Online Supplemental Material

Online supplemental Table 1. Unadjusted and adjusted[1] mean (95% CI) of hours of weekday/workday duration of nighttime sleep reported by adult Americans, by categories of potential covariates, National Health and Nutrition Examination Surveys, 2005-2010

	All	
	Unadjusted N=15199	Adjusted N=14992
All	6.89 (6.85, 6.93)	6.88 (6.84, 6.92)
Gender		
Men (n=7601)	6.82 (6.78, 6.87)	6.83 (6.79, 6.88)
Women (n=7598)	6.95 (6.90, 7.01)	6.93 (6.88, 6.98)
P^2 value	--	0.004
Age, y		
20-39 (n=4950)	6.90 (6.84, 6.96)	6.89 (6.83, 6.95)
40-59 (n=5015)	6.76 (6.69, 6.82)	6.78 (6.71, 6.84)
60-69 (n=2458)	6.99 (6.91, 7.08)	6.99 (6.91, 7.08)
$\geq$70 (n=2776)	7.13 (7.11, 7.23)	7.11 (7.04, 7.17)
P value	---	<0.0001
Race/ethnicity		
Non-Hispanic white (n=7408)	6.96 (6.91, 7.01)	6.95 (6.90, 7.00)
Non-Hispanic black (n=3089)	6.45 (6.36-6.53)	6.50 (6.41, 6.59)
Mexican-American (n=2740)	6.99 (6.91-7.06)	6.99 (6.90, 7.07)
Other (n=1962)	6.77 (6.68, 6.86)	6.76 (6.67, 6.85)
P	---	<0.0001
Poverty income ratio		
$\leq$1.3 (n=4212)	6.79 (6.71, 6.88)	6.81 (6.72, 6.90)
>1.3-3.5 (n=5434)	6.88 (6.82, 6.93)	6.88 (6.83, 6.94)
>3.5 (n=4376)	6.96 (6.90, 7.01)	6.93 (6.88, 6.99)
Unknown (n=1177)	6.78 (6.68, 6.88)	6.76 (6.67, 6.85)
P value	---	<0.01
Level of education		
<12 y (n=4388)	6.88 (6.82, 6.95)	6.91 (6.84, 6.99)
12 y (n=3641)	6.82 (6.74, 6.89)	6.84 (6.76, 6.91)
Some college (n=4165)	6.80 (6.73, 6.86)	6.81 (6.74, 6.87)
College (n=2987)	7.06 (7.01, 7.12)	7.00 (6.94, 7.05)
P value	---	<0.0001
Employment		
Yes (n=8449)	6.81 (6.77, 6.86)	6.81 (6.76, 6.86)

No (n=6748)	7.02 (6.96, 7.08)	7.01 (6.94, 7.08)
P value	---	<0.0001
Smoking status		
Never smoked (n=7992)	6.96 (6.91, 7.02)	6.95 (6.89, 7.01)
Former smoker (n=3835)	6.93 (6.88, 6.98)	6.90 (6.85, 6.95)
Current smoker (n=3368)	6.67 (6.59, 6.75)	6.72 (6.64, 6.79)
P value	---	<0.0001
Alcohol drinking status		
Never drinker (n=1898)	7.00 (6.89, 7.10)	6.90 (6.80, 7.00)
Former drinker (n=2125)	6.80 (6.72, 6.89)	6.82 (6.73, 6.90)
Current drinker (n=10130)	6.89 (6.84, 6.94)	6.90 (6.85, 6.94)
Unknown (n=1046)	6.84 (6.71, 6.97)	6.83 (6.70, 6.97)
P value	---	0.3
Any current self-reported chronic disease?		
Yes (n=6935)	6.78 (6.73, 6.83)	6.74 (6.68, 6.79)
No (n=8264)	6.96 (6.91, 7.01)	6.98 (6.94, 7.03)
P value	---	<0.0001
Body mass index (kg/m^2)		
<25 (n=4327)	7.00 (6.94, 7.07)	6.96 (6.91, 7.02)
25-<30 (n=5141)	6.88 (6.83, 6.92)	6.86 (6.82, 6.91)
≥30 (n=5545)	6.78 (6.72, 6.84)	6.83 (6.77, 6.89)
P value	---	0.0005
Day of recalled intake		
Monday-Thursday (n=5795)	6.94 (6.88, 7.00)	6.92 (6.87, 6.98)
Friday-Sunday (n=9404)	6.82 (6.78, 6.86)	6.83 (6.78, 6.88)
P value	---	0.008
Month of MEC exam		
Nov. –April (n=6883)	6.90 (6.83, 6.97)	6.92 (6.85, 6.98)
May –Oct (n=8316)	6.88 (6.83, 6.93)	6.86 (6.81, 6.91)
P value		0.2

[1] Estimated from linear regression models with hours of sleep duration as a continuous dependent variable and all variables in the table as independent variables. Therefore, the values are mean hours of sleep duration associated with a covariate adjusted for all other covariates in the table.

[2] P-value of Wald F global test for differences in hours of sleep duration among categories of each covariate.

Online Supplemental Table 2. Adjusted percentage[1] (95% CI) of adult Americans reporting main meals and snacks in a 24-h recall by categories of weekday/workday duration of nighttime sleep, National Health and Nutrition Examination Surveys, 2007-2010

	Duration of sleep (hours)			P^2- value
	≤ 6	7-8	≥ 9	
Reported breakfast, %	83* (81, 84)	86 (84, 87)	82* (79, 85)	0.005
Reported lunch,[3] % (men, n=5369)	77 (75, 79)	78 (75, 81)	74 (67, 80)	0.3
Reported lunch,[3] % (women, n=5533)	77* (75, 79)	82 (79, 84)	77 (72, 82)	0.006
Reported dinner, %	92 (90, 93)	93 (92, 94)	93 (90, 95)	0.3
Reported all three main meals[4] in the recall, %	59* (57, 61)	64 (61, 67)	59* (54, 64)	0.004
Reported any snack[5] before breakfast, % (among breakfast reporters, n=8103)	15* (13, 16)	11 (10, 12)	12 (9, 16)	0.006
Reported any snack after dinner, % (among dinner reporters, n=8473)	67 (64, 71)	64 (62, 66)	61 (56, 67)	0.1
Reported ≥ 50% of 24-h energy from snacks, %	9.4* (8.4, 10.5)	6.9 (5.9, 8.0)	8.8 (6.6, 11.8)	0.01
Percentage with EI/BEE[6] ratio of ≥ 1.2	51 (48, 54)	54 (52, 56)	51 (45, 57)	0.06

[1]From logistic regression models with each dietary variable as a dichotomous outcome; independent variables included hours of sleep duration (≤ 6, 7-8, ≥ 9), gender (in models for all), race/ethnicity (non-Hispanic white, non-Hispanic Black, Mexican-American, Other), poverty income ratio (<1.3, 1.3-3.5, >3.5, unknown), years of education (<12, 12, some college, college), BMI (<25, 25-30, >30), smoking status (never, former, current smoker), alcohol use status (never, former, current drinker, unknown), day of recall (Monday-Thursday, Friday to Sunday), month of MEC exam (Nov. to April, May to Oct.), chronic disease (yes, no), and employed (yes, no), and physical activity as tertiles of met minutes/week. N=10,902 (except as noted).

[2] P-value of Wald F global test for differences among three categories of hours of sleep duration.

[3]Significant sleep by gender interaction ($P_{interaction}$ =0.01).

[4] Main meals included eating episodes that were named as breakfast, brunch, lunch, dinner, supper and their Spanish equivalents.

[5] Included all eating episodes that were not main meals as defined above.

[6]Ratio of reported energy intake to calculated energy requirement for basal needs.

*Significantly different from the reference category of 7-8 hours of sleep (P <0.05).

Online Supplemental Table 3. Adjusted mean[1] (95% CI) number of main meal and non-main meal episodes and their relative contribution to 24-hour energy intake reported by adult Americans by categories of weekday/workday duration of nighttime sleep, National Health and Nutrition Examination Surveys, 2007-2010

	Duration of sleep (hours)			P^2- value
	≤6	7-8	≥9	
Number of all eating episodes, *n*	4.99 (4.90, 5.08)	5.00 (4.92, 5.09)	4.76* (4.64, 4.88)	0.001
Number of main meal[3] episodes, *n*	2.74* (2.70, 2.78)	2.80 (2.77, 2.84)	2.72* (2.66, 2.78)	0.004
Percentage of 24-h energy from main meals	76.9* (76.2, 77.5)	78.5 (77.8, 79.1)	77.8 (76.1, 79.4)	0.003
Number of snack[4] episodes, *n*	2.25 (2.16, 2.34)	2.20 (2.13, 2.27)	2.04* (1.93, 2.15)	0.003
Percentage of 24-h energy from snack episodes	23.1* (22.5-23.7)	21.5 (20.9-22.2)	22.2 (20.6, 23.8)	0.003
Number of eating episodes reported after dinner by dinner reporters, *n* (n=5399)	1.41* (1.37, 1.46)	1.35 (1.32, 1.39)	1.37 (1.28, 1.47)	0.04
Percentage of 24-h energy from eating episodes reported after dinner by dinner reporters (n=5399)	15.5 (14.5, 16.4)	14.6 (14.1, 15.1)	15.0 (12.9, 17.1)	0.2
Percentage of 24-h energy reported ≥ 8 PM	16.3 (15.2, 17.4)	15.2 (14.3, 16.1)	15.9 (14.0, 17.7)	0.2

[1] From linear regression models with each dietary variable as a continuous outcome; independent variables included hours of sleep duration (≤6, 7-8, ≥9), gender (in models for all), race/ethnicity (non-Hispanic white, non-Hispanic Black, Mexican-American, Other), poverty income ratio (<1.3, 1.3-3.5, >3.5, unknown), years of education (<12, 12, some college, college), BMI (<25, 25-30, >30), smoking status (never, former, current smoker), alcohol use status (never, former, current drinker, unknown), day of recall (Monday-Thursday, Friday to Sunday), month of MEC exam (Nov. to April, May to Oct.), chronic disease (yes, no), and employed (yes, no), and physical activity as tertiles of met minutes/week. N for all =10,902, except as noted.

[2] P-value of Wald F global test for differences among three categories of hours of sleep duration.

[3] Main meals included eating episodes named by the respondent as breakfast, brunch, lunch, dinner, supper and their Spanish equivalents.

[4] All eating episodes that were not main meals (defined above) were considered snacks.

* Significantly different from the reference category of 7-8 hours of sleep (P <0.05)

Online Supplemental Table 4. Adjusted mean[1] intermeal intervals and clock time (95% CI) of meals reported by adult Americans in a 24-h recall by categories of weekday/workday duration of nighttime sleep, National Health and Nutrition Examination Surveys, 2007-2010

	Duration of sleep (hours)			P^2- value
	≤ 6	7-8	≥ 9	
Length of the eating period,[3] *h*	12.45* (12.27,12.64)	12.15 (12.02,12.28)	11.66* (11.39,11.93)	<0.0001
Average interval between eating episodes, *h*	2.64* (2.61,2.68)	2.57 (2.54,2.61)	2.58 (2.51,2.65)	0.006
Clock time of the first eating episode of the day, *HH:MM*	7:56* (7:45,8:06)	8:07 (7:57,8:16)	8:32* (8:16,8:49)	0.0006
Clock time of the last eating episode of the day, *HH:MM*	20:23* (20:17,20:29)	20:15 (20:10,20:21)	20:12 (20:02,20:22)	0.02
Clock time of breakfast, *HH:MM* (among breakfast reporters, n=9282)	8:03* (7:56,8:10)	8:10 (8:04,8:16)	8:30* (8:18,8:42)	0.001
Clock time of lunch, *HH:MM* (among lunch reporters, n=8005)	12:37 (12:30,12:44)	12:43 (12:37,12:49)	12:46 (12:36,12:55)	0.1
Clock time of dinner, *HH:MM* (among dinner reporters, n=9740)	18:17 (18:06,18:28)	18:22 (18:12,18:32)	18:22 (18:11,18:33)	0.4

[1] From linear regression models with each dietary variable as a continuous outcome; independent variables included hours of sleep duration (≤ 6, 7-8, ≥ 9), gender (in models for all), race/ethnicity (non-Hispanic white, non-Hispanic Black, Mexican-American, Other), poverty income ratio (<1.3, 1.3-3.5, >3.5, unknown), years of education (<12, 12, some college, college), BMI (<25, 25-30, >30), smoking status (never, former, current smoker), alcohol use status (never, former, current drinker, unknown), day of recall (Monday-Thursday, Friday to Sunday), month of MEC exam (Nov. to April, May to Oct.), chronic disease (yes, no), and employed (yes, no), and physical activity as tertiles of met minutes/week. N for all=10,992, except as noted.

[2] P-value of Wald F global test for differences among three categories of hours of sleep duration.

[3] Interval between the reported times of the first and the last eating episodes in the 24-h recall.

*Significantly different from the reference category of 7-8 hours of sleep (P <0.05)

Online Supplemental Table 5. Adjusted mean[1] (95% CI) of dietary energy and macronutrients reported by adult Americans by categories of weekday/workday duration of nighttime sleep, National Health and Nutrition Examination Surveys, 2007-2010

	Duration of sleep (hours)			P^2- value
	$\leq$6	7-8	$\geq$9	
Energy, *kcal*	2131 (2075,2187)	2127 (2089,2165)	2103 (1995,2211)	0.9
Percentage of 24-h energy from carbohydrate	50* (49,50)	49 (49,50)	48 (47,49)	0.03
Percentage of 24-h energy from protein	15.7 (15.4,15.9)	16.0 (15.7,16.2)	15.5* (15.1,15.9)	0.01
Percentage of 24-h energy from fat	33.0 (32.6,33.5)	33.2 (32.9,33.6)	33.6 (32.6,34.6)	0.4
Percentage of 24-h energy from beverages[3,4] (men, n=5369)	19.9 (18.9,20.8)	19.9 (19.1,20.7)	21.5 (18.9,24.0)	0.4
Percentage of 24-h energy from beverages[3,4] (women, n=5533)	19.1* (18.1,20.0)	16.8 (16.3,17.4)	18.1 (15.9,20.2)	0.0001
Total sugar, *g*	120* (116,124)	115 (112,119)	112 (106,118)	0.02
Dietary fiber, *g*	16.4 (15.7,17.2)	16.7 (16.2,17.2)	15.3* (14.3,16.3)	0.007
Alcohol, *g*	10.3 (8.7,12.0)	10.7 (9.6,11.8)	13.9 (10.6,17.1)	0.09
Caffeine, *mg*	199* (189,214)	180 (166,194)	149* (127,171)	0.0001
EI/BEE[5] ratio	1.32 (1.28,1.35)	1.32 (1.29,1.34)	1.29 (1.23,1.36)	0.8

[1]From linear regression models with each dietary variable as a continuous outcome; independent variables included hours of sleep duration ($\leq$6, 7-8, $\geq$9), gender (in models for all), race/ethnicity (non-Hispanic white, non-Hispanic Black, Mexican-American, Other), poverty income ratio (<1.3, 1.3-3.5, >3.5, unknown), years of education (<12, 12, some college, college), BMI (<25, 25-30, >30), smoking status (never, former, current smoker), alcohol use status (never, former, current drinker, unknown), day of recall (Monday-Thursday, Friday to Sunday), month of MEC exam (Nov. to April, May to Oct.), chronic disease (yes, no), and employed (yes, no), and physical activity as tertiles of met minutes/week. N=10,902 (except as noted).

[2]P-value of Wald F global test for differences among three categories of hours of sleep duration.

[3] Included all types of beverages: milk, caffeinated and non-caffeinated beverages, energy drinks, alcoholic drinks, fruit and vegetable juices and drinks. Excluded plain tap or bottled water.

[4]Significant sleep by gender interaction ($P_{interaction}$ =0.0001).

[5]Ratio of reported energy intake to calculated energy requirement for basal needs.

[*]Significantly different from the reference category of 7-8 hours of sleep (P <0.05).