

## Supplemental Online Content

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### **eMethods.**

### **eReferences**

**eTable 1.** Trajectory Modeling Fit Criteria

**eTable 2.** Comparison of Baseline Characteristics Between Participants Included and Those Excluded in the Study

**eTable 3.** Actual Value of CGM-Derived Metrics Across Different Sleep Duration Trajectory Groups

**eTable 4.** Association of Sleep Duration Trajectories With CGM-Derived Metrics in Model 1, Model 2, and Model 3

**eTable 5.** Sensitivity Analysis for the Association of Sleep Duration Trajectories With CGM-Derived Metrics After Additional Adjustment for Sleep Onset Timing, Diseases Status, and Sleep Apnea Indices

**eTable 6.** Sensitivity Analysis for the Association of Sleep Duration Trajectory With CGM-Derived Metrics Using Mild Inadequate Sleep Duration Group as Reference

**eTable 7.** Prospective Association Between Baseline Sleep Duration and Follow-up CGM-Derived Metrics in Model 1, Model 2, and Model 3

**eTable 8.** Actual Value of CGM-Derived Metrics Across Different Sleep Onset Timing Trajectory Groups

**eTable 9.** Sensitivity Analysis for the Associations Between Sleep Onset Timing Trajectories and CGM-Derived Metrics After Additionally Adjusted for Sleep Duration, Diseases Status, Respectively

**eTable 10.** Prospective Associations Between First Follow-up Sleep Onset Timing and Second Follow-up CGM-Derived Metrics in Model 1, Model 2, and Model 3

**eFigure 1.** Flowchart of Analysis Sample Selection

**eFigure 2.** Predicted Sleep Duration Trajectories at Baseline, First Follow-up, and Second Follow-up

**eFigure 3.** Association of the Sleep Duration Trajectories With CGM-Derived Glycemic Control

**eFigure 4.** Description of Sleep Onset Timing at First Follow-up, and Second Follow-up by Groups of Trajectories of Sleep Onset

**eFigure 5.** Association of Sleep Onset Timing Trajectories With CGM-Derived Metrics in Model 2

This supplemental material has been provided by the authors to give readers additional information about their work.

## **eMethods**

### **Assessment of covariates**

#### **Demographic and lifestyle factors**

Demographic and lifestyle information were collected by self-report at each visit using standardized questionnaires. Smoking status was dichotomized into “currently smoking” and “not currently smoking”. Alcohol consumption was classified as either “current alcohol drinkers” or “not current alcohol drinkers”. Physical activity was quantified in metabolic equivalent for task (MET) hours per day, derived from responses to a 19-item physical activity questionnaire<sup>1</sup>. Tea or coffee consumption was categorized as “current drinkers” or “not current drinkers”. Total energy intake was estimated from a 79-item validated food frequency questionnaire<sup>2</sup>. Baseline data on education and household income were obtained through face-to-face interviews, with education stratified into “no more than high school”, “some collage”, and “bachelor’s degree and above”. Household income was categorized into four groups:  $\leq 500$  Chinese Yuan/month/person, 500-1,500 Chinese Yuan/month/person, 1,500-3,000 Chinese Yuan/month/person, and  $>3,000$  Chinese Yuan/month/person.

#### **Anthropometric and Clinical Measures**

Hight and weight were measurements were conducted by trained nurses, facilitating the calculation of body mass index (BMI) in kilogram per square meters. Fasting glucose level was determined using a Roche Cobas 8000 c702 automated analyzer (Roche Diagnostics GmbH, Shanghai, China) employing colorimetric methods. Glycated hemoglobin (HbA1c) was measured with the Bio-Rad D-10 Hemoglobin Testing System.

Type 2 diabetes (T2D) was ascertained based on fasting blood glucose  $\geq 7.0$  mmol/L, glycated hemoglobin (HbA1c)  $\geq 6.5\%$ , or the usage of diabetic medication, in accordance with T2D diagnosis criteria established by the American Diabetes Association<sup>3</sup>.

Hypertension was defined by currently use of antihypertensive medication, systolic blood pressure (SBP)  $\geq 140$  mmHg, or diastolic blood pressure (DBP)  $\geq 90$  mmHg<sup>4</sup>.

Dyslipidemia was characterized by total cholesterol (TC)  $\geq 6.2$  mmol/L, low-density lipoprotein cholesterol (LDL)  $\geq 4.1$  mmol/L, high-density lipoprotein cholesterol (HDL)  $< 1.0$  mmol/L, triglycerides (TG)  $\geq 2.3$  mmol/L or self-report medical history<sup>5</sup>.

## eReferences

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**eTable 1. Trajectory Modeling Fit Criteria**

<i>sleep duration</i>					
	n (%)	posterior predictive probability			
		mean	SD	minimum	maximum
severe inadequate sleep	66 (5.7)	0.85	0.16	0.51	1.00
moderate inadequate sleep	316 (27.3)	0.76	0.12	0.52	0.94
mild inadequate sleep	641 (55.4)	0.77	0.11	0.50	0.91
adequate	113 (11.5)	0.74	0.16	0.50	1.00
<i>sleep onset timing</i>					
	n (%)	posterior predictive probability			
		mean	SD	minimum	maximum
persistent early sleep onset	878 (79.2)	0.94	0.11	0.51	1.00
persistent late sleep onset	231 (20.8)	0.85	0.16	0.51	1.00

**eTable 2. Comparison of Baseline Characteristics Between Participants Included and Those Excluded in the Study**

Characteristics	Include (n=1156)	Exclude (n=1378)
Age, years, mean (SD)	63.0 (5.1)	63.6 (5.3)
Men, n (%)	340 (29.4)	414 (30)
BMI, kg/m <sup>2</sup> , mean (SD)	23.4 (3.3)	23.8 (3.3)
Current smoker, n (%)	63 (5.4)	134 (9.7)
Current alcohol drinker, n (%)	97 (8.4)	108 (7.8)
Tea consumption, n (%)	600 (51.9)	695 (50.6)
Education, n (%)		
Middle school or lower	266 (23)	410 (29.8)
High school or professional college	541 (46.8)	656 (47.7)
University	349 (30.2)	308 (22.4)
Household income (Chinese Yuan/month/person), n (%)		
Extremely Low ( $\leq 500$ ¥/month)	21 (1.8)	34 (2.5)
Low (501-1500 ¥/month)	276 (23.9)	436 (31.7)
Middle (1501-3000 ¥/month)	539 (46.6)	649 (47.2)
High ( $> 3000$ ¥/month)	320 (27.7)	255 (18.6)
Physical activity, MET-h/day, mean (SD)	42.1 (15.1)	42.5 (15.5)
Total energy intake, kcal/day, mean (SD)	1800.8 (564.4)	1858.5 (635)

Abbreviations: BMI, body mass index; MET, metabolic equivalent of task.

**eTable 3. Actual Value of CGM-Derived Metrics Across Different Sleep Duration Trajectory Groups**

CGM-derived metrics	sleep duration			
	severe inadequate sleep	moderate inadequate sleep	mild inadequate sleep	adequate sleep
CV, %, mean (SD)	25.42 (5.87)	24.19 (5.80)	24.47 (5.64)	23.42 (5.88)
SD, mmol/L, mean (SD)	1.54 (0.59)	1.45 (0.54)	1.47 (0.55)	1.38 (0.49)
MAGE, mmol/L, mean (SD)	3.76 (1.41)	3.52 (1.27)	3.62 (1.35)	3.37 (1.26)
MODD, mmol/L, median (IQR)	0.28 (0.21)	0.24 (0.15)	0.25 (0.16)	0.22 (0.14)
TIR, %, median (IQR)	92.62 (14.07)	94.14 (10.85)	93.66 (11.02)	95.49 (10.76)
daily MBG, mmol/L, mean (SD)	5.98 (1.35)	5.93 (1.38)	5.96 (1.45)	5.83 (0.97)

Abbreviations: CGM, continuous glucose monitoring; MBG, mean blood glucose; SD, standard deviation;

CV, coefficient of variation; MAGE, mean amplitude of glycemic excursions; MODD, mean of daily differences; TIR, time in range.

**eTable 4. Association of Sleep Duration Trajectories With CGM-Derived Metrics in Model 1, Model 2, and Model 3**

		model 1		model 2		model 3	
		beta (95%CI)	P	beta (95%CI)	P	beta (95%CI)	P
<i>Glycemic variability</i>							
SD	severe inadequate	0.14 (0.01, 0.27)	<b>0.03</b>	0.17 (0.05, 0.30)	<b>0.007</b>	0.14 (0.02,0.26)	<b>0.03</b>
	moderate inadequate	0.05 (-0.04, 0.14)	0.24	0.07 (-0.02, 0.15)	0.14	0.06 (-0.02,0.14)	0.16
	mild inadequate	0.07 (-0.01, 0.16)	0.07	0.09 (0.01, 0.17)	<b>0.03</b>	0.08 (0.00,0.15)	<b>0.05</b>
	adequate	ref		ref		ref	
CV	severe inadequate	2.51 (0.88, 4.15)	<b>0.003</b>	2.87 (1.23, 4.50)	<b>0.0006</b>	2.45 (0.85,4.05)	<b>0.003</b>
	moderate inadequate	0.92 (-0.21, 2.04)	0.11	0.91 (-0.20, 2.03)	0.11	0.81 (-0.29,1.90)	0.15
	mild inadequate	1.19 (0.15, 2.22)	<b>0.02</b>	1.17 (0.14, 2.20)	<b>0.03</b>	1.00 (-0.01,2.00)	<b>0.05</b>
	adequate	ref		ref		ref	
MAGE	severe inadequate	0.40 (0.04, 0.75)	<b>0.03</b>	0.47 (0.12, 0.82)	<b>0.008</b>	0.39 (0.05,0.72)	<b>0.02</b>
	moderate inadequate	0.16 (-0.09, 0.40)	0.21	0.18 (-0.06, 0.42)	0.14	0.17 (-0.06,0.40)	0.14
	mild inadequate	0.23 (0.01, 0.46)	<b>0.04</b>	0.26 (0.04, 0.48)	<b>0.02</b>	0.25 (0.04,0.46)	<b>0.02</b>
	adequate	ref		ref		ref	
MODD	severe inadequate	0.05 (0.01, 0.08)	<b>0.007</b>	0.06 (0.02, 0.09)	<b>0.003</b>	0.05 (0.01,0.08)	<b>0.006</b>
	moderate inadequate	0.01 (-0.01, 0.03)	0.4	0.02 (-0.01, 0.04)	0.19	0.02 (0.00,0.05)	0.08
	mild inadequate	0.02 (-0.01, 0.04)	0.19	0.02 (0.00, 0.04)	0.1	0.02 (0.00,0.04)	0.06
	adequate	ref		ref		ref	
<i>Mean glucose measures</i>							
TIR	severe inadequate	-2.77 (-5.07, -0.46)	<b>0.02</b>	-3.11 (-5.42, -0.8)	<b>0.008</b>	-3.04 (-5.31,-0.77)	<b>0.009</b>
	moderate inadequate	-0.75 (-2.33, 0.83)	0.35	-0.83 (-2.41, 0.75)	0.30	-1.07 (-2.63,0.48)	0.18
	mild inadequate	-0.93 (-2.39, 0.52)	0.21	-0.88 (-2.34, 0.58)	0.24	-1.14 (-2.57,0.29)	0.12
	adequate	ref		ref		ref	
MBG	severe inadequate	0.04 (-0.19, 0.26)	0.75	0.10 (-0.13, 0.32)	0.41	0.05 (-0.17,0.27)	0.65

moderate inadequate	-0.02 (-0.18, 0.13)	0.76	0.01 (-0.15, 0.16)	0.93	0.01 (-0.14,0.15)	0.93
mild inadequate	0.02 (-0.12, 0.16)	0.79	0.05 (-0.09, 0.19)	0.49	0.04 (-0.09,0.18)	0.54
adequate	ref		ref		ref	

Abbreviations: CGM, continuous glucose monitoring; MBG, mean blood glucose; SD, standard deviation; CV, coefficient of variation; MAGE, mean amplitude of glycemic excursions; MODD, mean of daily differences; TIR, time in range.

Model 1: adjusted for age, sex.

Model 2: adjusted for age, sex, BMI, physical activity, energy intake, education, income, smoke, alcohol, tea and coffee.

Model 3: adjusted for age, sex, BMI, physical activity, energy intake, education, income, smoke, alcohol, tea and coffee, and HbA1c at baseline.

**eTable 5. Sensitivity Analysis for the Association of Sleep Duration Trajectories With CGM-Derived Metrics After Additional Adjustment for Sleep Onset Timing, Diseases Status, and Sleep Apnea Indices**

		model 1		model 2		model 3	
		beta (95%CI)	P	beta (95%CI)	P	beta (95%CI)	P
<i>Glycemic variability</i>							
SD	severe inadequate	0.14 (0.01,0.28)	<b>0.04</b>	0.14 (0.01,0.26)	<b>0.03</b>	0.13(0, 0.26)	<b>0.04</b>
	moderate inadequate	0.05 (-0.04,0.14)	0.30	0.05 (-0.04,0.13)	0.27	0.03(-0.06, 0.12)	0.47
	mild inadequate	0.09 (0.01,0.17)	<b>0.04</b>	0.07 (-0.0,0.15)	0.06	0.07(-0.01, 0.16)	0.08
	adequate	ref		ref		ref	
CV	severe inadequate	2.43 (0.68,4.18)	<b>0.006</b>	2.62 (1.05,4.19)	<b>0.001</b>	2.59 (0.92, 4.26)	<b>0.002</b>
	moderate inadequate	0.70 (-0.49,1.89)	0.25	0.67 (-0.40,1.75)	0.22	0.50 (-0.66, 1.65)	0.40
	mild inadequate	1.24 (0.15,2.34)	<b>0.03</b>	0.95 (-0.04,1.94)	0.06	1.05 (-0.01, 2.11)	<b>0.05</b>
	adequate	ref		ref		ref	
MAGE	severe inadequate	0.40 (0.02,0.77)	<b>0.04</b>	0.40 (0.06,0.73)	<b>0.02</b>	0.39 (0.04, 0.75)	<b>0.03</b>
	moderate inadequate	0.15 (-0.11,0.40)	0.26	0.14 (-0.09,0.37)	0.22	0.11 (-0.14, 0.35)	0.39
	mild inadequate	0.27 (0.04,0.51)	<b>0.02</b>	0.24 (0.03,0.45)	<b>0.02</b>	0.25 (0.03, 0.48)	<b>0.03</b>
	adequate	ref		ref		ref	
MODD	severe inadequate	0.05 (0.01,0.09)	<b>0.01</b>	0.05 (0.01,0.08)	<b>0.006</b>	0.05 (0.01, 0.08)	<b>0.008</b>
	moderate inadequate	0.01 (-0.01,0.04)	0.30	0.02 (-0.00,0.04)	0.09	0.02 (-0.01, 0.04)	0.18
	mild inadequate	0.02 (-0.00,0.05)	0.06	0.02 (-0.00,0.04)	0.08	0.02 (0, 0.04)	0.09
	adequate	ref		ref		ref	
<i>Mean glucose measures</i>							
TIR	severe inadequate	-2.73 (-5.22,-0.25)	<b>0.03</b>	-2.68 (-4.9,-0.46)	<b>0.02</b>	-2.8 (-5.15, -0.44)	<b>0.02</b>
	moderate inadequate	-0.82 (-2.51,0.87)	0.34	-0.8 (-2.32,0.72)	0.30	-0.75 (-2.38, 0.88)	0.37
	mild inadequate	-1.14 (-2.69,0.42)	0.15	-0.96 (-2.36,0.44)	0.18	-1.15 (-2.65, 0.34)	0.13
	adequate	ref		ref		ref	

Abbreviations: CGM, continuous glucose monitoring; MBG, mean blood glucose; SD, standard deviation; CV, coefficient of variation; MAGE, mean amplitude of glycemic excursions; MODD, mean of daily differences; TIR, time in range.

Model 1: adjusted for age, sex, BMI, physical activity, energy intake, education, income, smoke, alcohol, tea, and sleep onset timing.

Model 2: adjusted for age, sex, BMI, physical activity, energy intake, education, income, smoke, alcohol, tea, type 2 diabetes, hypertension, and dyslipidemia.

Model 3: adjusted for age, sex, BMI, physical activity, energy intake, education, income, smoke, alcohol, tea, snoring, sleepy, type 2 diabetes, hypertension, and dyslipidemia.

**eTable 6. Sensitivity Analysis for the Association of Sleep Duration Trajectory With CGM-Derived Metrics Using Mild Inadequate Sleep Duration Group as Reference**

		model	
		beta(95%CI)	P
<i>Glycemic variability</i>			
SD	severe inadequate	0.09(-0.02,0.20)	0.12
	moderate inadequate	-0.02(-0.08,0.04)	0.47
	adequate	-0.09(-0.17,-0.01)	<b>0.03</b>
	mild inadequate	ref	
CV	severe inadequate	1.70(0.29,3.10)	<b>0.02</b>
	moderate inadequate	-0.26(-1.00,0.49)	0.50
	adequate	-1.17(-2.20,-0.14)	<b>0.03</b>
	mild inadequate	ref	
MAGE	severe inadequate	0.21(-0.09,0.51)	0.18
	moderate inadequate	-0.08(-0.24,0.08)	0.33
	adequate	-0.26(-0.48,-0.04)	<b>0.02</b>
	mild inadequate	ref	
MODD	severe inadequate	0.04(0.01,0.07)	<b>0.02</b>
	moderate inadequate	0.00(-0.02,0.01)	0.73
	adequate	-0.02(-0.04,0.00)	0.10
	mild inadequate	ref	
<i>Mean glucose measures</i>			
TIR	severe inadequate	-2.23(-4.22,-0.24)	<b>0.03</b>
	moderate inadequate	0.05(-1.00,1.10)	0.92
	adequate	0.88(-0.58,2.34)	0.24
	mild inadequate	ref	

Abbreviations: CGM, continuous glucose monitoring; MBG, mean blood glucose; SD, standard deviation;

CV, coefficient of variation; MAGE, mean amplitude of glycemic excursions; MODD, mean of daily differences; TIR, time in range.

**eTable 7. Prospective Association Between Baseline Sleep Duration and Follow-up CGM-Derived Metrics in Model 1, Model 2, and Model 3**

		model 1			model 2			model 3		
		beta (95%CI)	P	P-trend	beta (95%CI)	P	P-trend	beta (95%CI)	P	P-trend
Glycemic variability										
SD	severe inadequate	0.10(0.00,0.19)	<b>0.05</b>	0.08	0.10(0.01,0.20)	<b>0.03</b>	<b>0.04</b>	0.09(-0.01,0.18)	0.06	0.07
	moderate inadequate	0.09(-0.01,0.18)	0.07		0.10(0.01,0.20)	<b>0.04</b>		0.10(0.01,0.19)	<b>0.04</b>	
	mild inadequate	0.07(-0.03,0.17)	0.15		0.07(-0.03,0.17)	0.16		0.06(-0.03,0.16)	0.19	
	adequate	ref			ref			ref		
CV	severe inadequate	1.35(0.10,2.61)	<b>0.03</b>	<b>0.05</b>	1.33(0.07,2.60)	<b>0.04</b>	<b>0.05</b>	1.18(-0.06,2.42)	0.06	0.09
	moderate inadequate	0.81(-0.44,2.06)	0.21		0.89(-0.38,2.15)	0.17		0.81(-0.43,2.04)	0.20	
	mild inadequate	0.88(-0.40,2.15)	0.18		0.82(-0.46,2.11)	0.21		0.80(-0.45,2.05)	0.21	
	adequate	ref			ref			ref		
MAGE	severe inadequate	0.26(-0.01,0.52)	0.06	0.10	0.27(0.00,0.53)	<b>0.05</b>	0.08	0.25(-0.01,0.50)	0.06	0.10
	moderate inadequate	0.24(-0.03,0.50)	0.08		0.27(0.00,0.53)	<b>0.05</b>		0.27(0.02,0.52)	<b>0.03</b>	
	mild inadequate	0.19(-0.07,0.46)	0.15		0.20(-0.07,0.47)	0.16		0.20(-0.05,0.46)	0.12	
	adequate	ref			ref			ref		
MODD	severe inadequate	0.01(-0.02,0.03)	0.63	0.43	0.01(-0.02,0.04)	0.48	0.28	0.00(-0.02,0.03)	0.71	0.33
	moderate inadequate	0.01(-0.02,0.04)	0.5		0.01(-0.02,0.04)	0.45		0.00(-0.02,0.03)	0.74	
	mild inadequate	0.00(-0.03,0.03)	0.97		0.00(-0.03,0.03)	0.99		-0.01(-0.03,0.02)	0.62	
	adequate	ref			ref			ref		
Mean glucose measures										
TIR	severe inadequate	-0.54(-2.26,1.18)	0.54	0.40	-0.60(-2.38,1.18)	0.51	0.37	-0.64(-2.41,1.13)	0.48	0.29
	moderate inadequate	-0.31(-2.03,1.42)	0.73		-0.26(-2.05,1.52)	0.77		-0.49(-2.26,1.28)	0.59	
	mild inadequate	-0.06(-1.81,1.69)	0.95		-0.04(-1.84,1.77)	0.97		0.02(-1.77,1.82)	0.98	
	adequate	ref			ref			ref		

Abbreviations: CGM, continuous glucose monitoring; MBG, mean blood glucose; SD, standard deviation; CV, coefficient of variation; MAGE, mean amplitude of glycemic excursions; MODD, mean of daily differences; TIR, time in range.

Model 1: adjusted for age, sex.

Model 2: adjusted for age, sex, BMI, physical activity, energy intake, education, income, smoke, alcohol, tea.

Model 3: adjusted for age, sex, BMI, physical activity, energy intake, education, income, smoke, alcohol, tea, and HbA1c at baseline.

**eTable 8. Actual Value of CGM-Derived Metrics Across Different Sleep Onset Timing Trajectory Groups**

CGM-derived metrics	sleep onset timing	
	late onset	early onset
CV, %, mean (SD)	25.13 (6.13)	24.16 (5.66)
SD, mmol/L, mean (SD)	1.51 (0.57)	1.44 (0.52)
MAGE, mmol/L, mean (SD)	3.66 (1.39)	3.54 (1.30)
MODD, mmol/L, median (IQR)	0.25 (0.18)	0.24 (0.15)
TIR, %, median (IQR)	93.49 (13.19)	94.05 (11.11)
daily MBG, mmol/L, mean (SD)	5.94 (1.35)	5.90 (1.34)

Abbreviations: CGM, continuous glucose monitoring; MBG, mean blood glucose; SD, standard deviation;

CV, coefficient of variation; MAGE, mean amplitude of glycemic excursions; MODD, mean of daily differences; TIR, time in range.

**eTable 9. Sensitivity Analysis for the Associations Between Sleep Onset Timing Trajectories and CGM-Derived Metrics After Additionally Adjusted for Sleep Duration, Diseases Status, Respectively**

		model 1		model 2	
		beta (95% CI)	P	beta (95% CI)	P
<i>Glycemic variability</i>					
CV	after midnight	0.07 (0,0.13)	<b>0.05</b>	0.07 (0.01,0.13)	<b>0.02</b>
	before midnight	ref		ref	
SD	after midnight	0.96 (0.12,1.8)	<b>0.02</b>	1.12 (0.32,1.92)	<b>0.006</b>
	before midnight	ref		ref	
MAGE	after midnight	0.08 (-0.1,0.27)	0.37	0.13 (-0.03,0.29)	0.12
	before midnight	ref		ref	
MODD	after midnight	0.02 (0.01,0.04)	<b>0.01</b>	0.02 (0,0.04)	<b>0.01</b>
	before midnight	ref		ref	

Abbreviations: CGM, continuous glucose monitoring; MBG, mean blood glucose; SD, standard deviation;

CV, coefficient of variation; MAGE, mean amplitude of glycemic excursions; MODD, mean of daily differences; TIR, time in range.

Model 1: adjusted for age, sex, BMI, physical activity, energy intake, education, income, smoke, alcohol, tea, and sleep duration.

Model 2: adjusted for age, sex, BMI, physical activity, energy intake, education, income, smoke, alcohol, tea, type 2 diabetes, hypertension, and dyslipidemia.

**eTable 10. Prospective Associations Between First Follow-up Sleep Onset Timing and Second Follow-up CGM-Derived Metrics in Model 1, Model 2, and Model 3**

		model 1		model 2		model 3	
<i>Glycemic variability</i>		beta (95% CI)	<i>P</i>	beta (95% CI)	<i>P</i>	beta (95% CI)	<i>P</i>
SD	after midnight	0.06(0.00,0.12)	0.06	0.04(-0.02,0.11)	0.16	0.07(0.00,0.13)	<b>0.04</b>
	before midnight	ref		ref		ref	
CV	after midnight	0.76(-0.05,1.57)	0.07	0.70(-0.11,1.51)	0.09	0.96(0.05,1.86)	<b>0.04</b>
	before midnight	ref		ref		ref	
MAGE	after midnight	0.11(-0.06,0.28)	0.21	0.08(-0.09,0.25)	0.37	0.17(-0.01,0.35)	0.06
	before midnight	ref		ref		ref	
MODD	after midnight	0.02(0.01,0.04)	<b>0.005</b>	0.02(0.00,0.04)	<b>0.03</b>	0.02(0.00,0.04)	<b>0.05</b>
	before midnight	ref		ref		ref	

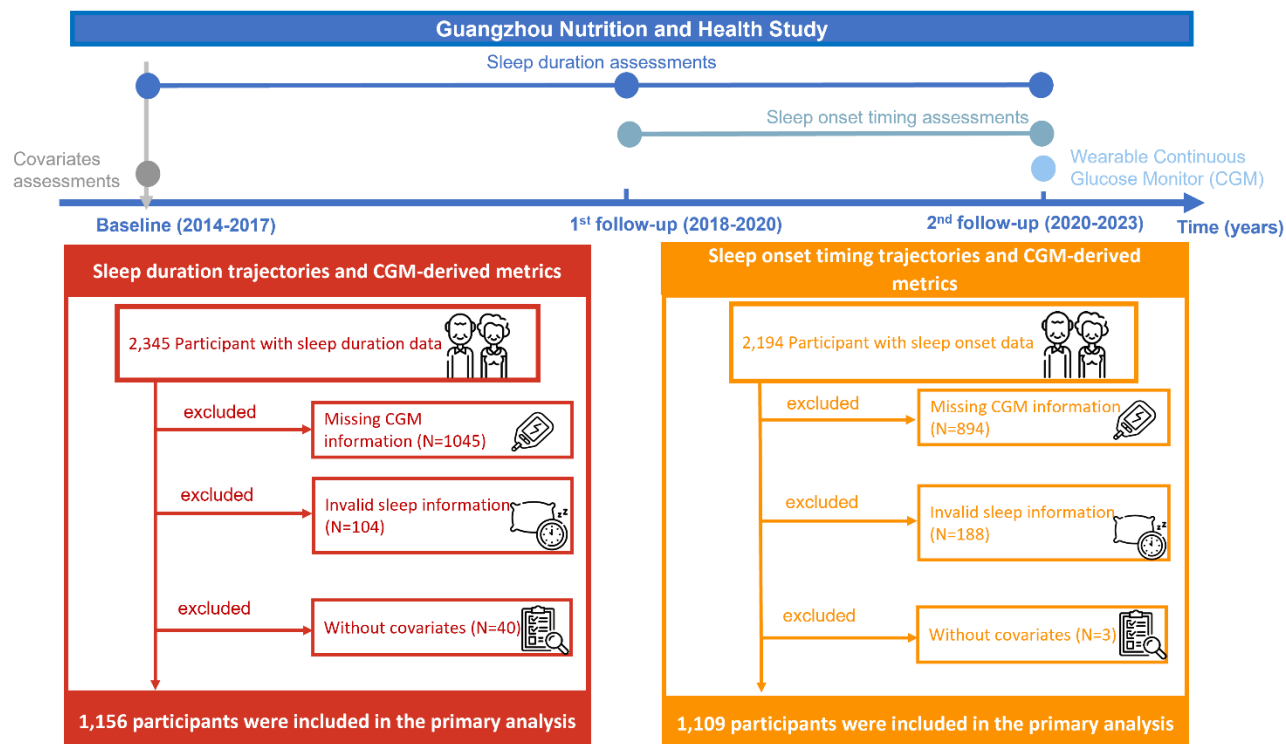
Abbreviations: CGM, continuous glucose monitoring; MBG, mean blood glucose; SD, standard deviation; CV, coefficient of variation; MAGE, mean amplitude of glycemic excursions; MODD, mean of daily differences; TIR, time in range.

Model 1: adjusted for age, sex.

Model 2: adjusted for age, sex, BMI, physical activity, energy intake, education, income, smoke, alcohol, tea.

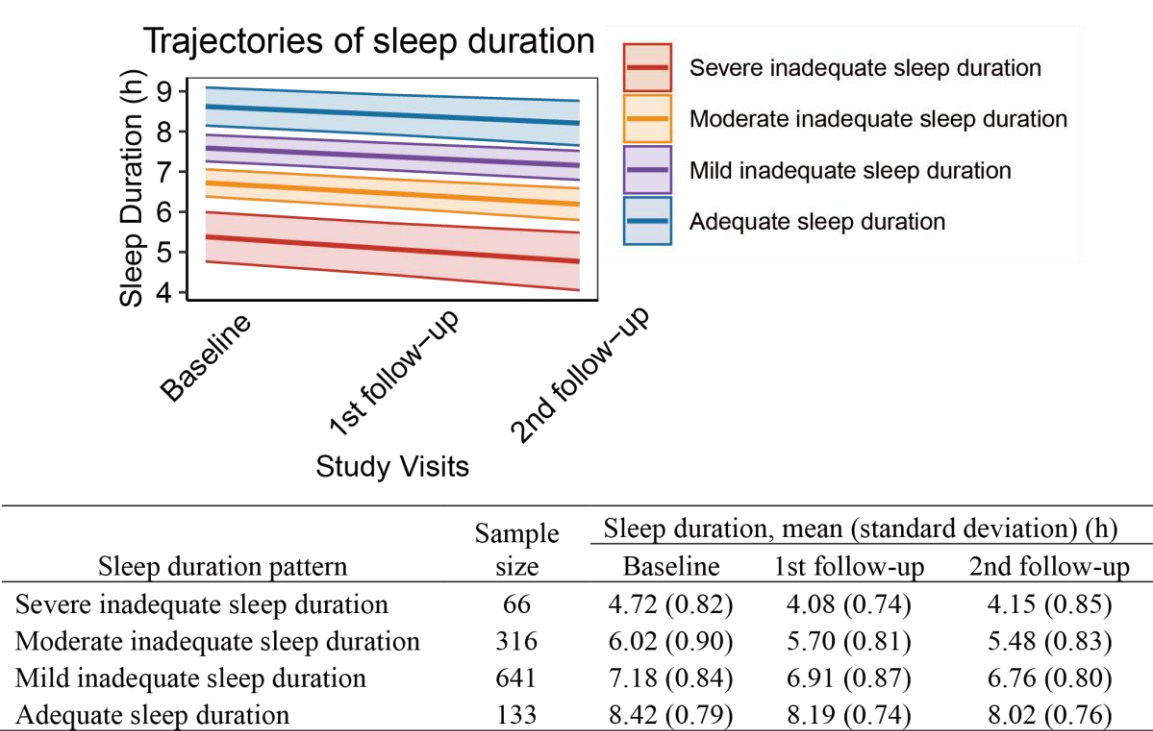
Model 3: adjusted for age, sex, BMI, physical activity, energy intake, education, income, smoke, alcohol, tea, and HbA1c at baseline.

**eFigure 1. Flowchart of Analysis Sample Selection**

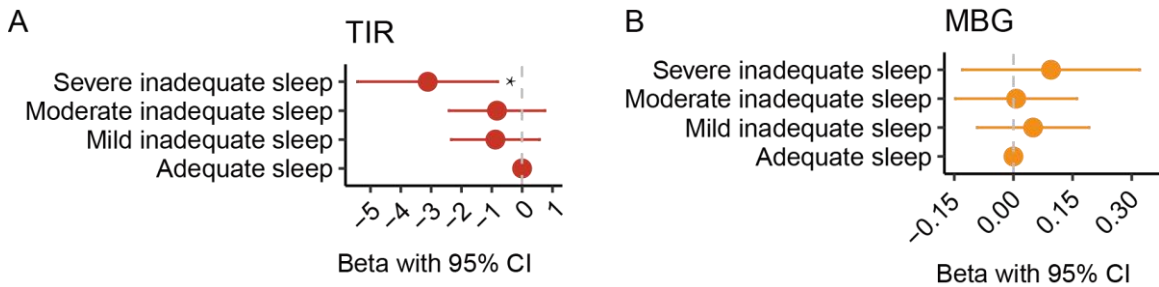


Abbreviations: GNHS, Guangzhou Nutrition and Health Study; CGM, continuous glucose monitoring.

**eFigure 2. Predicted Sleep Duration Trajectories at Baseline, First Follow-up, and Second Follow-up**

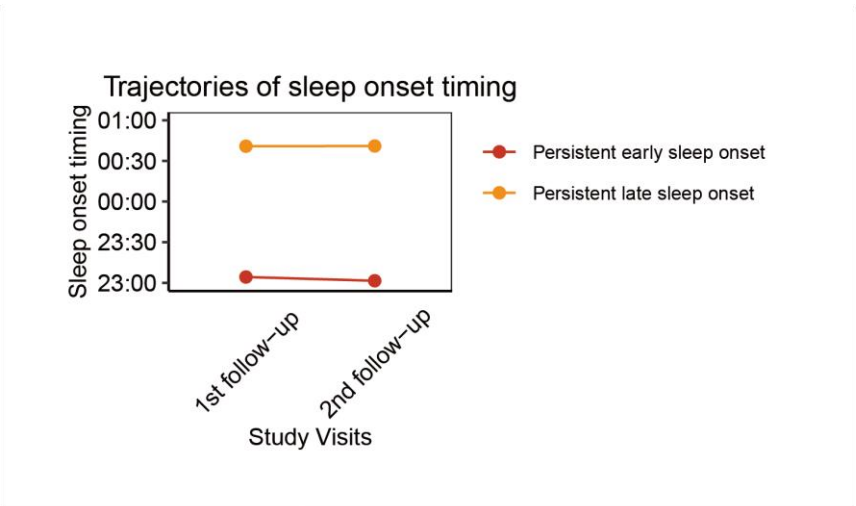


**eFigure 3. Association of the Sleep Duration Trajectories With CGM-Derived Glycemic Control**



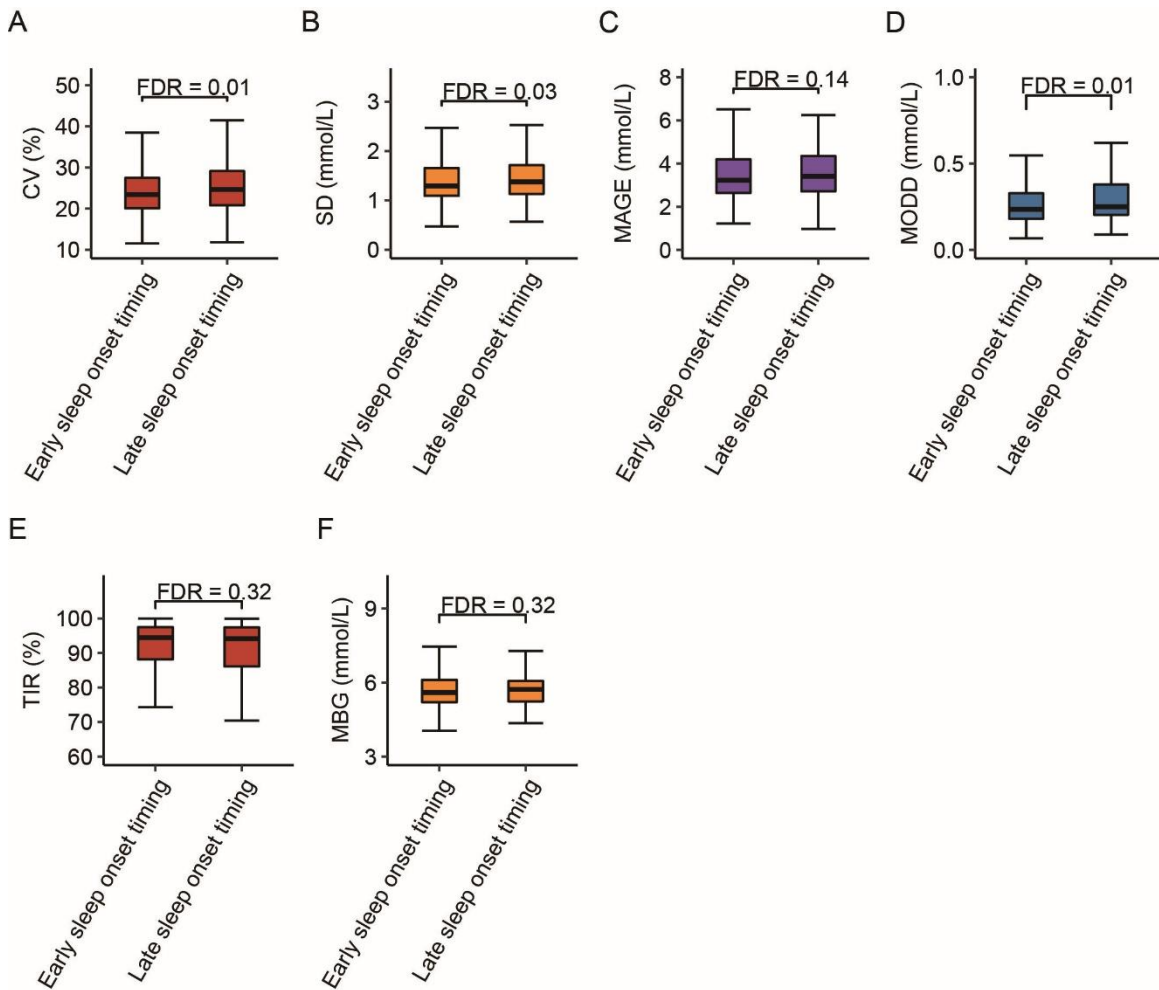
Association of long-term sleep duration patterns with glycemic variability, as qualified by TIR (**A**), MBG (**B**). Beta coefficients (95% CI) were derived from Huber robust regression models for sleep duration trajectories, severe inadequate sleep, moderate inadequate sleep, mild inadequate sleep vs. adequate sleep. Covariates included age, sex, BMI, total energy intake, physical activity, income, education, smoking, alcohol drinking, tea and coffee consumption. Multiple comparisons were controlled by false discovery rate (FDR < 0.05). The asterisks represent FDR<0.05. Abbreviations: CI, confidence interval; TIR, time in range; MBG, mean blood glucose.

**eFigure 4. Description of Sleep Onset Timing at First Follow-up, and Second Follow-up by Groups of Trajectories of Sleep Onset**



Sleep onset timing pattern	Sample size	Sleep duration, mean (standard deviation) (h)	
		1st follow-up	2nd follow-up
Persistent early sleep onset	878	23.07 (0.69)	23.02(0.72)
Persistent late sleep onset	231	24.68 (0.74)	24.68 (0.85)

**eFigure 5. Association of Sleep Onset Timing Trajectories With CGM-Derived Metrics in Model 2**



Box plots presents the median (interquartile range) of CV (A), SD (B), MAGE (C), MODD (D), TIR (E), MBG (F) for early sleep onset and late sleep onset group, respectively. Huber robust regression models were performed to examine the associations of sleep onset trajectories with CGM-derived measures (glycemic variability measures and mean-glucose measures), adjusting for covariates in model 2. False discovery rate (FDR) was applied to correct for multiple comparisons using the Benjamini-Hochberg method. Abbreviations: MBG, mean blood glucose; CV, coefficient of variation; SD,

standard deviation; MAGE, mean amplitude of glycemic excursions; MODD, mean of daily differences; TIR, time in range.