

Supplemental Material

Table S1. Bivariate associations between sleep variables

	Weekdays				Weekends				Relative mid-sleep time on weekdays	Corrected mid-sleep time on weekends
	Bedtime	Wake-up time	Sleep duration	Mid-sleep time	Bedtime	Wake-up time	Sleep duration	Mid-sleep time		
Weekdays										
Bedtime	1.000									
Wake-up time	0.348***	1.000								
Sleep duration	−0.788***	0.225***	1.000							
Mid-sleep time	0.911***	0.703***	−0.499***	1.000						
Weekends										
Bedtime	0.796***	0.329***	−0.600***	0.748***	1.000					
Wake-up time	0.328***	0.434***	−0.075**	0.440***	0.446***	1.000				
Sleep duration	−0.369***	0.139***	0.471***	−0.219***	−0.429***	0.589***	1.000			
Mid-sleep time	0.646***	0.452***	−0.381***	0.688***	0.832***	0.867***	0.126***	1.000		
Relative mid-sleep time on weekdays	−0.112***	−0.022	0.098***	−0.094***	−0.506***	−0.816***	−0.359***	−0.787***	1.000	
Corrected mid-sleep time on weekends	0.612***	0.518***	−0.288***	0.692***	0.919***	0.648***	−0.180***	0.912***	−0.664***	1.000

** p < 0.01, *** p < 0.001

Table S2. Coefficients of sleep duration on weekdays, relative mid-sleep time on weekdays, and corrected mid-sleep time on weekends on the SMFQ score in multivariate linear regression in males and females

Independent variables	Unstandardized coefficient (95% CI)	Standardized coefficient	P value
Males (n = 942) ^{1,2}			
Sleep duration on weekdays	−0.005 (−0.010, −0.000)	−0.071	0.041
Relative mid-sleep time on weekdays	−0.011 (−0.020, −0.003)	−0.126	0.007
Corrected mid-sleep time on weekends	−0.001 (−0.009, 0.006)	−0.021	0.684
Females (n = 940) ^{1,3}			
Sleep duration on weekdays	−0.010 (−0.016, −0.004)	−0.112	0.001
Relative mid-sleep time on weekdays	−0.015 (−0.025, −0.006)	−0.136	0.002
Corrected mid-sleep time on weekends	0.002 (−0.007, 0.010)	0.018	0.687

¹Adjusted by age and school.

²F(7, 934) = 2.73, p < 0.01, adjusted R² = 0.013

³F(7, 932) = 7.52, p < 0.001, adjusted R² = 0.046

Table S3. Coefficients of sleep duration on weekdays, relative mid-sleep time on weekdays, and corrected mid-sleep time on weekends on the SMFQ score in multivariate linear regression for imputed data sets

Independent variables	Unstandardized coefficient (95% CI)	Standardized coefficient	P value
All (n = 2309) ^{1,2}			
Sleep duration on weekdays	−0.009 (−0.013, −0.005)	−0.112	< 0.001
Relative mid-sleep time on weekdays	−0.015 (−0.021, −0.008)	−0.149	< 0.001
Corrected mid-sleep time on weekends	0.001 (−0.005, 0.006)	0.009	0.781
Sleep duration on weekdays × sex	−0.004 (−0.012, 0.003)	−0.050	0.233
Relative mid-sleep time on weekdays × sex	−0.004 (−0.015, 0.008)	−0.019	0.523
Corrected mid-sleep time on weekends × sex	0.003 (−0.007, 0.014)	0.020	0.546
Males (n = 1187) ^{3,4}			
Sleep duration on weekdays	−0.007 (−0.012, −0.002)	−0.093	0.007
Relative mid-sleep time on weekdays	−0.013 (−0.021, −0.005)	−0.143	0.002
Corrected mid-sleep time on weekends	−0.001 (−0.008, 0.006)	−0.009	0.862
Females (n = 1122) ^{3,5}			
Sleep duration on weekdays	−0.011 (−0.017, −0.006)	−0.128	< 0.001
Relative mid-sleep time on weekdays	−0.017 (−0.026, −0.007)	−0.153	0.001
Corrected mid-sleep time on weekends	0.002 (−0.006, 0.011)	0.024	0.613

¹Adjusted by age, sex, and school.

²F(11, 2138.7) = 12.71, p < 0.001, adjusted R² = 0.058

³Adjusted by age and school.

⁴F(7, 1122.2) = 5.24, p < 0.001, adjusted R² = 0.027

⁵F(7, 1076.4) = 9.77, p < 0.001, adjusted R² = 0.056

Table S4. Estimated relations of sleep duration on weekdays, relative mid-sleep time on weekdays, and corrected mid-sleep time on weekends with the SMFQ score using GAM in males and females

Smooth terms of independent variables	Estimated degrees of freedom	Chi-square	P value
Males (n = 942) ^{1,2}			
s(Sleep duration on weekdays)	1.87	10.24	0.010
s(Relative mid-sleep time on weekdays)	1.04	7.33	0.009
s(Corrected mid-sleep time on weekends)	1.00	0.11	0.739
Females (n = 940) ^{1,3}			
s(Sleep duration on weekdays)	1.70	9.97	0.018
s(Relative mid-sleep time on weekdays)	1.01	6.84	0.009
s(Corrected mid-sleep time on weekends)	1.87	6.45	0.038

¹Adjusted by age and school.

²Adjusted R² = 0.016

³Adjusted R² = 0.063

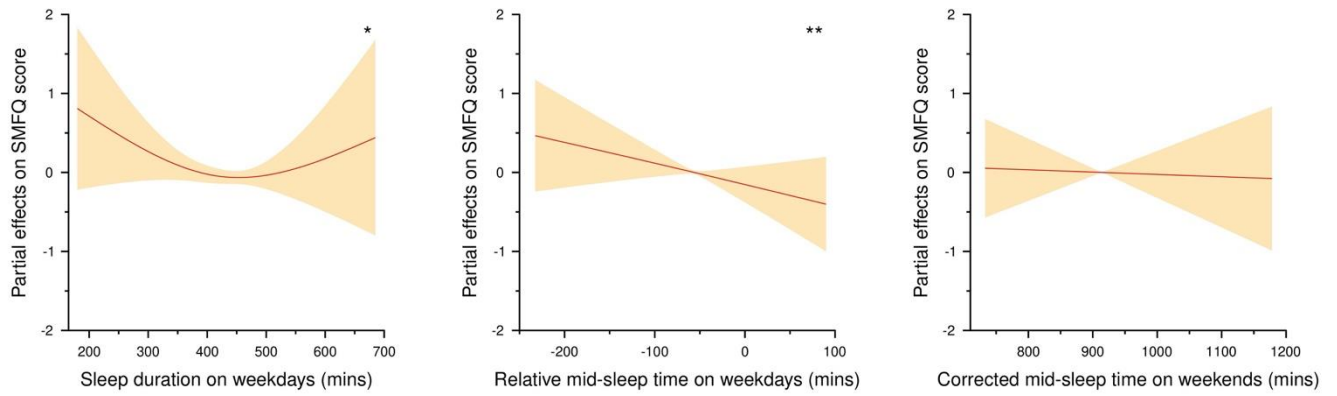


Figure S1. Estimated partial effects of sleep duration on weekdays, relative mid-sleep time on weekdays, and corrected mid-sleep time on weekends on the Short Mood and Feelings Questionnaire (SMFQ) score from a Generalized Additive Model (GAM) in males. The shadowed areas represent 95% confidence intervals. Natural cubic splines were applied to detect the best model shape. Age and school were used as covariates. Significant associations are marked with asterisks (** $P < 0.01$; * $P < 0.05$).

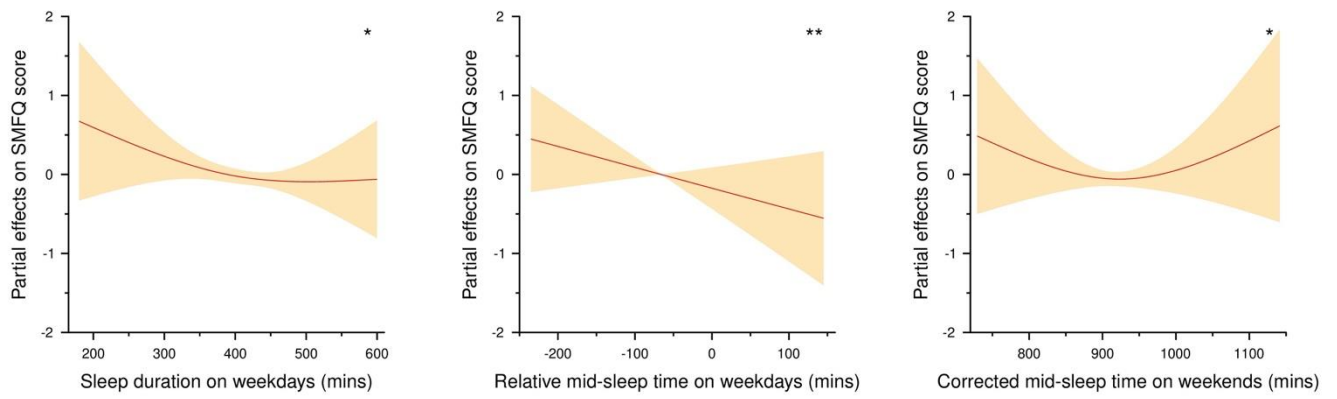


Figure S2. Estimated partial effects of sleep duration on weekdays, relative mid-sleep time on weekdays, and corrected mid-sleep time on weekends on the SMFQ score from a GAM in females. The shadowed areas represent 95% confidence intervals. Natural cubic splines were applied to detect the best model shape. Age and school were used as covariates. Significant associations are marked with asterisks (** $P < 0.01$; * $P < 0.05$).