Supplemental Information

SUPPLEMENTAL TABLE 3 Sleep Characteristics on Weekdays and Weekends

Sleep Characteristic	Overall, Median (IQR)	Weekday, Median (IQR)	Weekend, Median (IQR)
Average daily sleep duration, min	441.1 (413.3–468.1)	433.6 (402.7–463.0)	458.0 (423.0–497.5)
Average daily sleep efficiency, %	84.0 (80.4–86.7)	84.0 (80.5–86.8)	84.1 (79.9–87.6)
Average daily WASO, min	74.8 (58.3–94.4)	73.2 (56.2–92.4)	77.7 (57.0–103.5)
Day-to-day variability in sleep, SD[a]	56.0 (40.7–76.2)	44.8 (30.4–66.4)	44.5 (24.0–79.2)

[a] SD of daily time spent asleep (all d) in min.

SUPPLEMENTAL TABLE 4 Sex Differences in Associations of Sleep Exposures With Cardiometabolic Outcomes

Outcome	Girls, β (95% CI)	Boys, β (95% CI)	Sex Interaction P
Sleep duration (per 55 min)			
BMI z score	−.08 (−0.22 to 0.06)	−.22 (−0.39 to −0.06)	.93
Waist circumference, cm	−1.73 (−3.29 to −0.18)	−3.62 (−5.42 to −1.81)	.52
Sum of skinfolds, mm	−.85 (−2.66 to 0.95)	−3.07 (−5.15 to −1.00)	.81
DXA fat mass index, kg/m^2	−.13 (−0.62 to 0.37)	−.76 (−1.33 to −0.19)	.91
DXA trunk fat mass index, kg/m^2	−.05 (−0.30 to 0.20)	−.36 (−0.62 to −0.10)	.87
Metabolic risk, z score[a]	−.06 (−0.16 to 0.04)	−.04 (−0.15 to 0.06)	.94
HOMA-IR	−.13 (−0.46 to 0.21)	−.05 (−0.47 to 0.38)	.51
Systolic BP, mm Hg	−1.69 (−3.03 to −0.36)	−1.07 (−2.35 to 0.22)	.80
Triglycerides, mg/dL	2.12 (−4.29 to 8.54)	−.09 (−5.84 to 5.65)	.86
HDL cholesterol, mg/dL	1.04 (−1.29 to 3.38)	2.12 (−0.51 to 4.76)	.49
Sleep efficiency (per 6%)			
BMI z score	−.11 (−0.25 to 0.03)	−.11 (−0.26 to 0.03)	.74
Waist circumference, cm	−2.01 (−3.56 to −0.46)	−1.33 (−2.95 to 0.29)	.45
Sum of skinfolds, mm	−1.24 (−2.99 to 0.51)	−.18 (−2.04 to 1.67)	.17
DXA fat mass index, kg/m^2	−.39 (−0.88 to 0.11)	−.19 (−0.68 to 0.30)	.47
DXA trunk fat mass index, kg/m^2	−.23 (−0.48 to 0.02)	−.10 (−0.33 to 0.12)	.38
Metabolic risk, z score[a]	−.15 (−0.25 to −0.05)	−.02 (−0.11 to 0.07)	.05
HOMA-IR	−.05 (−0.41 to 0.30)	−.05 (−0.40 to 0.30)	.77
Systolic BP, mm Hg	−1.69 (−3.03 to −0.36)	−1.23 (−2.34 to −0.11)	.82
Triglycerides, mg/dL	−6.50 (−13.0 to −0.02)	2.40 (−2.41 to 7.21)	.01
HDL cholesterol, mg/dL	3.05 (0.70 to 5.39)	.60 (−1.63 to 2.82)	.17
WASO (per 36 min)			
BMI z score	.08 (−0.06 to 0.21)	.07 (−0.08 to 0.21)	.90
Waist circumference, cm	1.39 (−0.14 to 2.93)	.58 (−1.04 to 2.21)	.48
Sum of skinfolds, mm	.69 (−1.05 to 2.43)	−.51 (−2.37 to 1.34)	.32
DXA fat mass index, kg/m^2	.28 (−0.21 to 0.77)	.06 (−0.41 to 0.54)	.69
DXA trunk fat mass index, kg/m^2	.17 (−0.07 to 0.42)	.04 (−0.18 to 0.26)	.57
Metabolic risk, z score[a]	.11 (0.01 to 0.21)	.01 (−0.08 to 0.09)	.09
HOMA-IR	−.02 (−0.36 to 0.32)	.01 (−0.33 to 0.34)	.97
Systolic BP, mm Hg	1.15 (−0.18 to 2.47)	.98 (−0.14 to 2.09)	.97
Triglycerides, mg/dL	6.38 (0.12 to 12.65)	−2.54 (−7.28 to 2.20)	.01
HDL cholesterol, mg/dL	−2.69 (−4.97 to −0.41)	−.25 (−2.45 to 1.94)	.14
Sleep duration variability (per 35 min)			
BMI z score	.09 (−0.04 to 0.21)	−.11 (−0.28 to 0.06)	.01
Waist circumference, cm	.98 (−0.43 to 2.39)	−1.05 (−2.94 to 0.84)	.03
Sum of skinfolds, mm	1.51 (−0.08 to 3.09)	−.16 (−2.32 to 2.00)	.02
DXA fat mass index, kg/m^2	.47 (0.01 to 0.93)	−.31 (−0.87 to 0.25)	.00
DXA trunk fat mass index, kg/m^2	.24 (0.00 to 0.47)	−.15 (−0.41 to 0.11)	.00
Metabolic risk, z score[a]	−.01 (−0.10 to 0.07)	.01 (−0.09 to 0.11)	.83
HOMA-IR	−.14 (−0.43 to 0.16)	.18 (−0.21 to 0.57)	.76
Systolic BP, mm Hg	.85 (−0.36 to 2.07)	−.75 (−2.05 to 0.56)	.10
Triglycerides, mg/dL	−3.54 (−8.73 to 1.65)	1.03 (−4.68 to 6.75)	.45
HDL cholesterol, mg/dL	.64 (−1.26 to 2.53)	2.41 (−0.19 to 5.02)	.59

All models were adjusted for maternal education, household income and child age, sex, race and/or ethnicity, pubertal status (Tanner stage pubic hair score), season, and behaviors including actigraphy-derived MVPA, television-viewing, and consumption of sugar-sweetened beverages and fast food. Models for cardiometabolic outcomes (HOMA-IR, insulin, glucose, systolic blood pressure, triglycerides, and HDL cholesterol) are additionally adjusted for BMI z score. BP, blood pressure.

[a] Mean of 5 sex- and cohort-specific z scores for waist circumference, systolic blood pressure, HDL cholesterol scaled inversely, and log-transformed triglycerides and HOMA-IR; higher scores are indicative of greater metabolic risk.

SUPPLEMENTAL TABLE 5 Mutually Adjusted Associations of Sleep Measures With Cardiometabolic Outcomes

Outcome	Sleep Duration (IQR 55 min)	Sleep Efficiency (IQR 6%)	WASO (IQR 36 min)	Sleep Duration Variability (IQR 35 min)
Adiposity measures, mean difference per IQR, β (95% CI)				
BMI z score	−.14 (−0.25 to −0.03)	−.06 (−0.17 to 0.04)	.05 (−0.05 to 0.14)	−.01 (−0.11 to 0.09)
Waist circumference, cm	−2.51 (−3.75 to −1.26)	−.77 (−1.94 to 0.41)	.62 (−0.45 to 1.70)	−.11 (−1.21 to 0.98)
Sum of skinfolds, mm	−1.51 (−3.01 to −0.02)	.03 (−1.36 to 1.43)	−.13 (−1.41 to 1.14)	1.14 (−0.15 to 2.43)
DXA fat mass index, kg/m^2	−.34 (−0.74 to 0.06)	−.16 (−0.52 to 0.21)	.12 (−0.22 to 0.45)	.17 (−0.18 to 0.52)
DXA trunk fat mass index, kg/m^2	−.15 (−0.34 to 0.04)	−.11 (−0.28 to 0.07)	.08 (−0.08 to 0.24)	.08 (−0.08 to 0.25)
Cardiometabolic markers, mean difference per IQR, β (95% CI)				
Metabolic risk, z score[a]	−.09 (−0.17 to 0.00)	−.06 (−0.14 to 0.02)	.04 (−0.03 to 0.11)	−.02 (−0.09 to 0.05)
HOMA-IR	−.11 (−0.39 to 0.17)	−.04 (−0.30 to 0.22)	.01 (−0.22 to 0.24)	.03 (−0.21 to 0.26)
Insulin, μU/mL	−.89 (−2.86 to 1.08)	−.10 (−1.91 to 1.71)	.18 (−1.47 to 1.83)	.01 (−1.64 to 1.67)
Glucose, mg/dL	2.29 (−1.23 to 5.81)	−4.41 (−7.68 to −1.15)	2.68 (−0.29 to 5.65)	2.53 (−0.45 to 5.51)
Systolic BP, mm Hg	−1.29 (−2.26 to −0.33)	−1.34 (−2.25 to −0.43)	1.12 (0.29 to 1.96)	−.61 (−1.47 to 0.24)
Triglycerides, mg/dL	.88 (−3.41 to 5.18)	−.98 (−4.92 to 2.96)	.77 (−2.82 to 4.37)	−1.73 (−5.34 to 1.88)
HDL cholesterol, mg/dL	1.39 (−0.40 to 3.19)	.82 (−0.83 to 2.47)	−0.64 (−2.15 to 0.86)	1.02 (−0.49 to 2.53)

All models adjusted for maternal education, household income and child age, sex, race and/or ethnicity, pubertal status (Tanner stage pubic hair score), and season. Sleep efficiency, WASO, and sleep duration variability exposures were additionally adjusted for sleep duration. Sleep duration exposure were additionally adjusted for sleep efficiency. BP, blood pressure.
[a] Mean of 5 sex- and cohort-specific z scores for waist circumference, systolic blood pressure, HDL cholesterol scaled inversely, and log-transformed triglycerides and HOMA-IR; higher scores are indicative of greater metabolic risk.