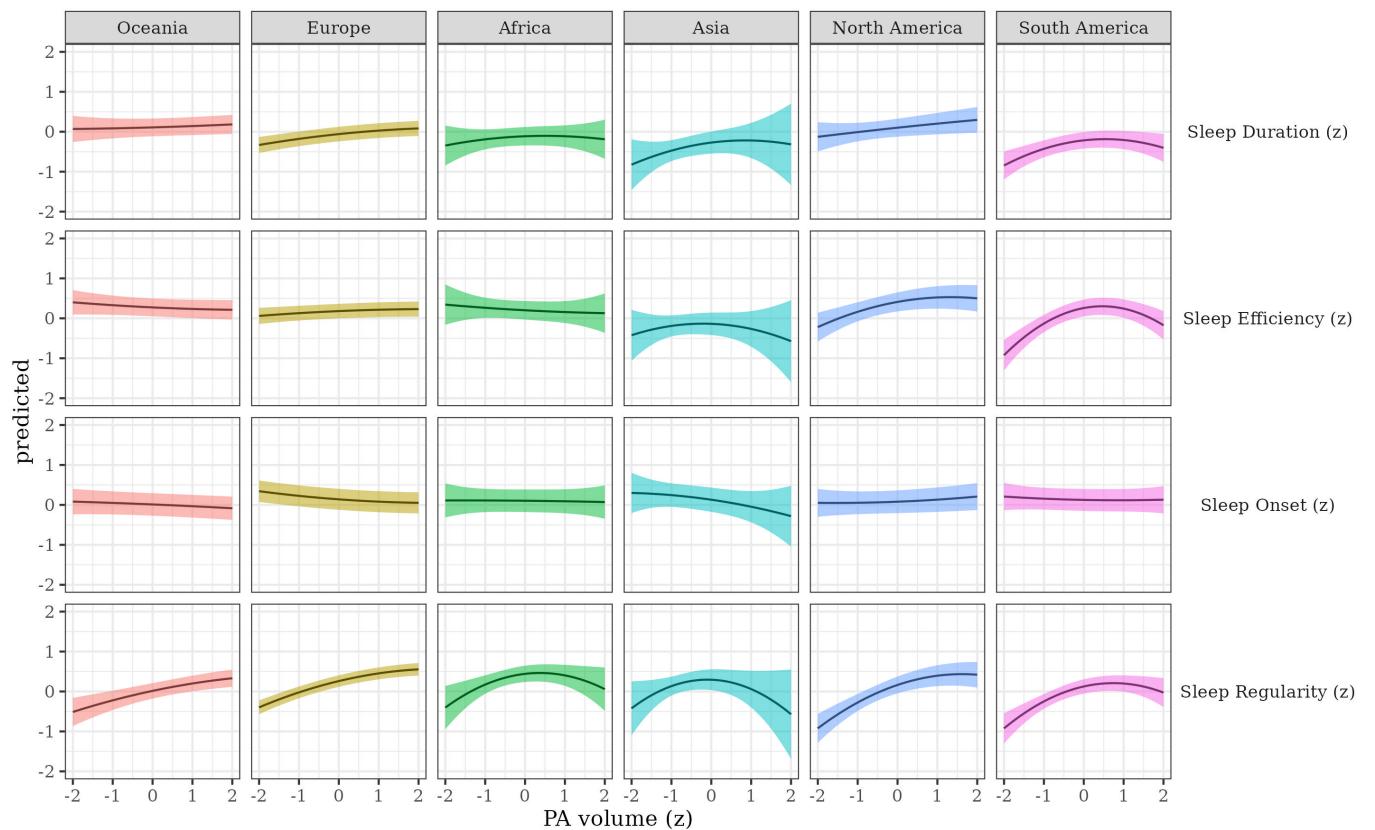


Figure 42. Sleep metrics on Physical activity volume by region

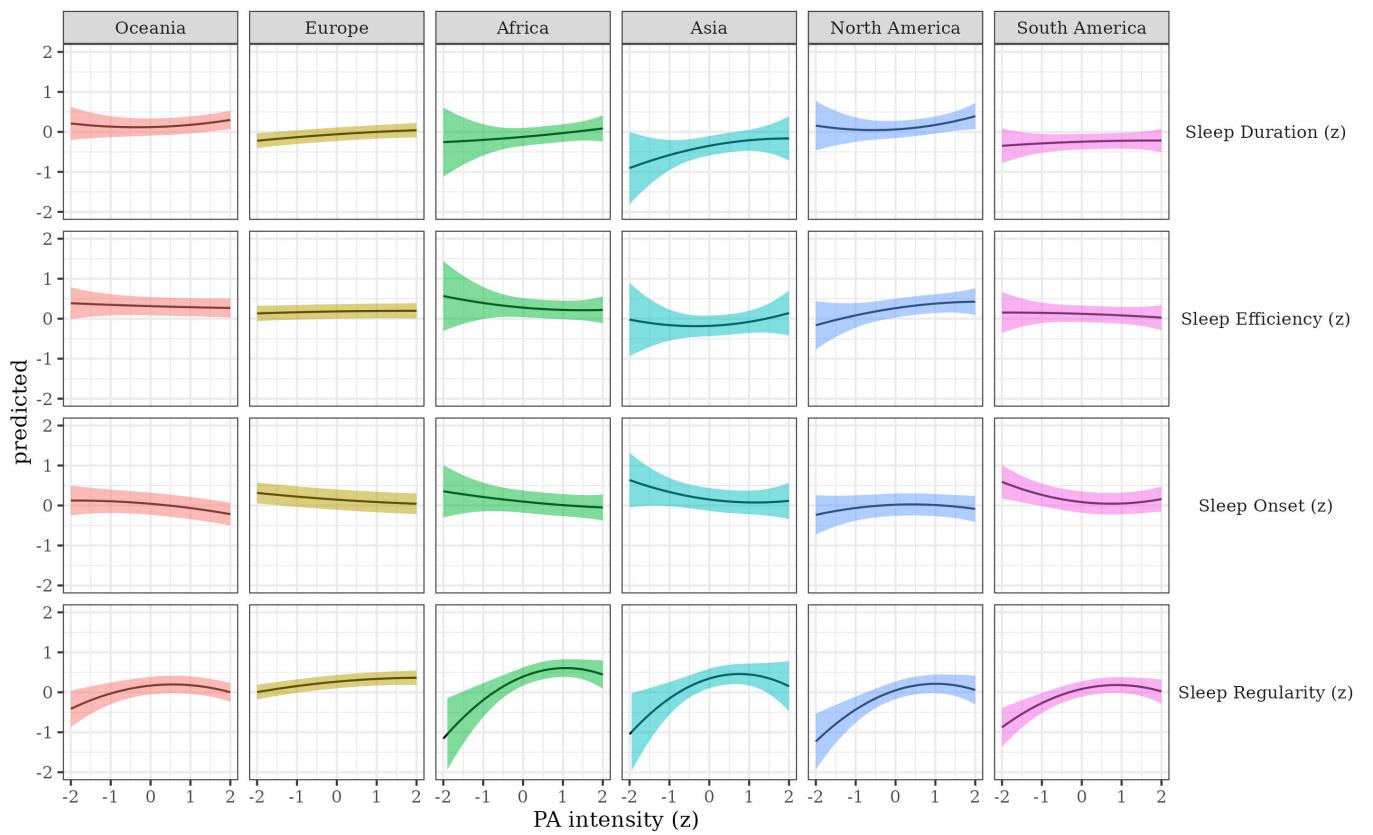


Figure 43. Sleep metrics on Physical activity intensity moderated by region

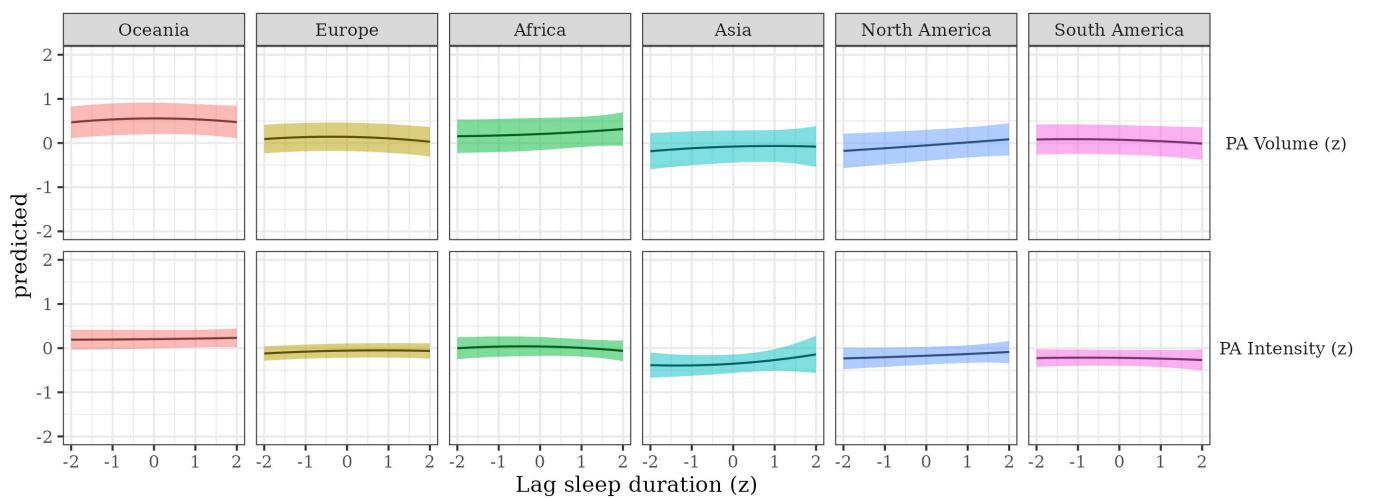


Figure 44. Physical activity by sleep duration moderated by region

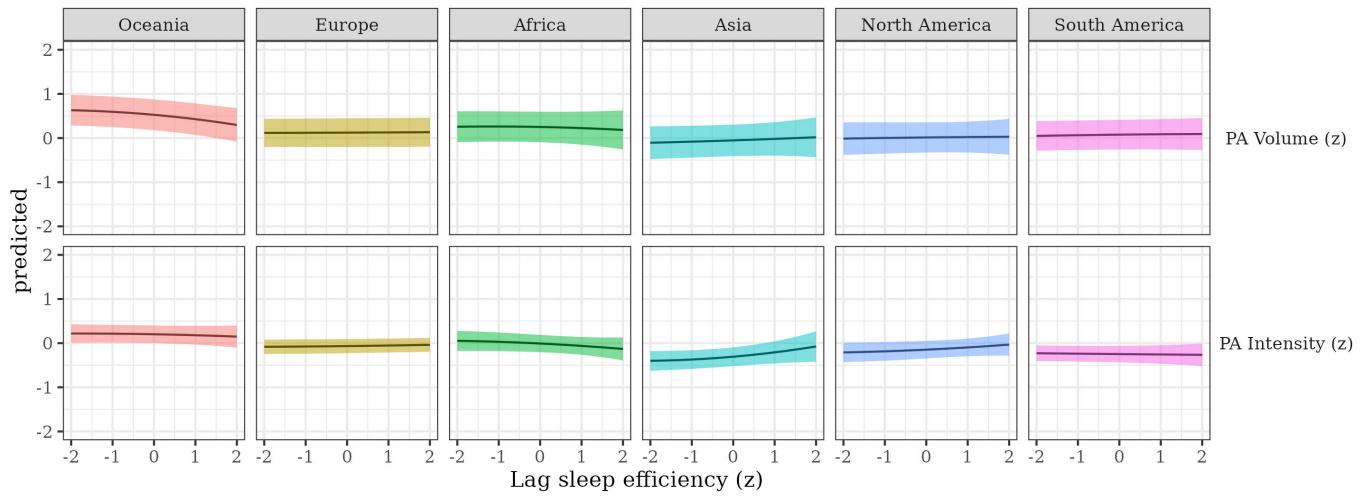


Figure 45. Physical activity by sleep efficiency moderated by region

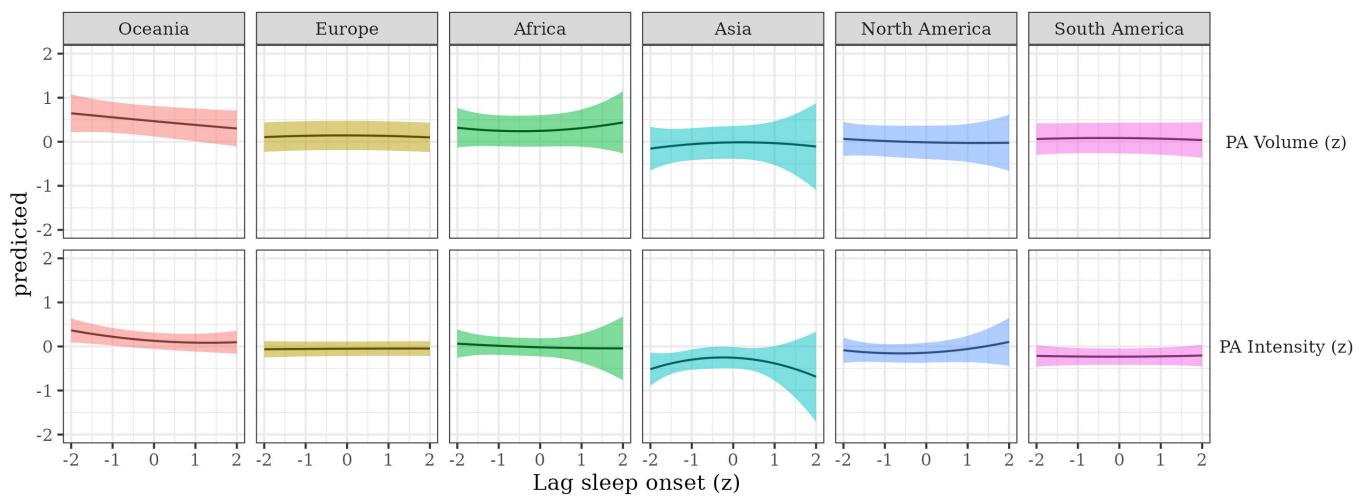


Figure 46. Physical activity by sleep onset moderated by region

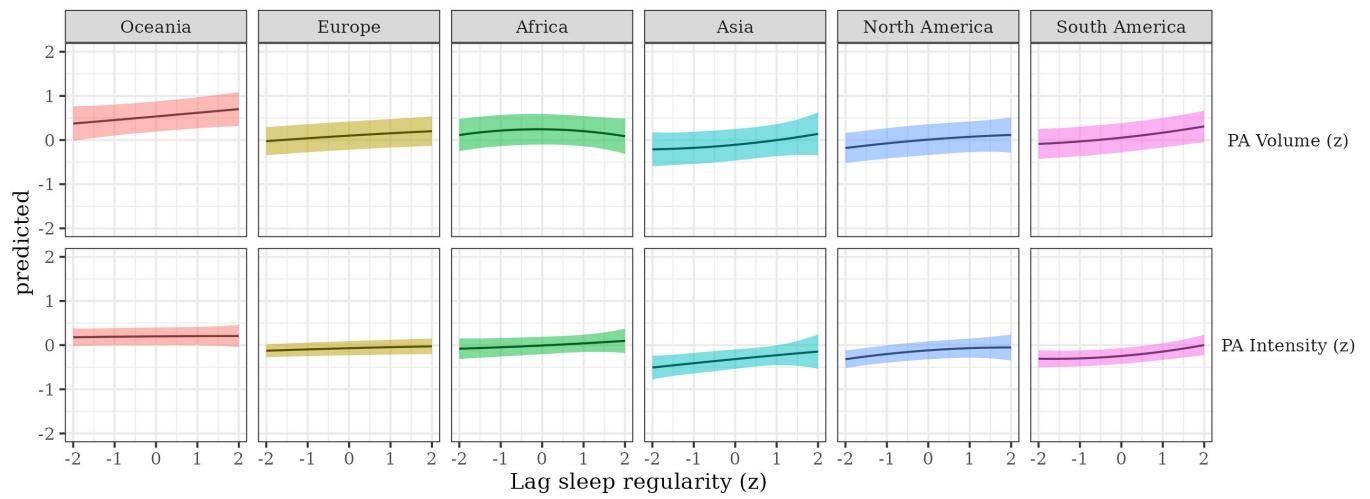


Figure 47. Physical activity by sleep regularity moderated by region

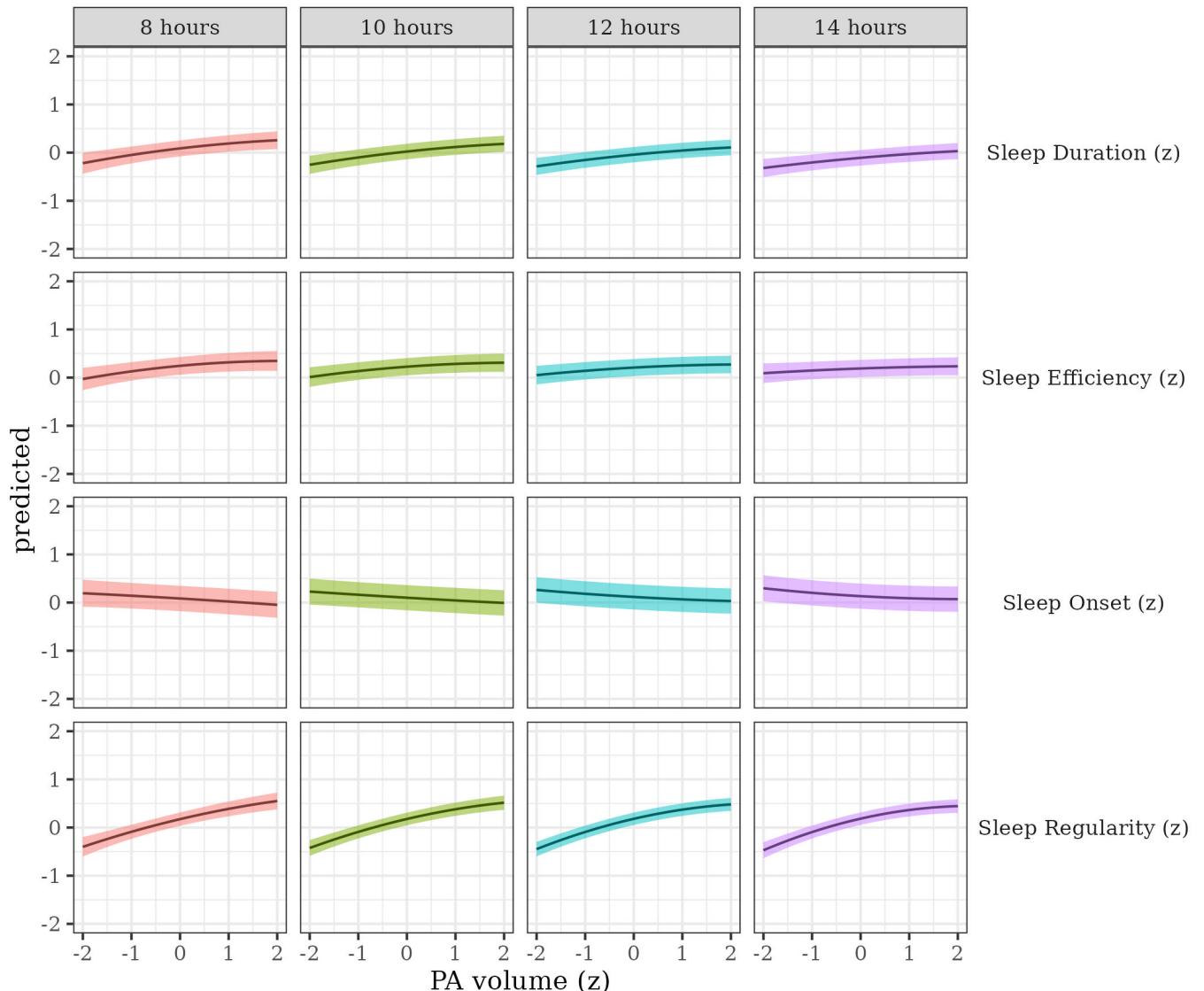


Figure 48. Sleep metrics on Physical activity volume by daylight hours

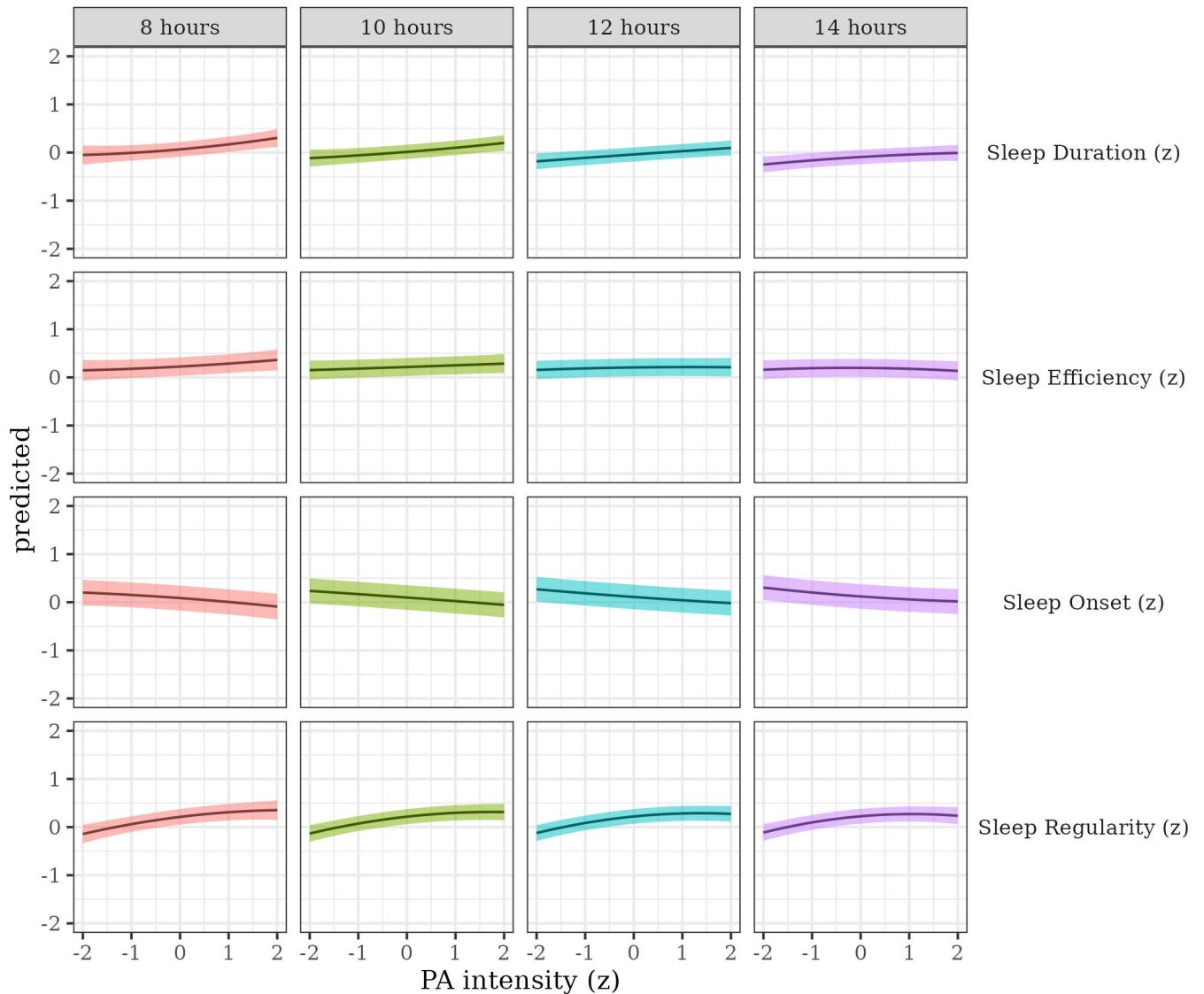


Figure 49. Sleep metrics on Physical activity intensity moderated by daylight hours

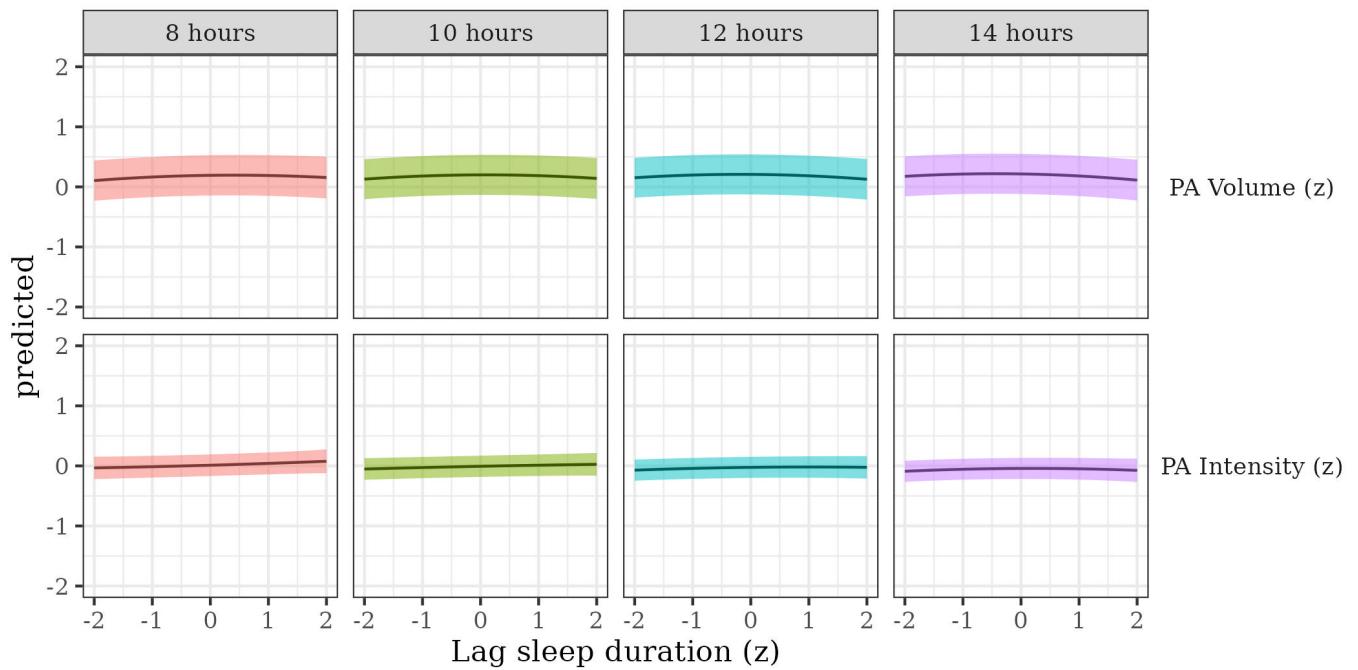


Figure 50. Physical activity by sleep duration moderated by daylight hours

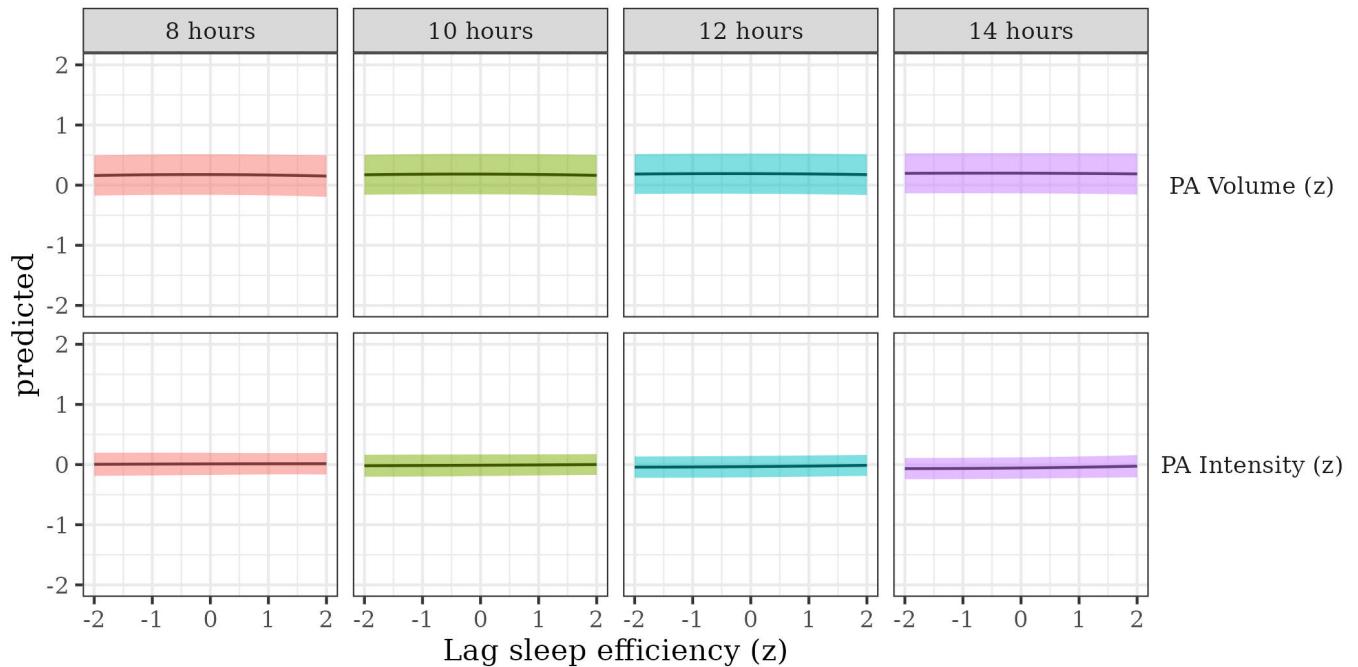


Figure 51. Physical activity by sleep efficiency moderated by daylight hours

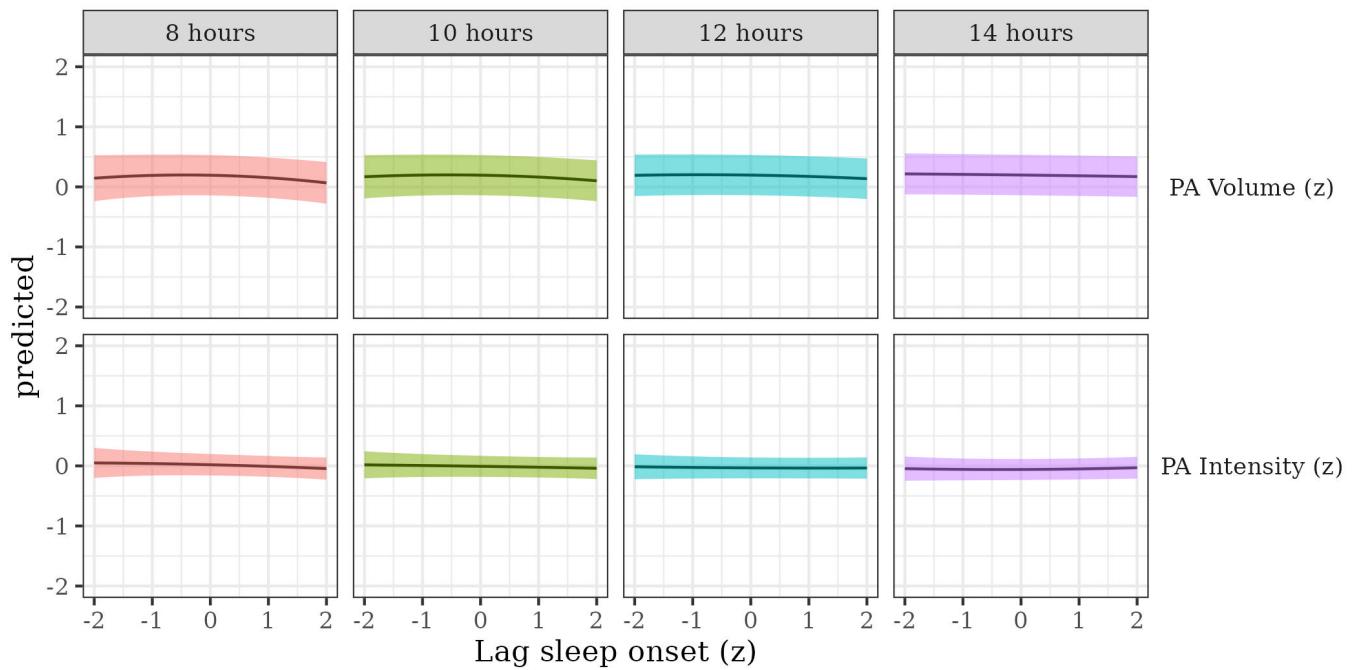


Figure 52. Physical activity by sleep onset moderated by daylight hours

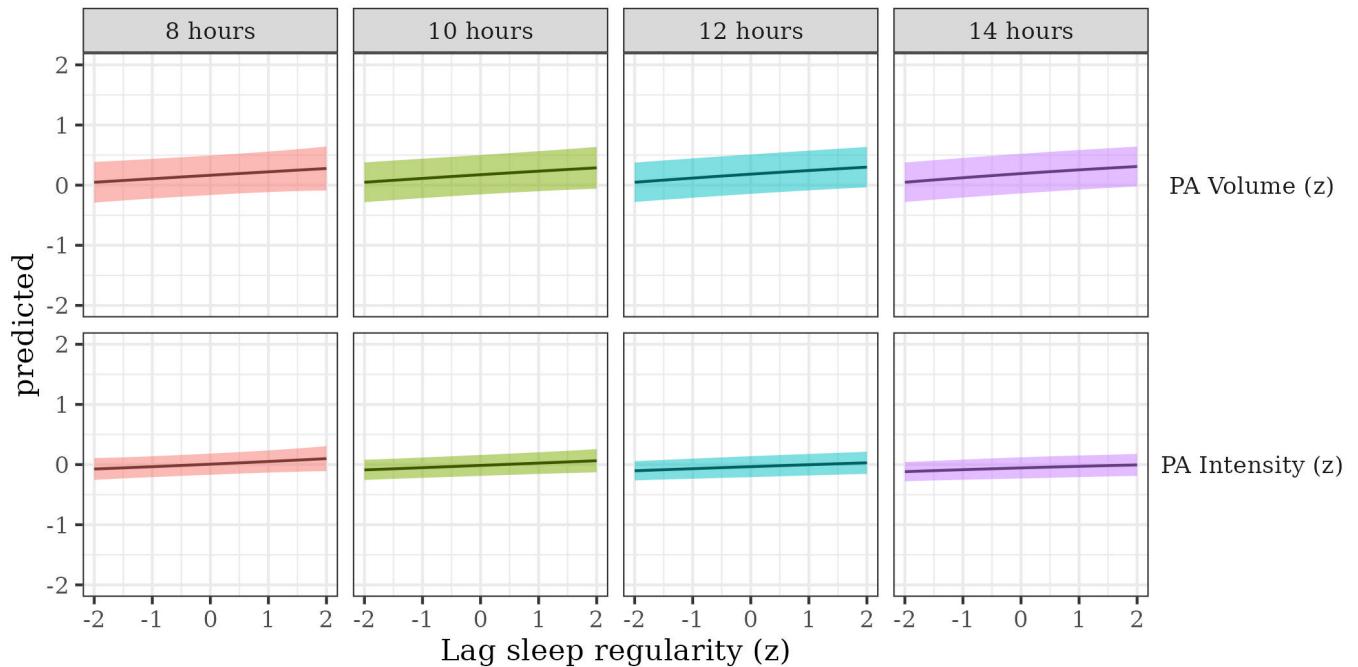


Figure 53. Physical activity by sleep regularity moderated by daylight hours

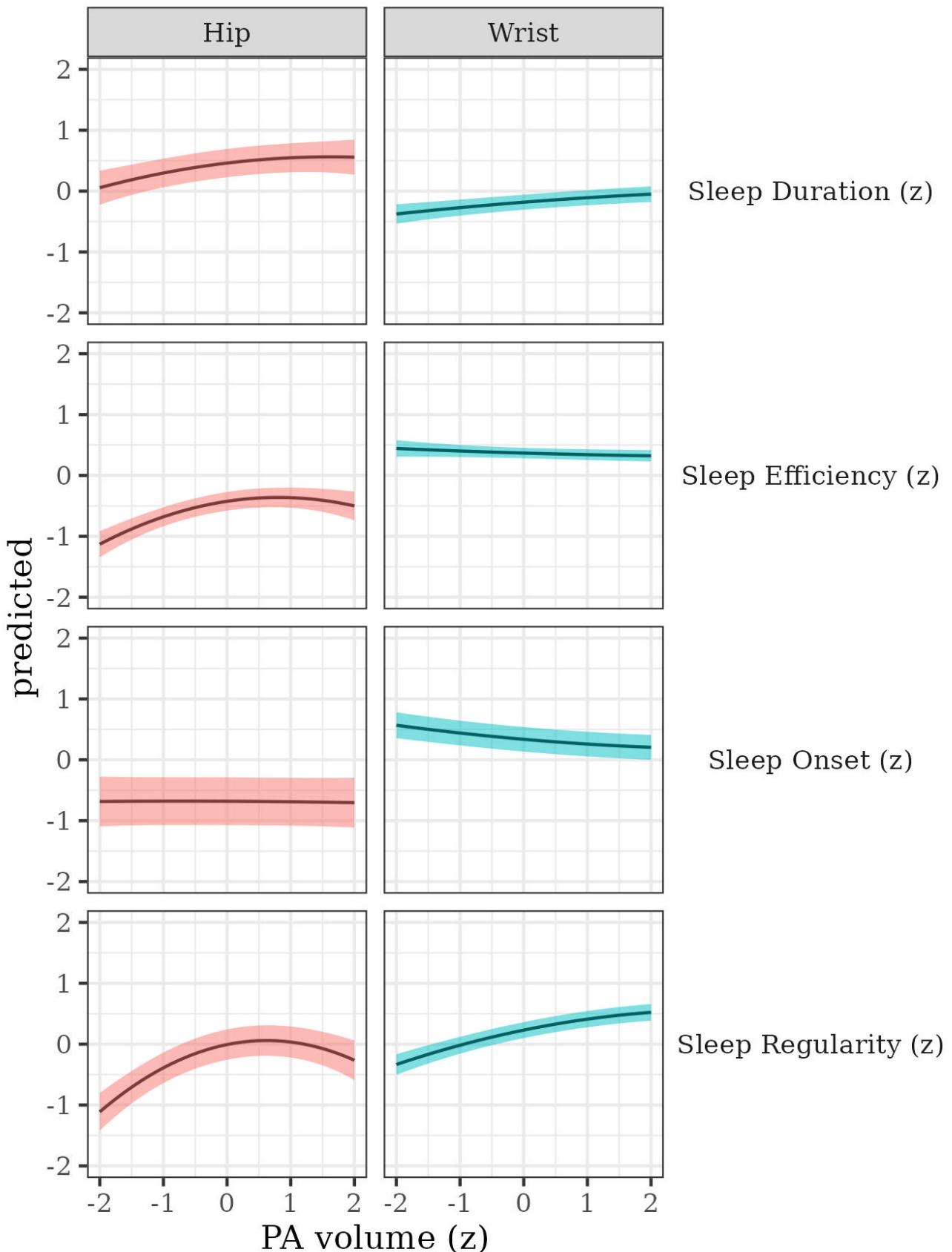


Figure 54. Sleep metrics on Physical activity volume by wear location

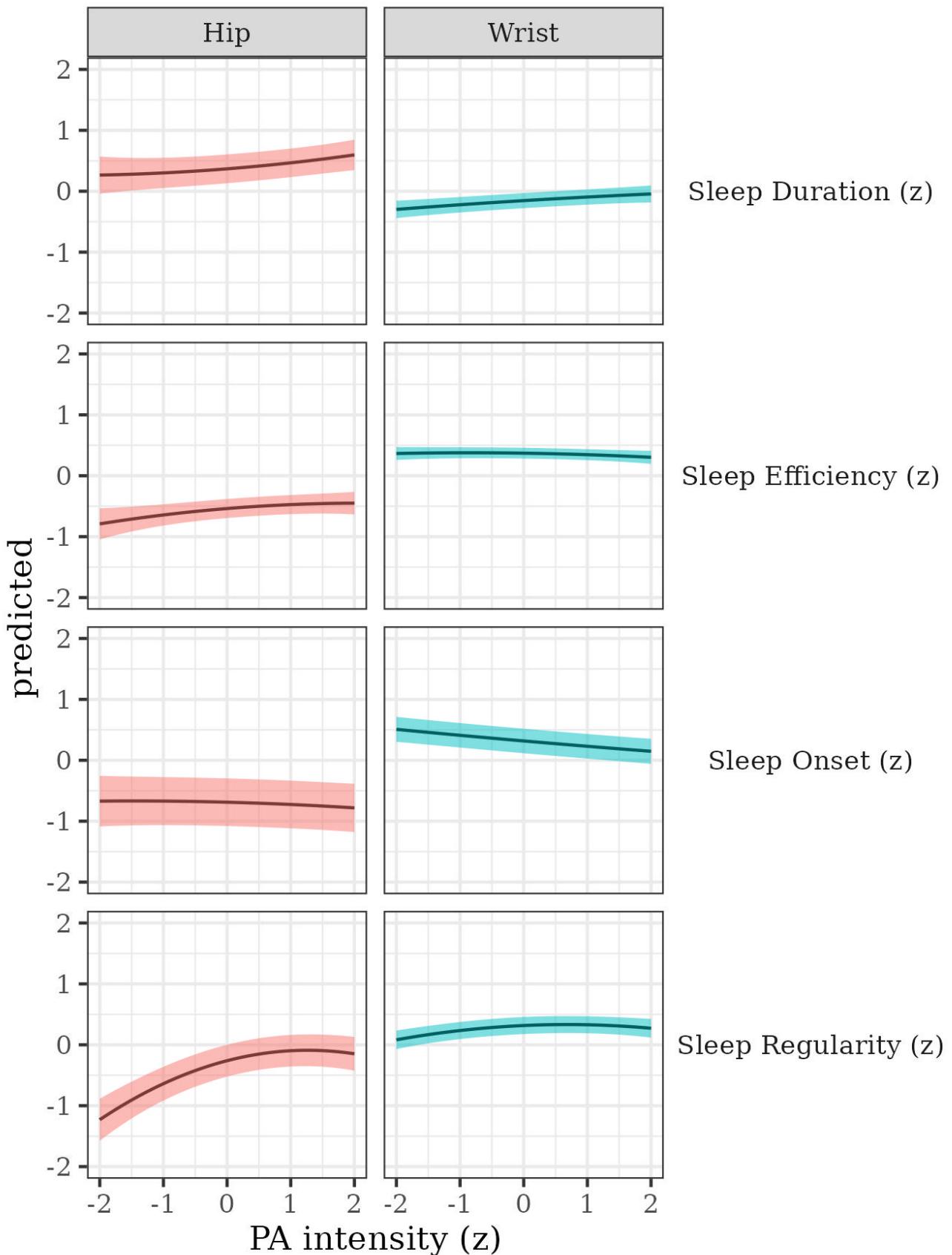


Figure 55. Sleep metrics on Physical activity intensity moderated by wear location

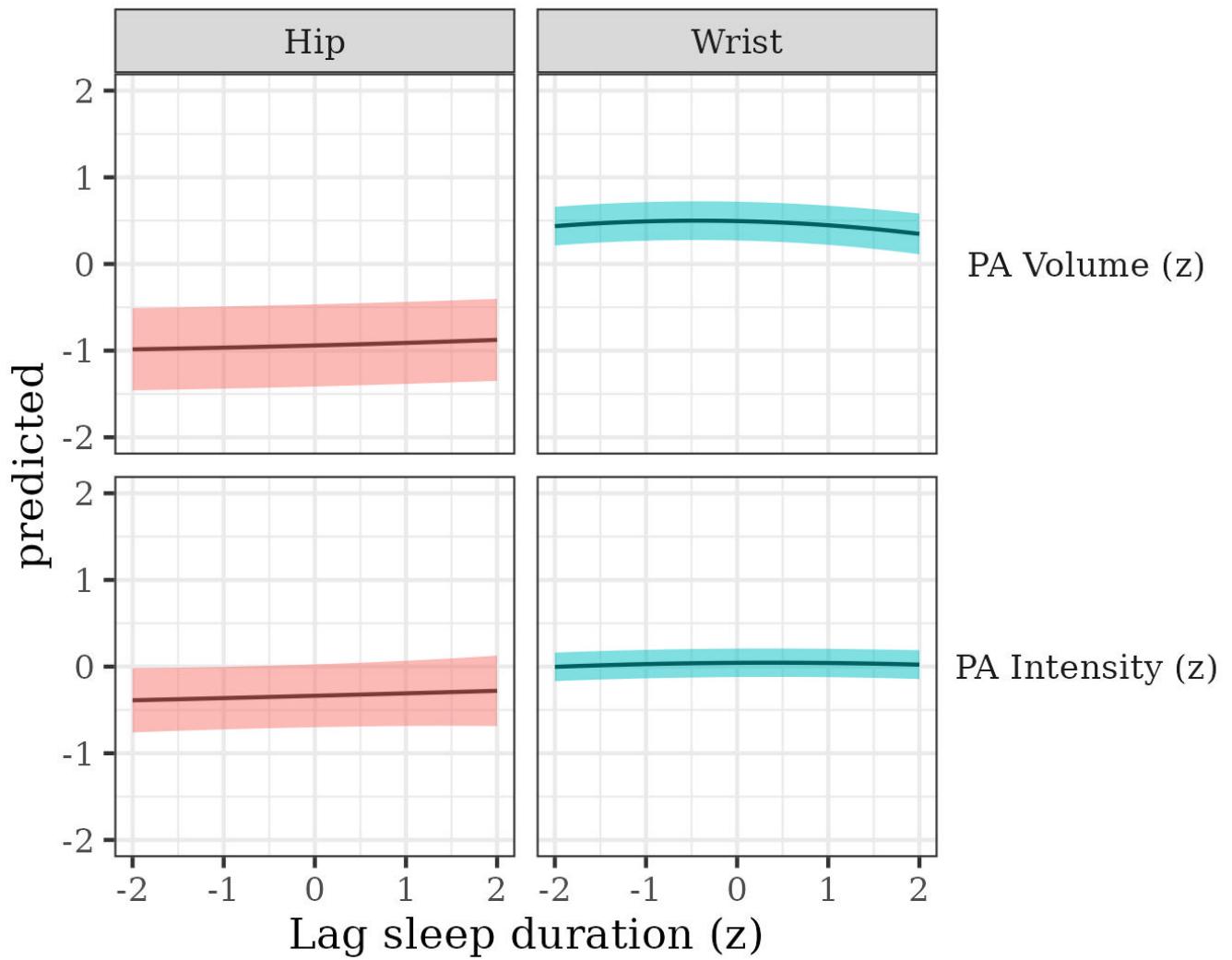


Figure 56. Physical activity by sleep duration moderated by wear location

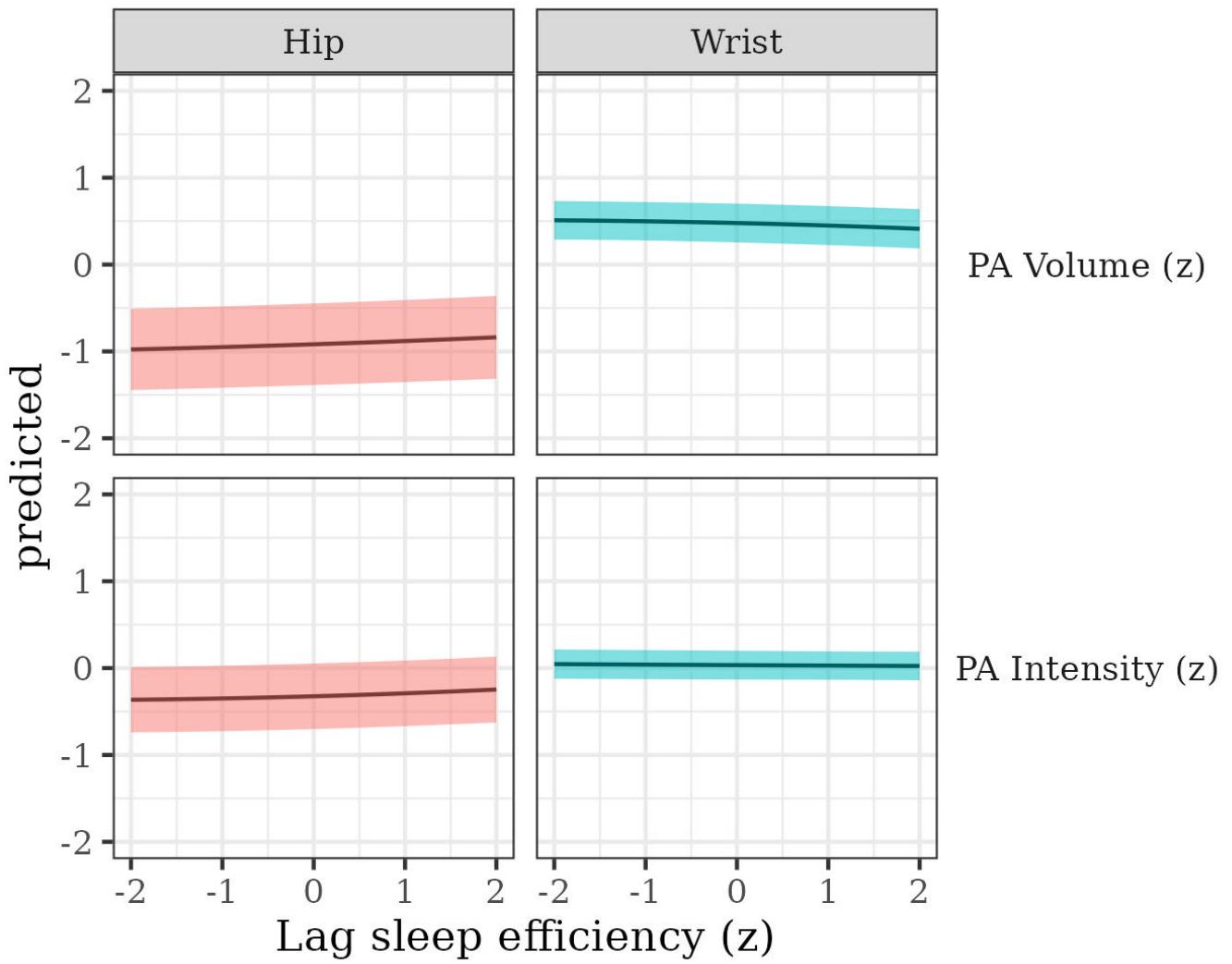


Figure 57. Physical activity by sleep efficiency moderated by wear location

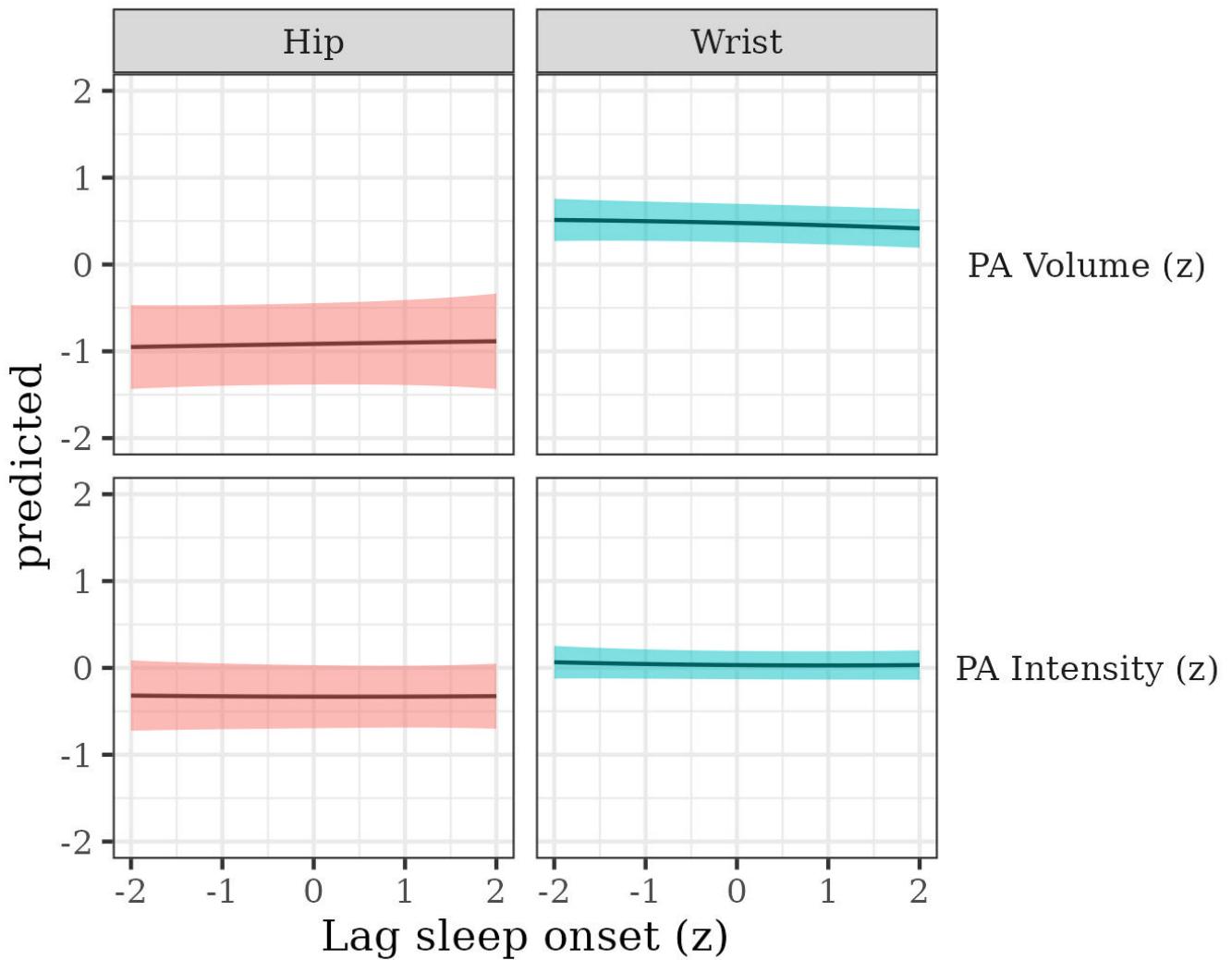


Figure 58. Physical activity by sleep onset moderated by wear location

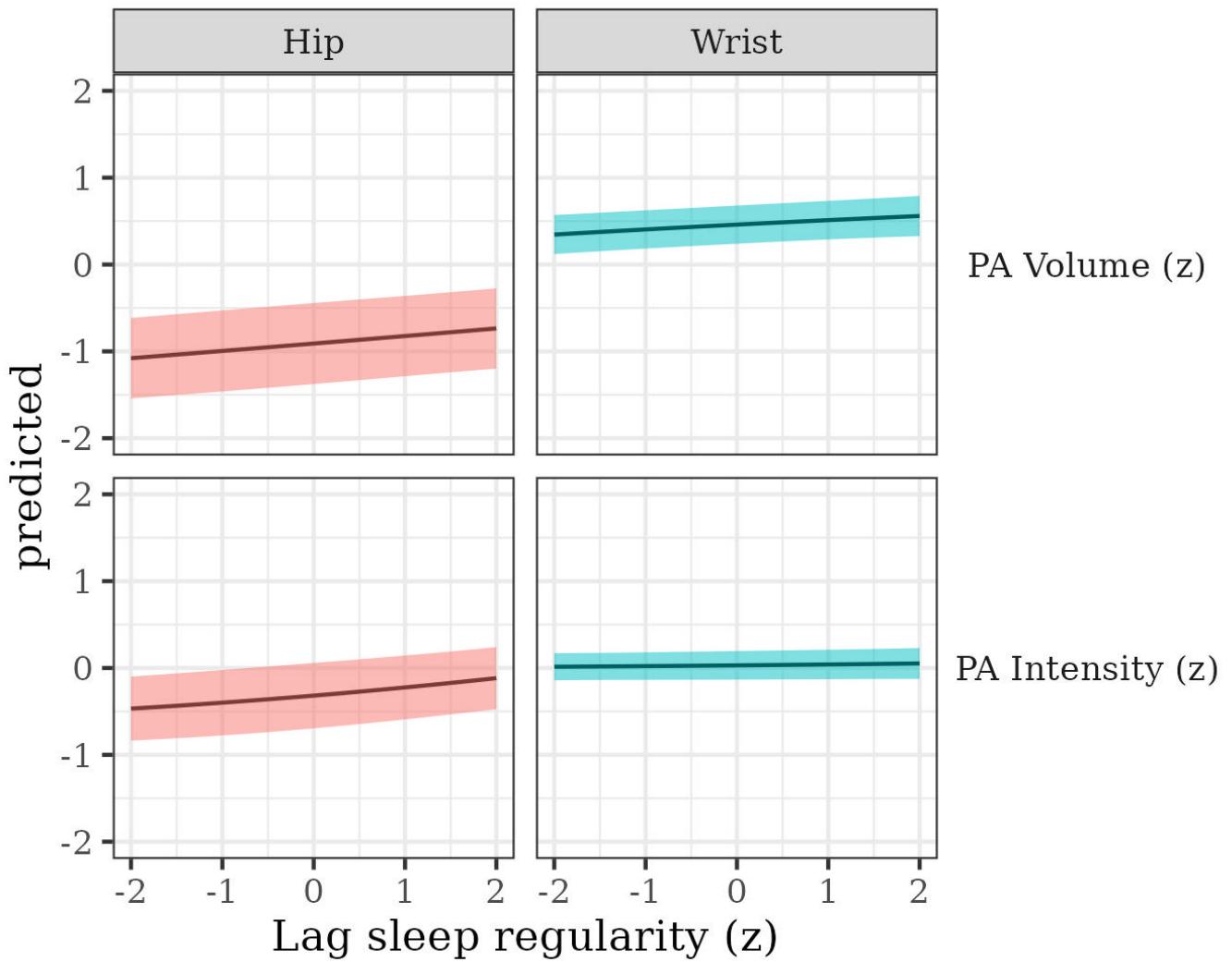


Figure 59. Physical activity by sleep regularity moderated by wear location

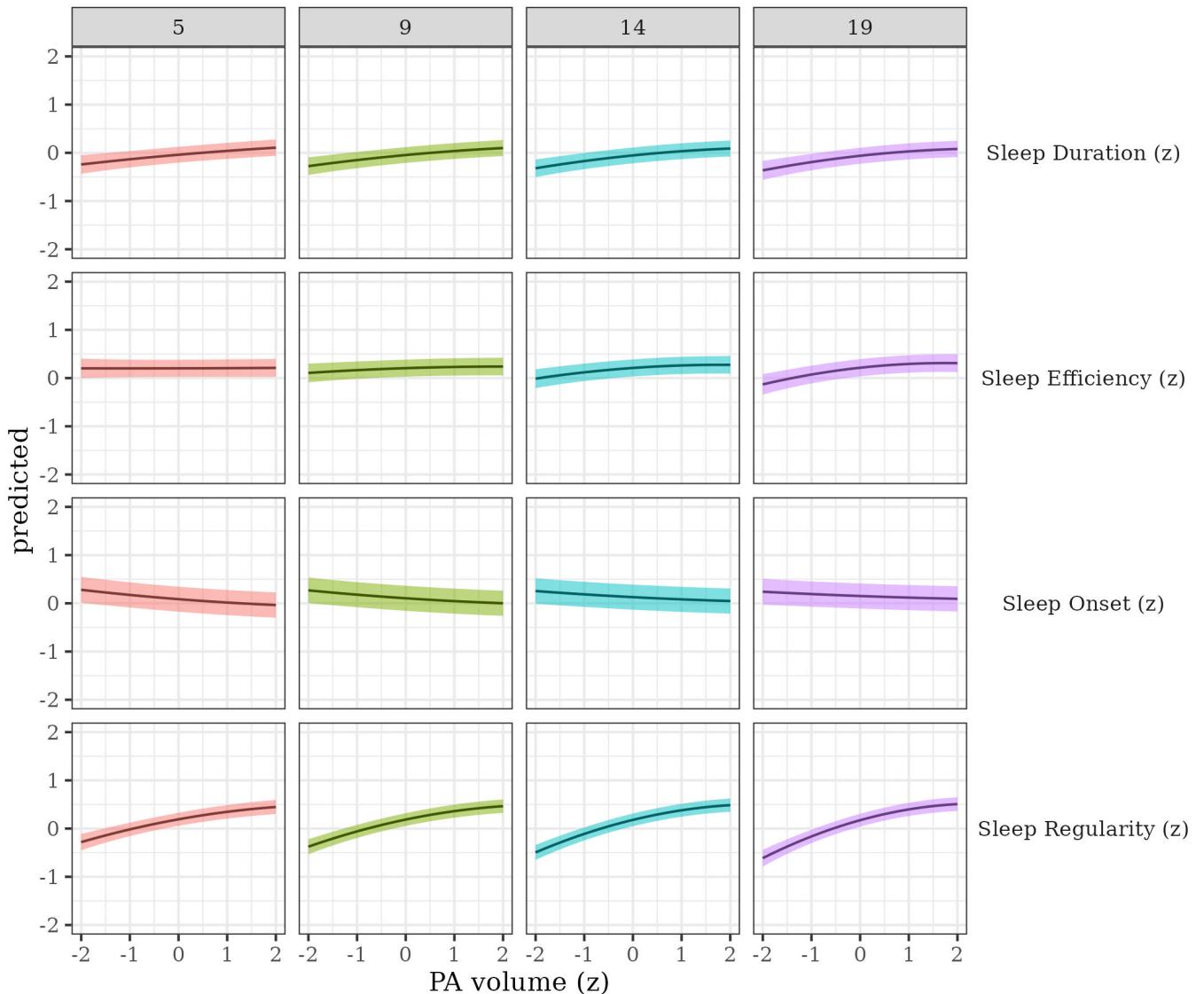


Figure 60. Sleep metrics on Physical activity volume by most active hour

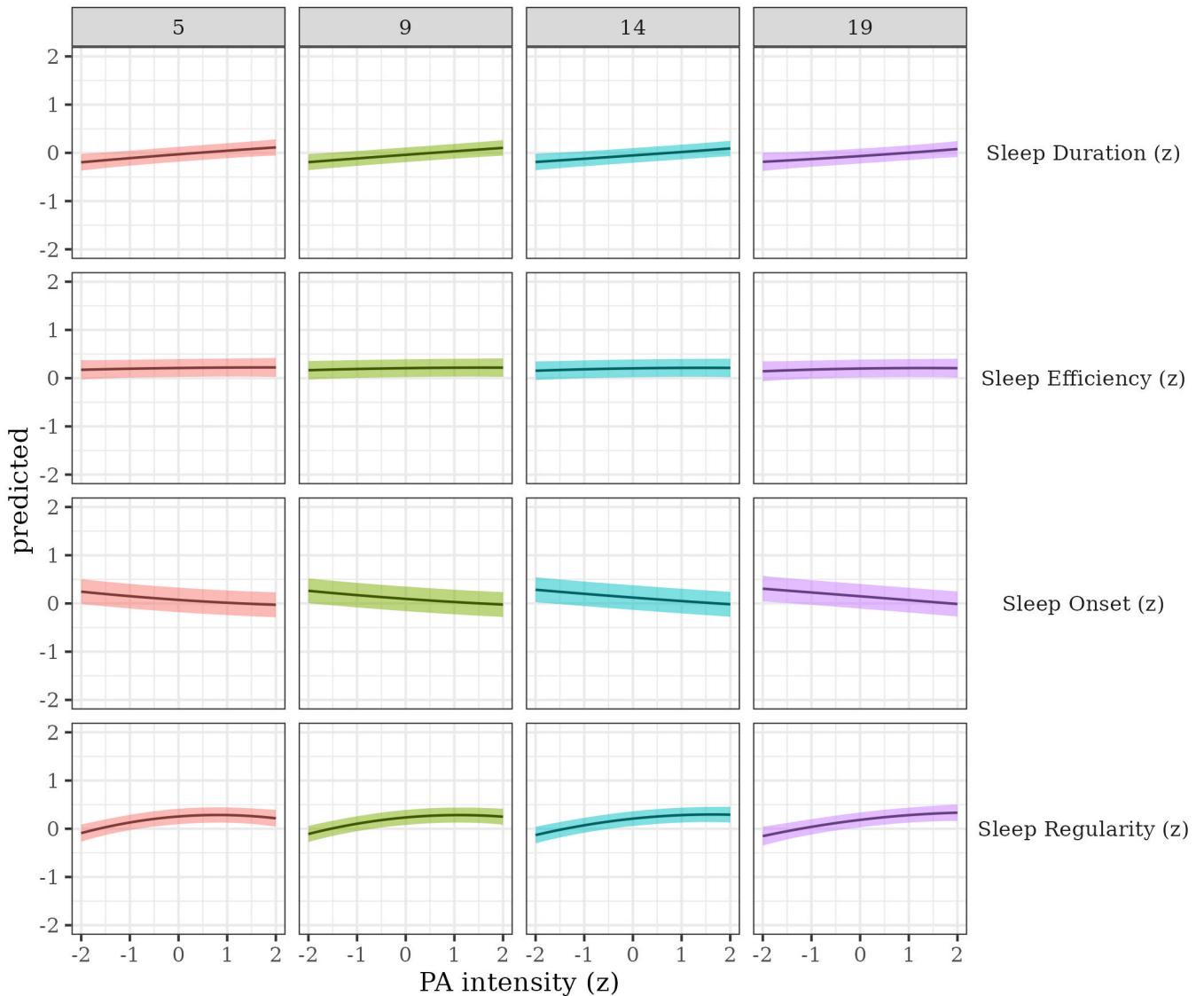


Figure 61. Sleep metrics on Physical activity intensity moderated by most active hour

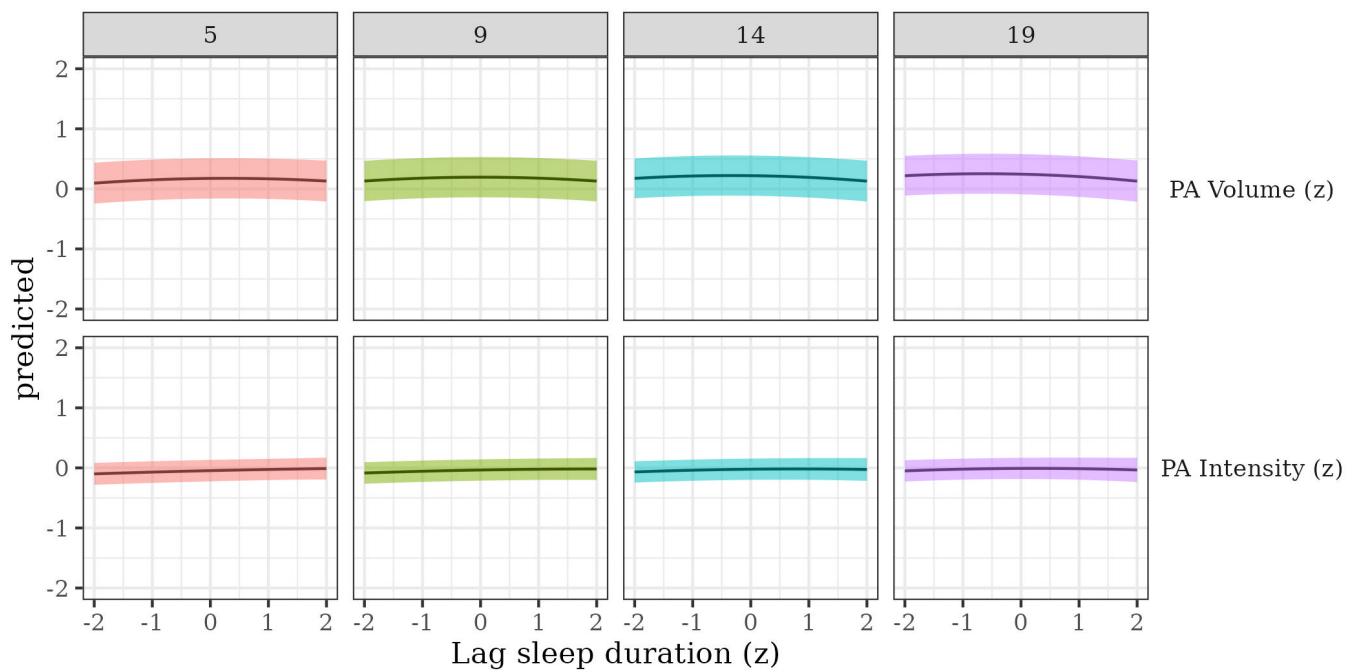


Figure 62. Physical activity by sleep duration moderated by most active hour

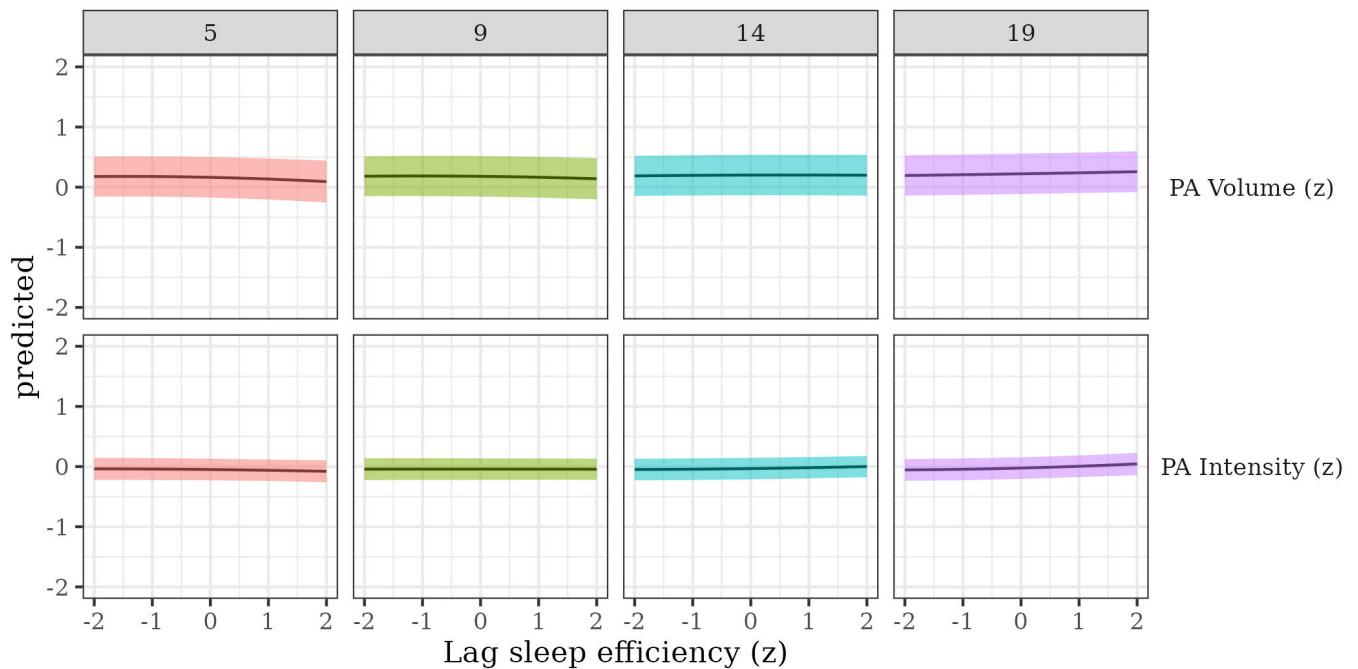


Figure 63. Physical activity by sleep efficiency moderated by most active hour

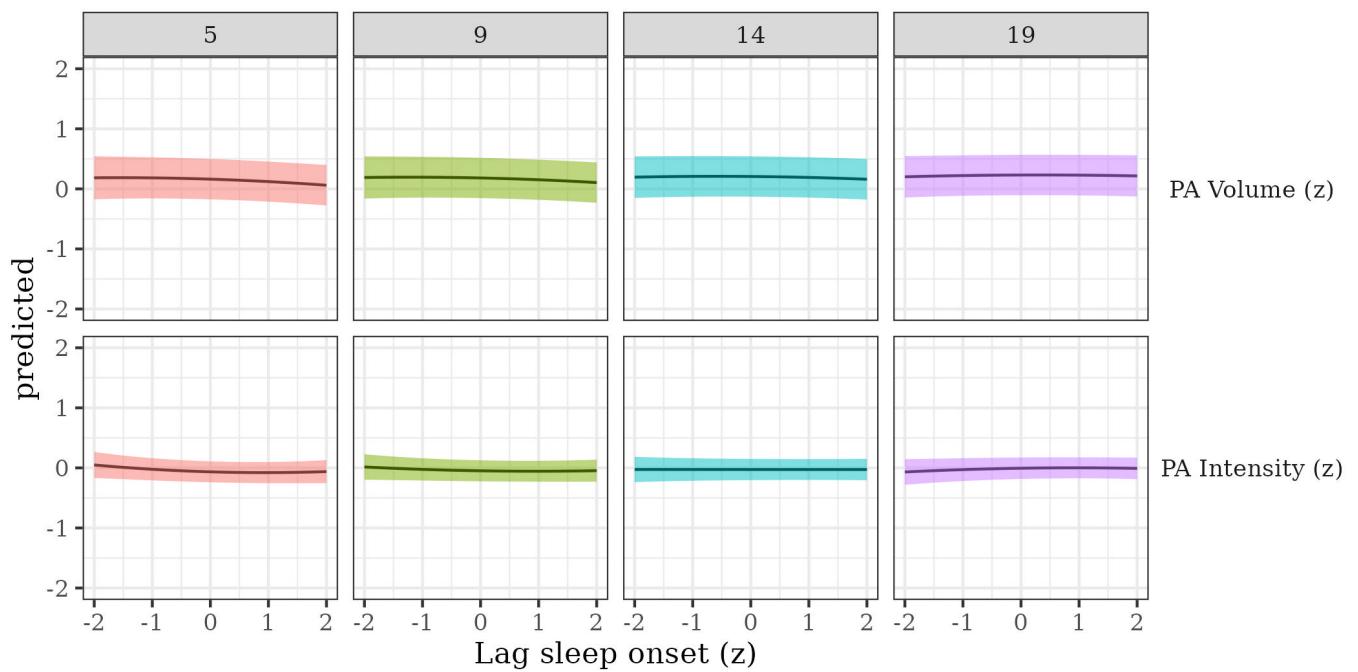


Figure 64. Physical activity by sleep onset moderated by most active hour

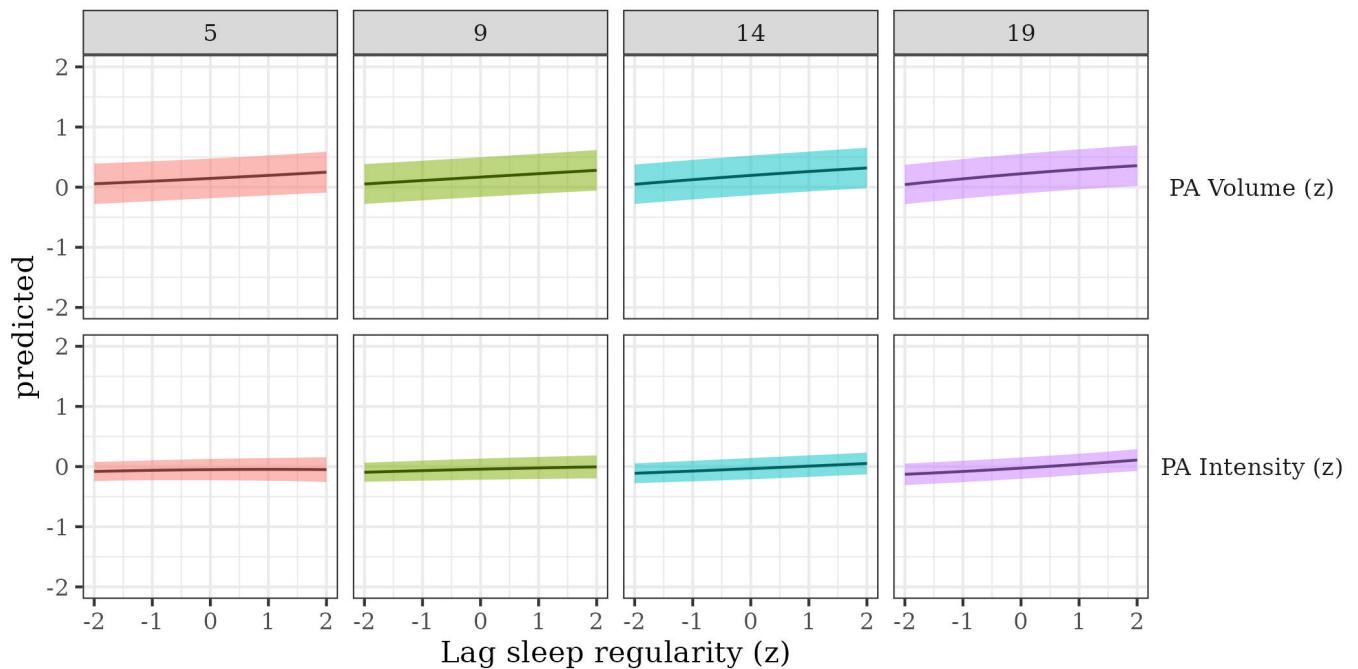


Figure 65. Physical activity by sleep regularity moderated by most active hour

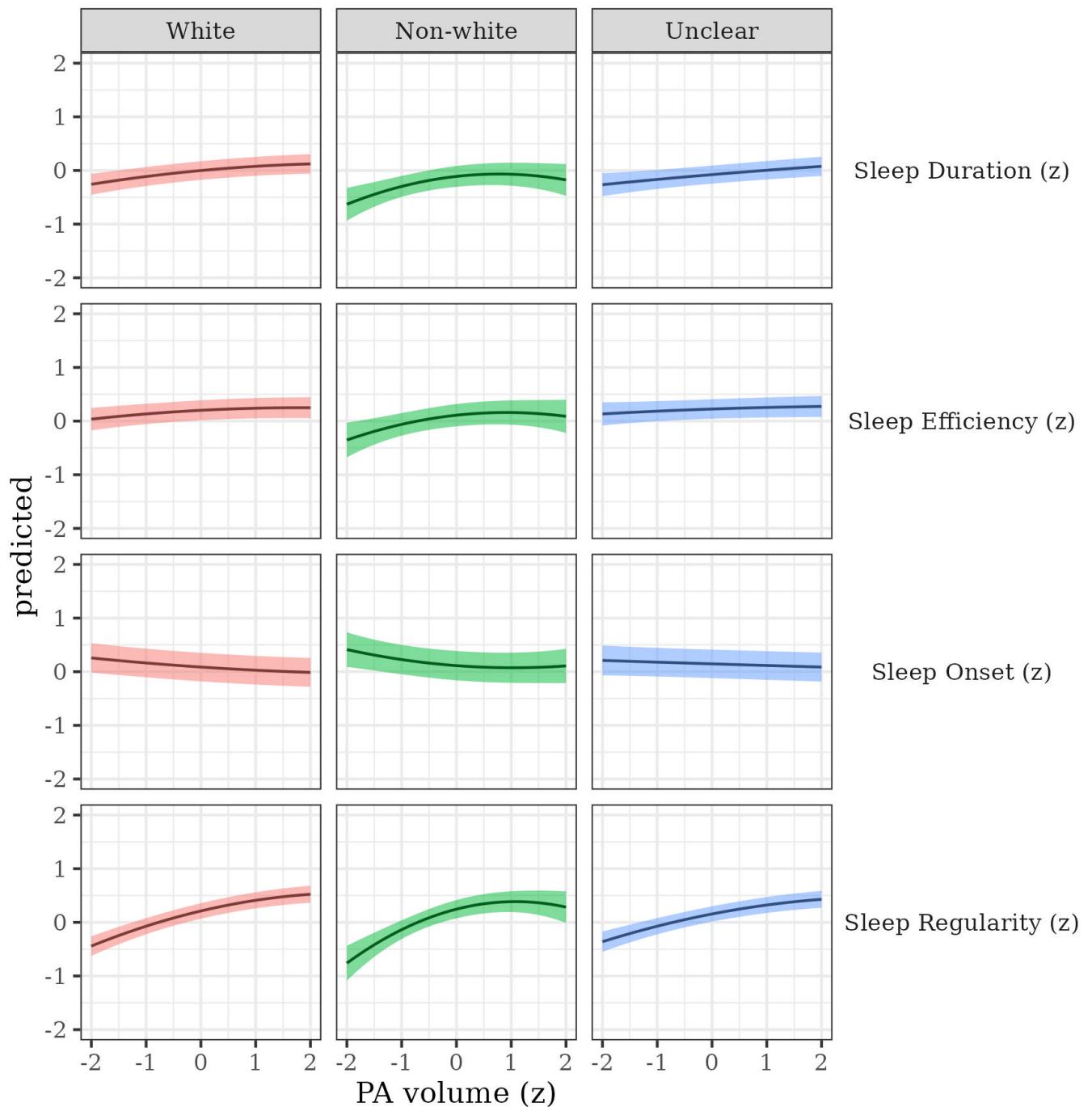


Figure 66. Sleep metrics on Physical activity volume by ethnicity

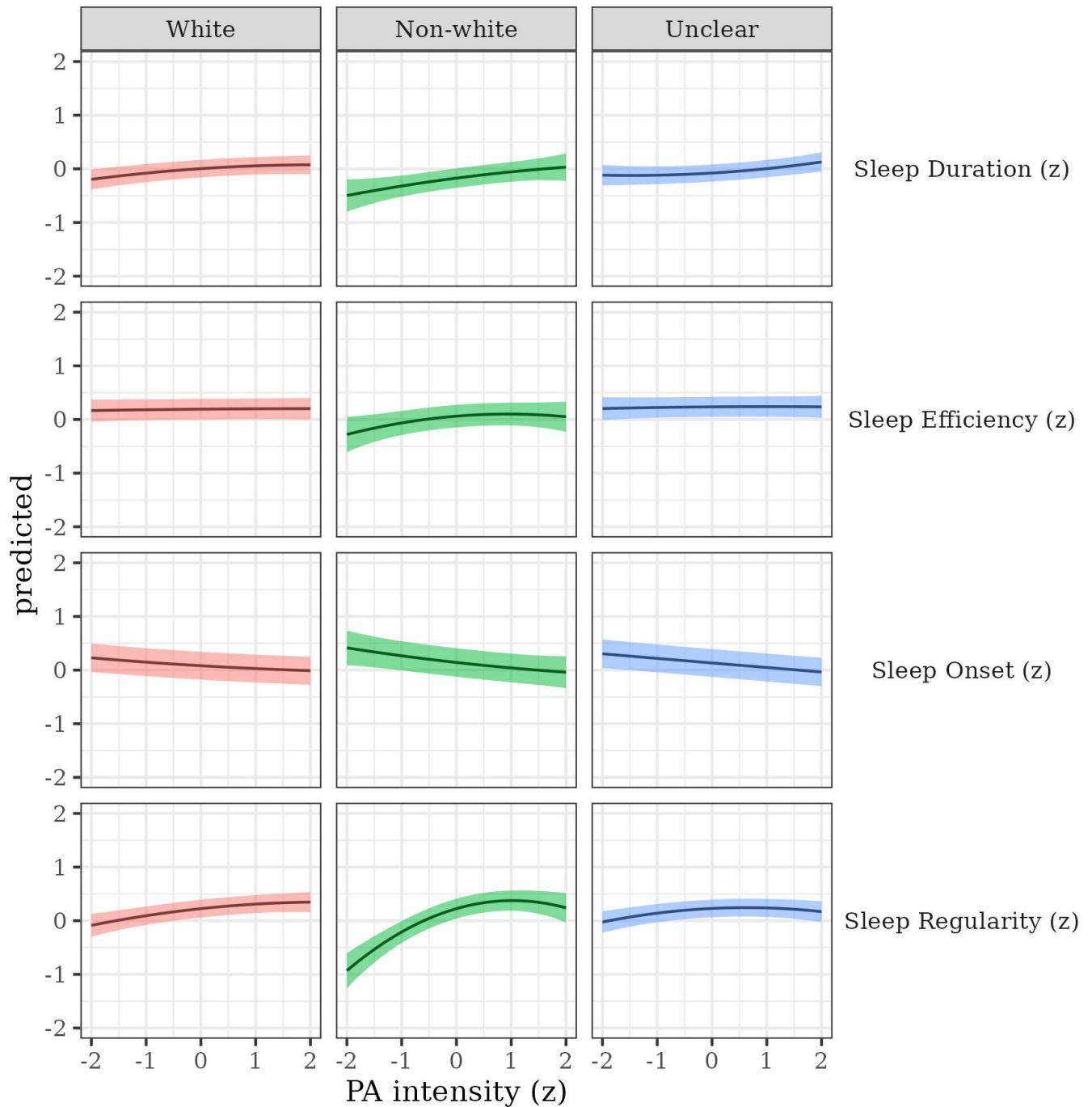


Figure 67. Sleep metrics on Physical activity intensity moderated by ethnicity

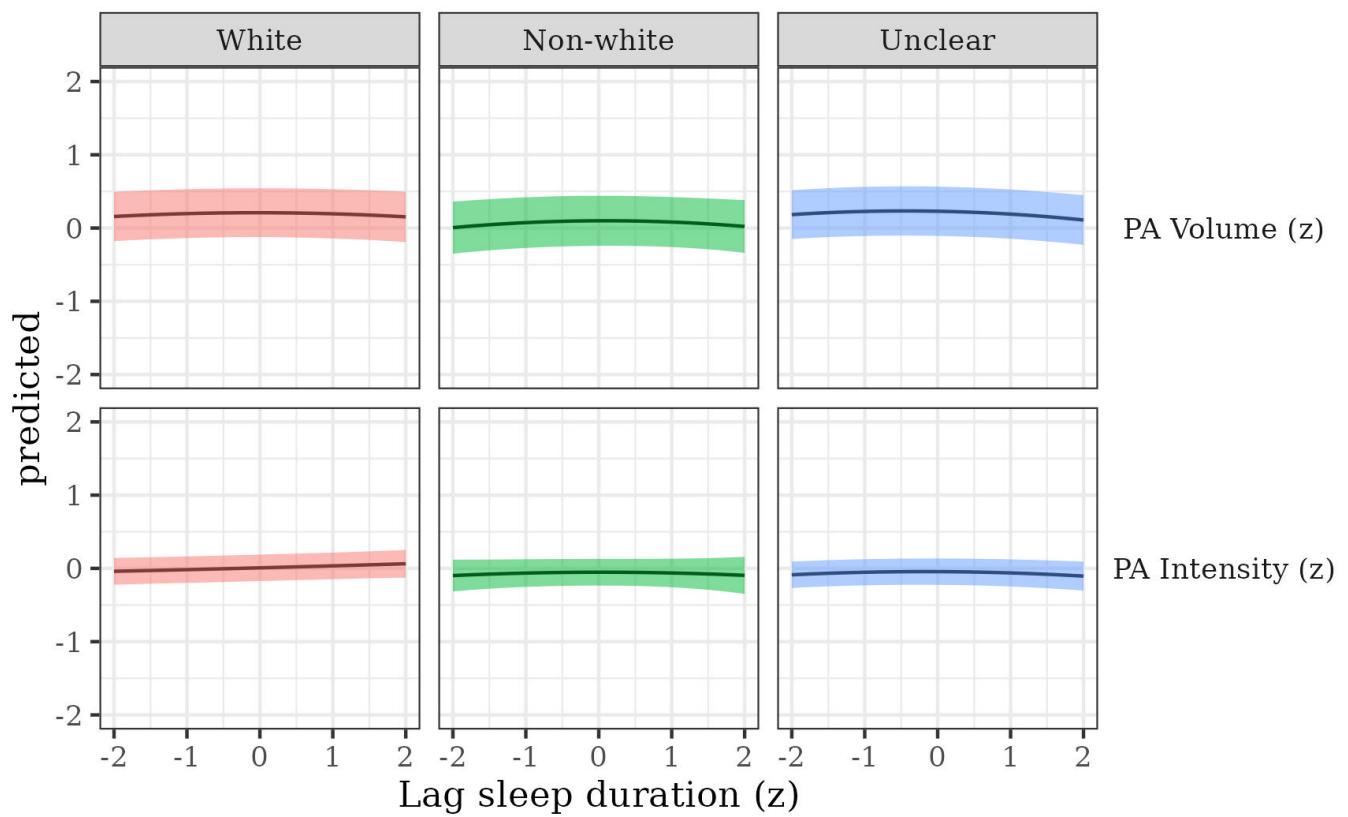


Figure 68. Physical activity by sleep duration moderated by ethnicity

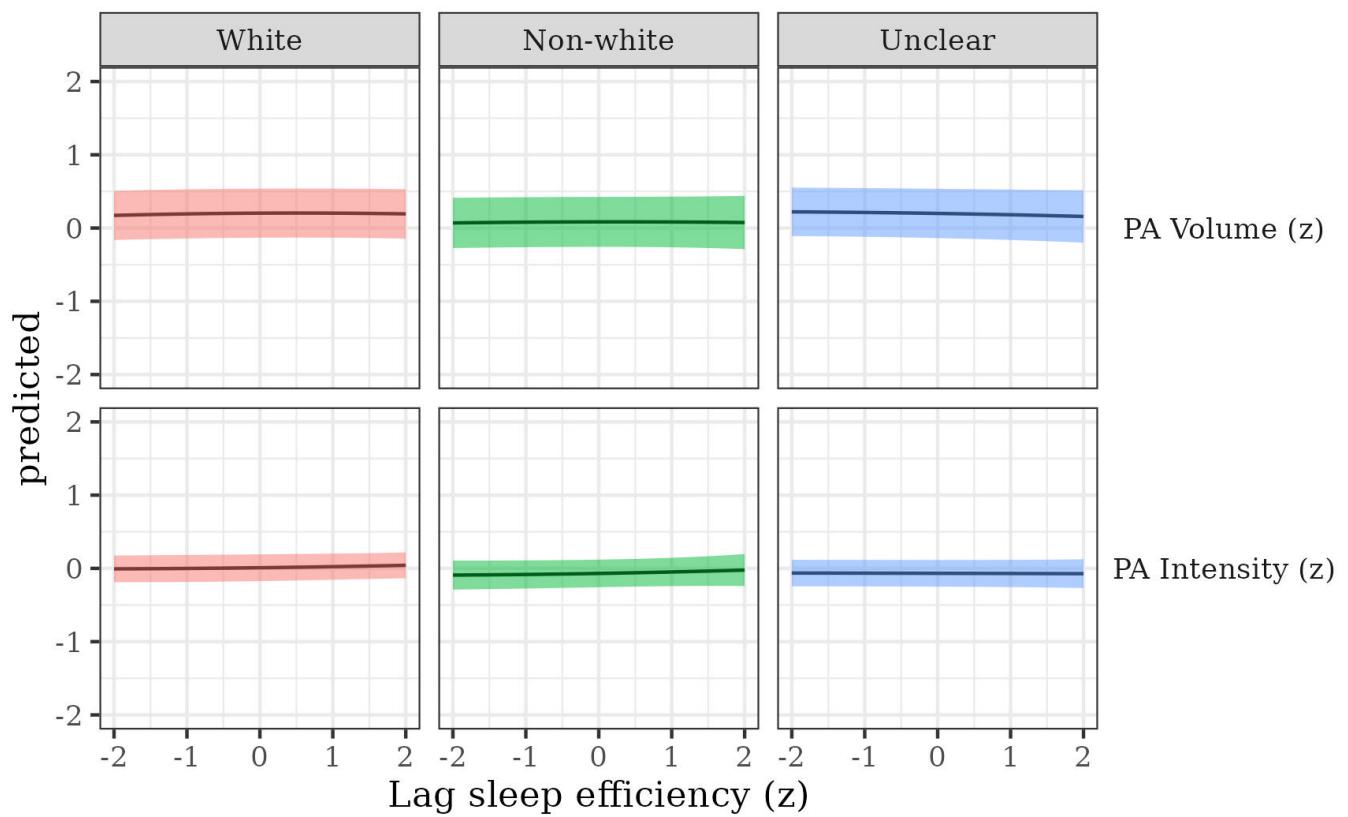


Figure 69. Physical activity by sleep efficiency moderated by ethnicity

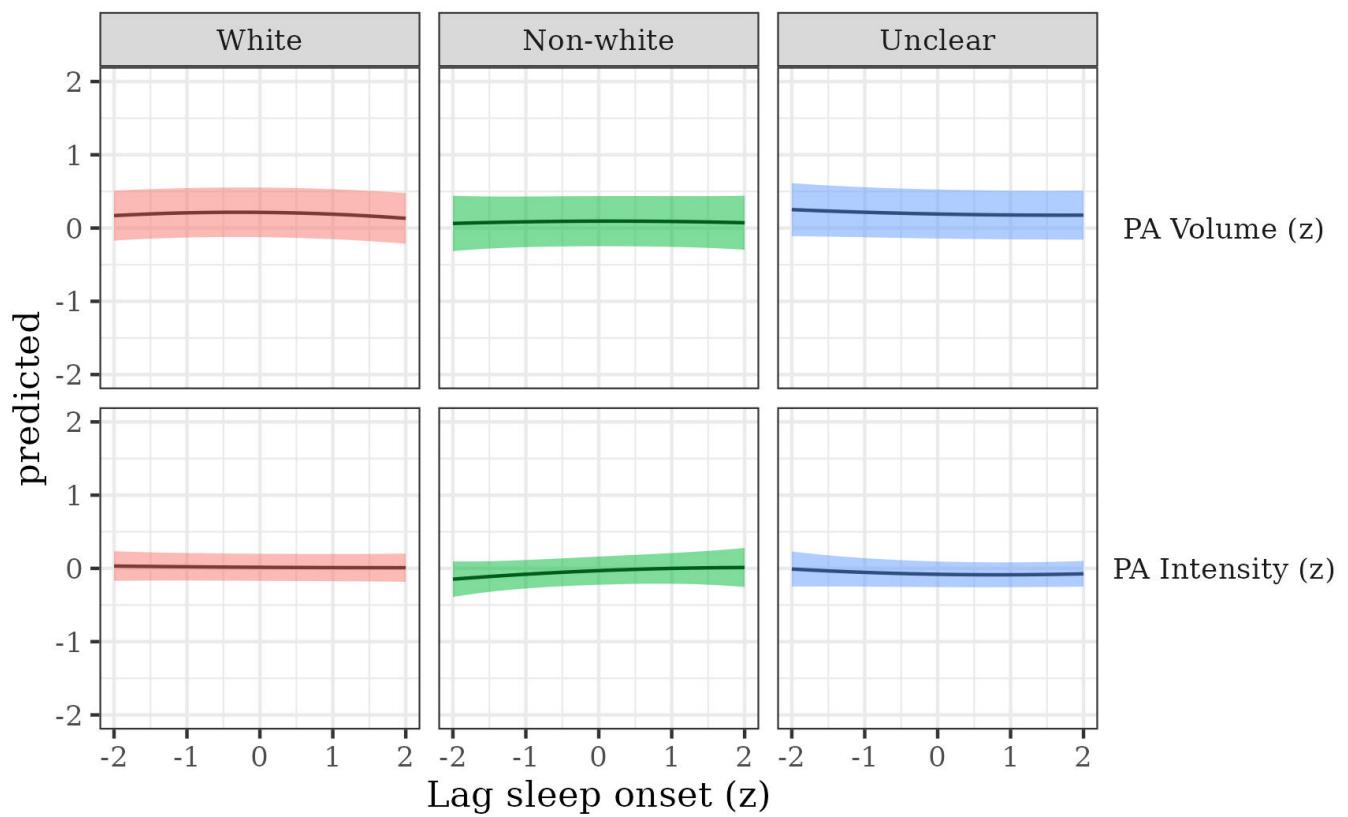


Figure 70. Physical activity by sleep onset moderated by ethnicity

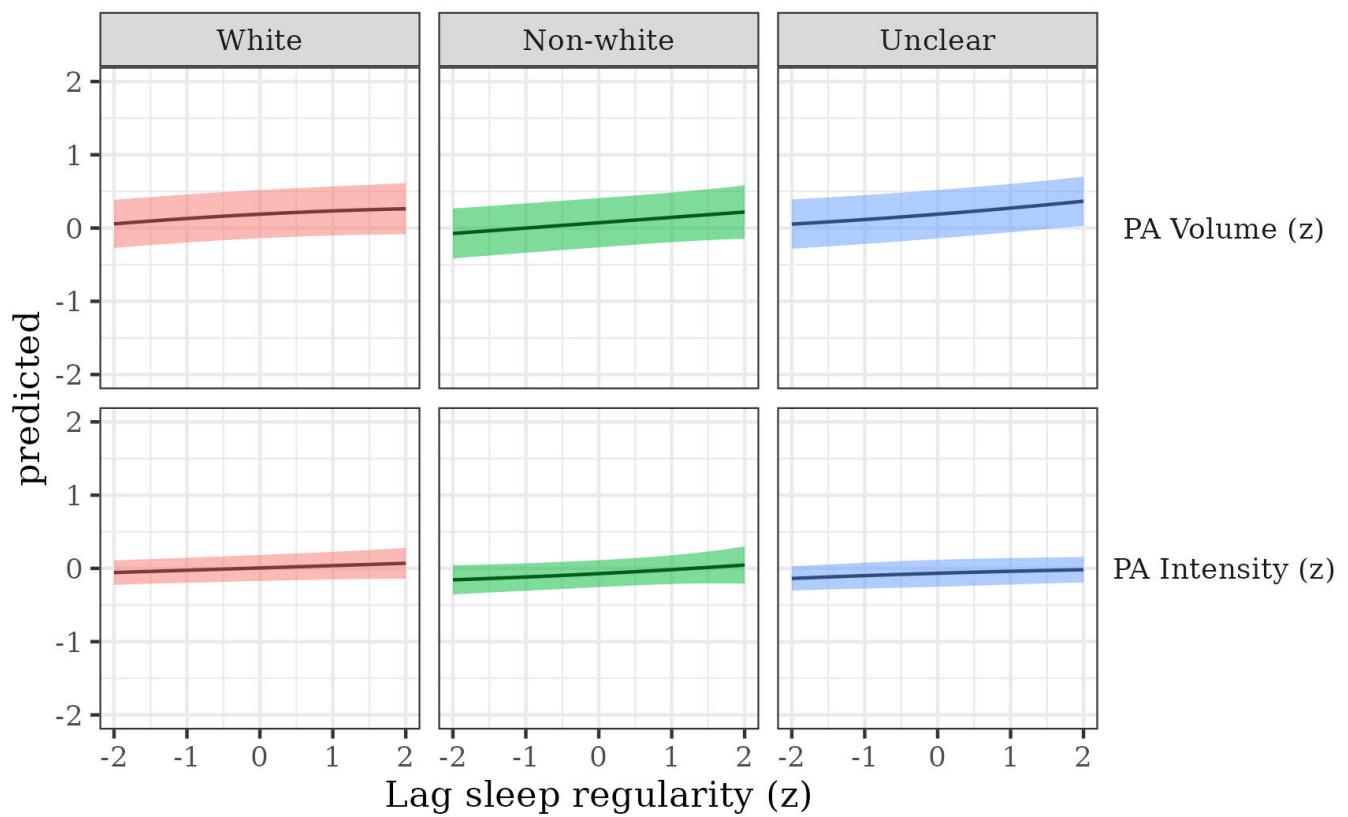


Figure 71. Physical activity by sleep regularity moderated by ethnicity