Supplementary Table 1. Means (SDs) of changes in BMI, physical activity, and AHEI-2010 score among each sleep trajectory compared to consistent 7h sleep duration

	Persistent 5h sleep duration	Persistent 6h sleep duration	Persistent 7h sleep duration	Persistent 8h sleep duration	Increased sleep duration	Decreased sleep duration	P*
2-years BMI change	-0.03 (2.51)	0.04 (2.16)	0.01 (1.86)	-0.04 (1.85)	-0.06 (2.09)	0.00 (1.98)	0.008
4-years BMI change	-0.02 (2.86)	0.12 (2.54)	0.11 (2.22)	0.04 (2.24)	0.03 (2.58)	0.13 (2.38)	0.009
6-years BMI change	0.02 (3.23)	0.26 (2.80)	0.25 (2.48)	0.19 (2.49)	0.14 (2.79)	0.29 (2.65)	0.001
Physical activity change (METs-hours/week)	4.68 (32.79)	3.88 (28.67)	4.22 (27.53)	3.74 (27.39)	4.15 (28.56)	3.99 (26.74)	0.35
AHEI-2010 change	3.01 (9.34)	3.22 (9.10)	3.40 (9.20)	3.31 (9.42)	3.30 (9.38)	3.22 (9.11)	0.58

*P value was calculated by ANOVA.

The 2-years BMI change was the change from baseline (2009) to 2011, the 4-years BMI change was from baseline to 2013, and the 6-years BMI change was from baseline to 2015. The physical activity change was 4-years change from baseline to 2013 and the AHEI-2010 change was 4-years change from 2007 to 2011, based on data availability.

SUPPLEMENTARY DATA

Supplementary Table 2. 2-year lag analyses on hazard ratios (95% CI) of type 2 diabetes according to trajectories of sleeping time

	Consistent sleep duration of 5h	Consistent sleep duration of 6h	Consistent sleep duration of 7h	Consistent sleep duration of 8h	Increased sleep duration from 6 to 7.5h	Decreased sleep duration from 8 to 6h
Cases/person-years	36/7,183	273/60,496	467/144,136	216/71,052	72/17,599	82/18,135
Age-adjusted	1.52 (1.08, 2.14)	1.39 (1.19, 1.61)	1.00	0.94 (0.80, 1.11)	1.32 (1.03, 1.70)	1.43 (1.13, 1.81)
MV1	1.20 (0.85, 1.70)	1.23 (1.05, 1.43)	1.00	0.95 (0.80, 1.11)	1.27 (0.99, 1.63)	1.23 (0.97, 1.56)
MV2	1.15 (0.81, 1.62)	1.22 (1.05, 1.42)	1.00	0.96 (0.82, 1.13)	1.19 (0.92, 1.53)	1.21 (0.95, 1.53)
MV3	1.00 (0.71, 1.41)	1.15 (0.99, 1.34)	1.00	1.02 (0.87, 1.20)	1.08 (0.84, 1.39)	1.17 (0.92, 1.48)

Hazard ratios were estimated from age stratified Cox proportional hazards model.
MV1 model was adjusted for race (non-white or white), family history of diabetes, menopausal status (pre or post-menopausal), postmenopausal hormone use (never, past, or current), smoking status (never, past, or current), alcohol intake (0, 0-<5, 5-<15, 15-<30, or ≥30 g/day), Alternate Healthy Eating Index dietary score (in quintiles), physical activity (<3, 3-<9, 9-<18, 18-<27, ≥27 MET-h/week), marital status (yes or no), parity (nulliparous, 1, 2, or ≥3), physical exam (yes or no), duration of rotating night shift work (year), and chronotype (morning type, evening type, neither type, or missing). All covariates, except race, family history, parity, and chronotype, were modeled as time-varying.
MV2 model was further adjusted for development of hypertension (yes or no), hypercholesterolemia (yes or no), depression (yes or no), and sleep apnea (yes or no).
MV3 model was further adjusted for updated body mass index (<20, 20-<25, 25-<30, 30-<35, 35-<40, ≥40).

Supplementary Table 3. Stratified analyses on hazard ratios (95% CI) of type 2 diabetes according to trajectories of sleeping time

	Consistent 5h	Consistent 6h	Consistent 7h	Consistent 8h	Increased	Decreased	P for interaction
Age < 60							
Cases/person-years	40/6,534	254/55,342	441/130,903	213/64,582	85/16,955	98/17,182	
MV	1.36 (0.98, 1.89)	1.18 (1.01, 1.38)	1.00	0.97 (0.82, 1.14)	1.44 (1.14, 1.82)	1.44 (1.16, 1.80)	
Age ≥ 60							0.59
Cases/person-years	26/3,515	154/28,934	284/69,025	128/33,838	34/7,586	40/8,042	
MV	1.51 (1.00, 2.27)	1.16 (0.95, 1.41)	1.00	0.95 (0.77, 1.18)	1.11 (0.77, 1.58)	1.09 (0.78, 1.52)	
BMI < 30							
Cases/person-years	12/6,493	111/59,410	237/152,097	98/76,250	37/17,112	41/17,808	
MV	0.92 (0.51, 1.66)	1.03 (0.82, 1.29)	1.00	0.84 (0.66, 1.06)	1.46 (1.03, 2.08)	1.20 (0.85, 1.68)	
BMI ≥ 30							0.18
Cases/person-years	54/3,556	297/24,866	488/47,831	243/22,169	82/7,429	97/7,416	
MV	1.34 (1.00, 1.79)	1.13 (0.98, 1.31)	1.00	1.08 (0.92, 1.26)	1.08 (0.85, 1.37)	1.23 (0.98, 1.53)	
Morning type							
Cases/person-years	32/5,500	200/47,802	407/127,191	190/62,370	59/15,016	64/14,077	
MV	1.47 (1.01, 2.12)	1.16 (0.98, 1.38)	1.00	0.96 (0.81, 1.15)	1.21 (0.92, 1.59)	1.26 (0.96, 1.64)	
Evening type							
Cases/person-years	31/3,817	180/31,253	285/62,637	134/30,723	54/8,307	66/9,764	0.93

MV	1.39 (0.95, 2.04)	1.12 (0.92, 1.36)	1.00	0.95 (0.77, 1.17)	1.41 (1.04, 1.89)	1.34 (1.02, 1.76)	
Neither							
Cases/person-years	2/667	26/4,735	31/9,367	15/4,957	5/1,135	8/1,268	
MV	0.56 (0.10, 3.07)	1.77 (0.97, 3.22)	1.00	0.91 (0.45, 1.84)	2.44 (0.82, 7.24)	1.35 (0.53, 3.44)	
Never had night shift							
Cases/person-years	11/1,693	76/19,642	190/60,469	100/34,442	18/5,168	48/7,617	
MV	1.63 (0.87, 3.03)	1.09 (0.83, 1.44)	1.00	0.94 (0.73, 1.20)	1.19 (0.73, 1.95)	1.80 (1.29, 2.49)	0.26
Ever had night shift							
Cases/person-years	55/8,356	332/64,633	535/139,460	241/63,978	101/19,373	90/17,607	
MV	1.44 (1.09, 1.91)	1.20 (1.04, 1.38)	1.00	0.99 (0.85, 1.15)	1.38 (1.11, 1.71)	1.15 (0.92, 1.44)	
Nulliparous							
Cases/person-years	21/2,133	68/14,390	133/32,523	94/20,542	21/4,617	36/5,073	
MV	1.73 (1.06, 2.82)	0.96 (0.71, 1.30)	1.00	1.14 (0.87, 1.50)	1.08 (0.67, 1.75)	1.52 (1.04, 2.24)	0.11
Parous							
Cases/person-years	45/7,916	340/69,885	592/167,405	247/77,878	98/19,924	102/20,151	
MV	1.32 (0.97, 1.79)	1.23 (1.07, 1.41)	1.00	0.90 (0.78, 1.05)	1.38 (1.11, 1.72)	1.28 (1.03, 1.58)	
Without Family history of diabetes							
Cases/person-years	26/6,325	189/54,437	329/133,545	168/66,212	55/16,040	54/16,390	
MV	1.29 (0.86, 1.95)	1.26 (1.05, 1.51)	1.00	1.02 (0.84, 1.23)	1.44 (1.08, 1.93)	1.18 (0.88, 1.58)	0.65
With Family history of diabetes							

Cases/person-years	40/3,724	219/29,839	396/66,384	173/32,208	64/8,501	84/8,833	
MV	1.46 (1.05, 2.04)	1.11 (0.94, 1.31)	1.00	0.90 (0.75, 1.08)	1.26 (0.96, 1.65)	1.40 (1.10, 1.78)	
Physical activity < median (16.9 METs-hours/week)							
Cases/person-years	42/4,684	256/41,846	494/99,417	229/50,366	68/11,540	87/13,050	
MV	1.41 (1.02, 1.95)	1.12 (0.96, 1.30)	1.00	0.93 (0.80, 1.09)	1.15 (0.89, 1.49)	1.21 (0.96, 1.52)	0.37
Physical activity ≥ median (16.9 METs-hours/week)							
Cases/person-years	24/5,365	152/42,429	231/100,511	112/48,053	51/13,001	51/12,174	
MV	1.35 (0.88, 2.07)	1.28 (1.04, 1.58)	1.00	0.99 (0.79, 1.25)	1.56 (1.14, 2.12)	1.58 (1.16, 2.16)	
AHEI-2010 < median (53.0)							
Cases/person-years	36/5,257	259/44,671	449/99,268	218/47,894	73/12,756	87/13,591	
MV	1.23 (0.87, 1.73)	1.18 (1.01, 1.38)	1.00	1.01 (0.86, 1.19)	1.31 (1.02, 1.68)	1.26 (1.00, 1.59)	0.55
AHEI-2010 ≥ median (53.0)							
Cases/person-years	30/4,792	149/39,605	276/100,661	123/50,526	46/11,786	51/11,633	
MV	1.72 (1.17, 2.54)	1.20 (0.97, 1.47)	1.00	0.89 (0.71, 1.10)	1.43 (1.04, 1.96)	1.40 (1.03, 1.89)	

Hazard ratios were estimated from age stratified Cox proportional hazards model.

MV model was adjusted for race (non-white or white), family history of diabetes, menopausal status (pre or post-menopausal), postmenopausal hormone use (current user or not), smoking status (never, past, or current), alcohol intake (0, 0-<5, 5-<15, or ≥15 g/day), Alternate Healthy Eating Index dietary score (in quintiles), physical activity (<3, 3-<9, 9-<18, 18-<27, ≥27 MET-h/week), marital status (yes or no), parity (nulliparous, 1, 2, or ≥3), and physical exam (yes or no), duration of rotating night shift work (year), and chronotype (morning type evening type, or neither), except the stratification factor.

The categorizations of postmenopausal hormone use and alcohol intake were changed due to the small numbers of cases.

For stratified analyses with chronotype, participants with missing chronotype data were excluded due to the small numbers of cases.

P for interactions were calculated by likelihood ratio tests comparing the models with and without interaction terms.

Supplementary Table 4. Hazard ratios (95% CI) of type 2 diabetes according to sleep duration in each age period

	≤ 5h	6h	7h	8h	≤ 9h
Age 20-25					
Cases/person-years	92/16,847	404/86,853	655/172,559	554/144,227	92/21,952
MV1	1.24 (1.00, 1.55)	1.16 (1.02, 1.31)	1.00	1.03 (0.92, 1.15)	1.01 (0.81, 1.26)
MV2	1.00 (0.80, 1.24)	1.03 (0.91, 1.17)	1.00	1.04 (0.93, 1.17)	1.02 (0.82, 1.27)
Age 26-35					
Cases/person-years	114/20,867	525/114,332	714/186,883	402/109,461	42/10,895
MV1	1.24 (1.02, 1.52)	1.14 (1.01, 1.27)	1.00	0.95 (0.84, 1.08)	0.94 (0.68, 1.28)
MV2	1.04 (0.85, 1.27)	1.04 (0.93, 1.17)	1.00	1.00 (0.88, 1.13)	0.98 (0.71, 1.34)
Age 36-45					
Cases/person-years	103/19,482	504/104,653	735/192,743	412/114,447	43/11,112
MV1	1.14 (0.92, 1.41)	1.15 (1.02, 1.29)	1.00	0.97 (0.86, 1.09)	0.96 (0.71, 1.31)
MV2	0.96 (0.78, 1.19)	1.08 (0.96, 1.21)	1.00	1.00 (0.89, 1.13)	0.96 (0.71, 1.32)
Age 46+					

Cases/person-years	143/21,682	482/98,870	670/179,187	424/124,938	78/17,762
MV1	1.41 (1.17, 1.69)	1.19 (1.05, 1.34)	1.00	0.97 (0.86, 1.09)	1.10 (0.87, 1.40)
MV2	1.24 (1.04, 1.50)	1.12 (1.00, 1.27)	1.00	0.98 (0.86, 1.11)	1.00 (0.78, 1.27)

Hazard ratios were estimated from age stratified Cox proportional hazards model.

MV1 model was adjusted for race (non-white or white), family history of diabetes, menopausal status (pre or post-menopausal), postmenopausal hormone use (never, past, or current), smoking status (never, past, or current), alcohol intake (0, 0-<5, 5-<15, 15-<30, or ≥30 g/day), Alternate Healthy Eating Index dietary score (in quintiles), physical activity (<3, 3-<9, 9-<18, 18-<27, ≥27 MET-h/week), marital status (yes or no), parity (nulliparous, 1, 2, or ≥3), physical exam (yes or no), duration of rotating night shift work (year), and chronotype (morning type, evening type, neither type, or missing). All covariates, except race, family history, parity, and chronotype, were modeled as time-varying.

MV2 model was further adjusted for development of hypertension (yes or no), hypercholesterolemia (yes or no), depression (yes or no), sleep apnea (yes or no), and updated body mass index (<20, 20-<25, 25-<30, 30-<35, 35-<40, ≥40).

Supplementary Figure 1. Sleeping duration trajectory group according to chronotype. P values were calculated from chi-square tests to compare whether the distribution of sleep duration trajectories differed by chronotype.