Multiverse analysis

First Author[1] & Ernst-August Doelle[1,2]

[1] Wilhelm-Wundt-University

[2] Konstanz Business School

Author Note

Abstract

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

Keywords: keywords

Word count: X

Multiverse analysis

Results

Model diagnostics

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

Multiverse

In this document we show the relationship between sleep and physical activity by the moderators that were pre-registered in our protocol.

Moderation

In the following section we present models for a range of moderators which were pre-defined in our protocol.

Table 1

Model diagnostics

Model name	Skewness	Kurtosis	Converged (%)
Models moderated by age data imp log			
Scale sleep duration by log PA volume	0.09	-2.39	100.00%
Scale sleep efficiency by log PA volume	-0.93	-3.81	100.00%
Scale sleep onset by log PA volume	0.46	-4.86	100.00%
Scale sleep regularity by log PA volume	-0.86	-3.21	100.00%
Scale sleep duration by PA intensity	0.09	-2.37	100.00%
Scale sleep efficiency by PA intensity	-0.93	-3.77	100.00%
Scale sleep onset by PA intensity	0.47	-4.75	100.00%
Scale sleep regularity by PA intensity	-0.85	-3.16	100.00%
Log PA volume by sleep duration(lagged)	-0.45	-2.49	100.00%
Scale PA intensity by sleep duration(lagged)	0.14	-2.74	100.00%
Log PA volume by sleep efficiency(lagged)	-0.45	-2.51	100.00%
Scale PA intensity by sleep efficiency(lagged)	0.14	-2.73	100.00%
Log PA volume by sleep onset(lagged)	-0.46	-2.50	100.00%
Scale PA intensity by sleep onset(lagged)	0.14	-2.73	100.00%
Log PA volume by sleep regularity(lagged)	-0.36	-2.35	100.00%
Scale PA intensity by sleep regularity(lagged)	0.18	-2.67	100.00%
Models moderated by bmi data imp log			
Scale sleep duration by log PA volume	0.09	-2.40	100.00%
Scale sleep efficiency by log PA volume	-0.93	-3.80	100.00%
Scale sleep onset by log PA volume	0.47	-4.84	100.00%
Scale sleep regularity by log PA volume	-0.86	-3.22	100.00%
Scale sleep duration by PA intensity	0.09	-2.37	100.00%
Scale sleep efficiency by PA intensity	-0.93	-3.77	100.00%
Scale sleep onset by PA intensity	0.47	-4.75	100.00%
Scale sleep regularity by PA intensity	-0.86	-3.13	100.00%
Log PA volume by sleep duration(lagged)	-0.45	-2.49	100.00%
Scale PA intensity by sleep duration(lagged)	0.14	-2.75	100.00%
Log PA volume by sleep efficiency(lagged)	-0.45	-2.51	100.00%
Scale PA intensity by sleep efficiency(lagged)	0.14	-2.73	100.00%
Log PA volume by sleep onset(lagged)	-0.46	-2.50	100.00%
Scale PA intensity by sleep onset(lagged)	0.14	-2.73	100.00%
Log PA volume by sleep regularity(lagged)	-0.36	-2.35	100.00%
Scale PA intensity by sleep regularity(lagged)	0.17	-2.67	100.00%

Table 1 continued

Model name	Skewness	Kurtosis	Converged (%)
Models moderated by ses data imp log			
Scale sleep duration by log PA volume	0.09	-2.40	100.00%
Scale sleep efficiency by log PA volume	-0.93	-3.78	100.00%
Scale sleep onset by log PA volume	0.46	-4.84	100.00%
Scale sleep regularity by log PA volume	-0.86	-3.19	100.00%
Scale sleep duration by PA intensity	0.09	-2.37	100.00%
Scale sleep efficiency by PA intensity	-0.93	-3.77	100.00%
Scale sleep onset by PA intensity	0.47	-4.76	100.00%
Scale sleep regularity by PA intensity	-0.86	-3.11	100.00%
Log PA volume by sleep duration(lagged)	-0.45	-2.48	100.00%
Scale PA intensity by sleep duration(lagged)	0.14	-2.75	100.00%
Log PA volume by sleep efficiency(lagged)	-0.46	-2.50	100.00%
Scale PA intensity by sleep efficiency(lagged)	0.14	-2.73	100.00%
Log PA volume by sleep onset(lagged)	-0.45	-2.50	100.00%
Scale PA intensity by sleep onset(lagged)	0.14	-2.73	100.00%
Log PA volume by sleep regularity(lagged)	-0.36	-2.35	100.00%
Scale PA intensity by sleep regularity(lagged)	0.17	-2.68	100.00%
Models moderated by sex data imp log			
Scale sleep duration by log PA volume	0.09	-2.40	100.00%
Scale sleep efficiency by log PA volume	-0.92	-3.78	100.00%
Scale sleep onset by log PA volume	0.47	-4.82	100.00%
Scale sleep regularity by log PA volume	-0.86	-3.21	100.00%
Scale sleep duration by PA intensity	0.09	-2.37	100.00%
Scale sleep efficiency by PA intensity	-0.93	-3.78	100.00%
Scale sleep onset by PA intensity	0.47	-4.75	100.00%
Scale sleep regularity by PA intensity	-0.86	-3.12	100.00%
Log PA volume by sleep duration(lagged)	-0.45	-2.49	100.00%
Scale PA intensity by sleep duration(lagged)	0.14	-2.75	100.00%
Log PA volume by sleep efficiency(lagged)	-0.45	-2.50	100.00%
Scale PA intensity by sleep efficiency(lagged)	0.14	-2.73	100.00%
Log PA volume by sleep onset(lagged)	-0.46	-2.51	100.00%
Scale PA intensity by sleep onset(lagged)	0.14	-2.73	100.00%
Log PA volume by sleep regularity(lagged)	-0.37	-2.36	100.00%
Scale PA intensity by sleep regularity(lagged)	0.17	-2.67	100.00%
Models moderated by weekday x data imp log			

Table 1 continued

Model name	Skewness	Kurtosis	Converged (%)
Scale sleep duration by log PA volume	0.07	-2.34	100.00%
Scale sleep efficiency by log PA volume	-0.91	-3.78	100.00%
Scale sleep onset by log PA volume	0.45	-4.92	100.00%
Scale sleep regularity by log PA volume	-0.91	-3.54	100.00%
Scale sleep duration by PA intensity	0.07	-2.35	100.00%
Scale sleep efficiency by PA intensity	-0.91	-3.76	100.00%
Scale sleep onset by PA intensity	0.46	-4.81	100.00%
Scale sleep regularity by PA intensity	-0.92	-3.62	100.00%
Log PA volume by sleep duration(lagged)	-0.38	-2.49	100.00%
Scale PA intensity by sleep duration(lagged)	0.19	-2.84	100.00%
Log PA volume by sleep efficiency(lagged)	-0.39	-2.52	100.00%
Scale PA intensity by sleep efficiency(lagged)	0.19	-2.88	100.00%
Log PA volume by sleep onset(lagged)	-0.38	-2.50	100.00%
Scale PA intensity by sleep onset(lagged)	0.20	-2.88	100.00%
Log PA volume by sleep regularity(lagged)	-0.32	-2.34	100.00%
Scale PA intensity by sleep regularity(lagged)	0.21	-2.76	100.00%
Models moderated by season data imp log			
Scale sleep duration by log PA volume	0.09	-2.39	100.00%
Scale sleep efficiency by log PA volume	-0.93	-3.79	100.00%
Scale sleep onset by log PA volume	0.47	-4.83	100.00%
Scale sleep regularity by log PA volume	-0.87	-3.23	100.00%
Scale sleep duration by PA intensity	0.09	-2.36	100.00%
Scale sleep efficiency by PA intensity	-0.92	-3.76	100.00%
Scale sleep onset by PA intensity	0.47	-4.76	100.00%
Scale sleep regularity by PA intensity	-0.86	-3.11	100.00%
Log PA volume by sleep duration(lagged)	-0.45	-2.47	100.00%
Scale PA intensity by sleep duration(lagged)	0.14	-2.76	100.00%
Log PA volume by sleep efficiency(lagged)	-0.45	-2.49	100.00%
Scale PA intensity by sleep efficiency(lagged)	0.14	-2.73	100.00%
Log PA volume by sleep onset(lagged)	-0.46	-2.49	100.00%
Scale PA intensity by sleep onset(lagged)	0.14	-2.73	100.00%
Log PA volume by sleep regularity(lagged)	-0.37	-2.35	100.00%
Scale PA intensity by sleep regularity(lagged)	0.17	-2.68	100.00%
Models moderated by region data imp log			
Scale sleep duration by log PA volume	0.10	-2.39	100.00%

Table 1 continued

Model name	Skewness	Kurtosis	Converged (%)
Scale sleep efficiency by log PA volume	-0.93	-3.81	100.00%
Scale sleep onset by log PA volume	0.46	-4.82	100.00%
Scale sleep regularity by log PA volume	-0.87	-3.25	100.00%
Scale sleep duration by PA intensity	0.09	-2.36	100.00%
Scale sleep efficiency by PA intensity	-0.92	-3.77	100.00%
Scale sleep onset by PA intensity	0.46	-4.74	100.00%
Scale sleep regularity by PA intensity	-0.84	-3.07	100.00%
Log PA volume by sleep duration(lagged)	-0.45	-2.48	100.00%
Scale PA intensity by sleep duration(lagged)	0.14	-2.77	100.00%
Log PA volume by sleep efficiency(lagged)	-0.46	-2.51	100.00%
Scale PA intensity by sleep efficiency(lagged)	0.14	-2.74	100.00%
Log PA volume by sleep onset(lagged)	-0.46	-2.49	100.00%
Scale PA intensity by sleep onset(lagged)	0.13	-2.74	100.00%
Log PA volume by sleep regularity(lagged)	-0.36	-2.32	100.00%
Scale PA intensity by sleep regularity(lagged)	0.17	-2.67	100.00%
Models moderated by daylight hours data imp log			
Scale sleep duration by log PA volume	0.09	-2.41	100.00%
Scale sleep efficiency by log PA volume	-0.93	-3.79	100.00%
Scale sleep onset by log PA volume	0.47	-4.83	100.00%
Scale sleep regularity by log PA volume	-0.86	-3.21	100.00%
Scale sleep duration by PA intensity	0.09	-2.38	100.00%
Scale sleep efficiency by PA intensity	-0.93	-3.78	100.00%
Scale sleep onset by PA intensity	0.47	-4.75	100.00%
Scale sleep regularity by PA intensity	-0.86	-3.12	100.00%
Log PA volume by sleep duration(lagged)	-0.45	-2.49	100.00%
Scale PA intensity by sleep duration(lagged)	0.14	-2.76	100.00%
Log PA volume by sleep efficiency(lagged)	-0.45	-2.50	100.00%
Scale PA intensity by sleep efficiency(lagged)	0.14	-2.73	100.00%
Log PA volume by sleep onset(lagged)	-0.46	-2.50	100.00%
Scale PA intensity by sleep onset(lagged)	0.14	-2.74	100.00%
Log PA volume by sleep regularity(lagged)	-0.37	-2.35	100.00%
Scale PA intensity by sleep regularity(lagged)	0.18	-2.66	100.00%
Models moderated by accelerometer wear location data imp log			
Scale sleep duration by log PA volume	0.09	-2.40	100.00%
Scale sleep efficiency by log PA volume	-0.92	-3.81	100.00%

Table 1 continued

Model name	Skewness	Kurtosis	Converged (%)
Scale sleep onset by log PA volume	0.46	-4.87	100.00%
Scale sleep regularity by log PA volume	-0.86	-3.21	100.00%
Scale sleep duration by PA intensity	0.09	-2.37	100.00%
Scale sleep efficiency by PA intensity	-0.92	-3.76	100.00%
Scale sleep onset by PA intensity	0.48	-4.73	100.00%
Scale sleep regularity by PA intensity	-0.85	-3.14	100.00%
Log PA volume by sleep duration(lagged)	-0.45	-2.49	100.00%
Scale PA intensity by sleep duration(lagged)	0.14	-2.75	100.00%
Log PA volume by sleep efficiency(lagged)	-0.45	-2.50	100.00%
Scale PA intensity by sleep efficiency(lagged)	0.14	-2.73	100.00%
Log PA volume by sleep onset(lagged)	-0.45	-2.50	100.00%
Scale PA intensity by sleep onset(lagged)	0.14	-2.73	100.00%
Log PA volume by sleep regularity(lagged)	-0.35	-2.32	100.00%
Scale PA intensity by sleep regularity(lagged)	0.19	-2.67	100.00%
Models moderated by PA mostactivehr data imp log			
Scale sleep duration by log PA volume	0.09	-2.40	100.00%
Scale sleep efficiency by log PA volume	-0.92	-3.79	100.00%
Scale sleep onset by log PA volume	0.47	-4.83	100.00%
Scale sleep regularity by log PA volume	-0.86	-3.18	100.00%
Scale sleep duration by PA intensity	0.09	-2.37	100.00%
Scale sleep efficiency by PA intensity	-0.93	-3.78	100.00%
Scale sleep onset by PA intensity	0.47	-4.74	100.00%
Scale sleep regularity by PA intensity	-0.85	-3.06	100.00%
Log PA volume by sleep duration(lagged)	-0.45	-2.49	100.00%
Scale PA intensity by sleep duration(lagged)	0.14	-2.75	100.00%
Log PA volume by sleep efficiency(lagged)	-0.46	-2.52	100.00%
Scale PA intensity by sleep efficiency(lagged)	0.14	-2.72	100.00%
Log PA volume by sleep onset(lagged)	-0.46	-2.50	100.00%
Scale PA intensity by sleep onset(lagged)	0.14	-2.73	100.00%
Log PA volume by sleep regularity(lagged)	-0.37	-2.33	100.00%
Scale PA intensity by sleep regularity(lagged)	0.17	-2.66	100.00%