

Supplementary Online Content

Cespedes Feliciano EM, Rifas-Shiman SL, Quante M, Redline S, Oken E, Taveras EM. Chronotype, social jet lag, and cardiometabolic risk factors in early adolescence. *JAMA Pediatr*. Published online September 16, 2019. doi:10.1001/jamapediatrics.2019.3089

eTable 1. Individual Questionnaire Items on the Adapted Morningness-Eveningness Scale: Descriptive Statistics by Sex

eTable 2. Weekly Sleep Patterns, Chronotype, and Social Jetlag

eTable 3. Sleep Characteristics by Chronotype and Sex

eTable 4. Associations of Sleep Characteristics with Overweight and Obesity by Sex

eFigure. Participants in Project Viva Analyses of Social Jetlag, Chronotype, and Cardiometabolic Health

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

eTable 1. Individual Questionnaire Items on the Adapted Morningness-Eveningness Scale: Descriptive Statistics by Sex			
	Overall	Girls	Boys
	n=804	n=418	n=386
	N (%)		
1. Imagine: School is canceled! You can get up whenever you want to. When would you get out of bed? Between...			
1. 5:00 and 6:30 am	23 (2.9)	3 (0.7)	20 (5.2)
2. 6:30 and 7:45 am	105 (13.1)	36 (8.6)	69 (17.9)
3. 7:45 and 9:45 am	362 (45.0)	194 (46.4)	168 (43.5)
4. 9:45 and 11:00 am	245 (30.5)	137 (32.8)	108 (28.0)
5. After 11:00 am	69 (8.6)	48 (11.5)	21 (5.4)
2. Is it easy for you to get up in the morning?			
1. No way!	122 (15.2)	63 (15.1)	59 (15.3)
2. Sort of	338 (42.0)	191 (45.7)	147 (38.1)
3. Pretty easy	292 (36.3)	143 (34.2)	149 (38.6)
4. It's a cinch	52 (6.5)	21 (5.0)	31 (8.0)
3. When do you have the most energy to do your favorite things?			
1. Morning! I'm tired in the evening	40 (5.0)	16 (3.8)	24 (6.2)
2. Morning more than evening	148 (18.4)	75 (17.9)	73 (18.9)
3. Evening more than morning	432 (53.7)	237 (56.7)	195 (50.5)
4. Evening! I'm tired in the morning	184 (22.9)	90 (21.5)	94 (24.4)
4. When does your body start to tell you it's time to go to bed (even if you ignore it)? Between...			
1. 8:00 and 9:00 pm	93 (11.6)	54 (12.9)	39 (10.1)
2. 9:00 and 10:15 pm	328 (40.8)	181 (43.3)	147 (38.1)
3. 10:15 pm and 12:30 am	310 (38.6)	150 (35.9)	160 (41.5)
4. 12:30 and 1:45 am	53 (6.6)	26 (6.2)	27 (7.0)
5. 1:45 and 3:00 am	20 (2.5)	7 (1.7)	13 (3.4)
5. Guess what? Your parents have decided to let you set your own bedtime. What time would you pick? Between...			
1. 8:00 and 9:00 pm	59 (7.3)	38 (9.1)	21 (5.4)
2. 9:00 and 10:15 pm	332 (41.3)	192 (45.9)	140 (36.3)
3. 10:15 pm and 12:30 am	328 (40.8)	150 (35.9)	178 (46.1)
4. 12:30 and 1:45 am	55 (6.8)	27 (6.5)	28 (7.3)
5. 1:45 and 3:00 am	30 (3.7)	11 (2.6)	19 (4.9)

eTable 2. Weekly Sleep Patterns, Chronotype, and Social Jetlag^{1,2,3}									
Sleep duration	Sleep onset	Sleep offset	Total	Female	Social Jetlag	Social Jetlag >2h	Strong Evening Preference	Intermediate Preference	Strong Morning Preference
			N (%)	N (%)	Median (IQR)	N (%)	N (%)	N (%)	N (%)
WE > WD	WE ≥WD	WD ≤ WE	388 (48.4)	222 (57.2)	1.3 (0.8-1.9)	79 (20.4)	95 (24.5)	207 (53.4)	86 (22.2)
WE < WD	WE ≥WD	WD ≤ WE	167 (20.8)	61 (36.5)	1.1 (0.6-1.7)	29 (17.4)	34 (20.4)	87 (52.1)	46 (27.5)
WE > WD	WE < WD	WD ≤ WE	124 (15.5)	71 (57.3)	0.4 (0.1-0.7)	1 (0.8)	27 (21.8)	65 (52.4)	32 (25.8)
WE < WD	WE ≥ WD	WD > WE	56 (7.0)	29 (51.8)	0.1 (-0.2-0.3)	1 (1.8)	13 (23.2)	30 (53.6)	13 (23.2)
WE < WD	WE < WD	WD > WE	27 (3.4)	15 (55.6)	-0.7 (-0.9--0.4)	0 (0.0)	8 (29.6)	13 (48.1)	6 (22.2)
WE > WD	WE < WD	WD > WE	26 (3.2)	13 (50.0)	-0.7 (-1.0--0.4)	0 (0.0)	6 (23.1)	17 (65.4)	3 (11.5)
WE > WD	WE ≥WD	WD > WE	7 (0.9)	3 (42.9)	-0.0 (-0.1-0.2)	0 (0.0)	5 (71.4)	2 (28.6)	0 (0.0)
WE < WD	WE < WD	WD ≤ WE	7 (0.9)	3 (42.9)	0.0 (-0.2-0.2)	0 (0.0)	2 (28.6)	4 (57.1)	1 (14.3)

WE: Weekend; WD: Weekday

¹ Social jetlag is computed as the difference in average sleep midpoint on weekend days minus the average sleep midpoint on weekdays in hours

² Morningness-Eveningness scales are derived from five questions regarding adolescents' preferences for when to get into bed and out of bed, what time of day they had the most energy and how easy it was to get up in the morning; here the extreme quintiles were categorized as strong evening and morning preferences, respectively, while the middle three quintiles were designated as intermediate preference

³ All cells represent row percentages other than column headings, which represent column percentages

eTable 3. Sleep Characteristics by Chronotype and Sex^{1,2}									
	Evening			Intermediate			Morning		
	Median	Inter-quartile range		Median	Inter-quartile range		Median	Inter-quartile range	
Girls									
Social jetlag, hours	1.1	0.4	1.9	0.9	0.4	1.5	0.8	0.3	1.5
Sleep duration, hours	7.2	6.8	7.8	7.5	7.1	7.8	7.8	7.2	8.1
Sleep midpoint on weekends, time	4:55	3:58	5:48	4:05	3:27	4:47	3:43	2:56	4:13
Sleep midpoint on weekdays, time	3:30	2:54	4:41	2:54	2:25	3:47	2:35	2:08	3:12
Sleep onset on weekends, time	2:39	0:32	23:04	22:30	1:28	23:12	22:33	21:43	23:14
Sleep onset on weekdays, time	22:27	1:35	23:13	22:28	21:49	23:06	22:02	21:32	22:33
Boys									
Social jetlag, hours	1.0	0.4	1.9	0.8	0.3	1.4	0.6	0.3	1.2
Sleep duration, hours	7.2	6.6	7.7	7.1	6.7	7.6	7.3	6.8	7.6
Sleep midpoint on weekends, time	4:29	3:54	5:29	3:55	3:20	4:52	3:15	2:42	3:56
Sleep midpoint on weekdays, time	3:26	2:45	4:27	2:59	2:24	3:49	2:32	1:57	3:07
Sleep onset on weekends, time	22:06	1:12	23:22	22:24	1:43	23:13	22:25	21:16	22:56
Sleep onset on weekdays, time	22:21	1:27	23:09	22:22	21:29	22:53	22:05	21:24	22:43

¹ Social jetlag is computed as the difference in average sleep midpoint on weekend days minus the average sleep midpoint on weekdays in hours

² Morningness-Eveningness scales are derived from five questions regarding adolescents' preferences for when to get into bed and out of bed, what time of day they had the most energy and how easy it was to get up in the morning; here the extreme quintiles were categorized as strong evening and morning preferences, respectively, while the middle three quintiles were designated as intermediate preference

eTable 4. Associations of Sleep Characteristics with Overweight and Obesity by Sex^{1,2,3}

	Girls			Boys		
BMI percentile category	Normal-weight <85th	Overweight 85th -<95th	Obese ≥95th	Normal-weight <85th	Overweight 85th -<95th	Obese ≥95th
	n=302	n=69	n=47	n=281	n=53	n=52
<i>Sleep characteristics</i>	Median (IQR)					
Actigraphy sleep duration, hours/day	7.6 (7.2-7.9)	7.4 (7.0-7.9)	7.1 (6.8-7.8)	7.3 (6.8-7.7)	7.0 (6.6-7.2)	7.0 (6.6-7.6)
Social Jetlag, hours	0.9 (0.3-1.6)	0.9 (0.4-1.5)	1.0 (0.6-2.0)	0.8 (0.3-1.4)	0.8 (0.3-1.4)	1.2 (0.4-1.8)
Chronotype preference	N (%)					
Evening	64 (21.2)	19 (27.5)	18 (38.3)	62 (22.1)	15 (28.3)	13 (25.0)
Intermediate	164 (54.3)	35 (50.7)	22 (46.8)	155 (55.2)	24 (45.3)	26 (50.0)
Morning	74 (24.5)	15 (21.7)	7 (14.9)	64 (22.8)	14 (26.4)	13 (25.0)
<i>Multivariable adjusted associations</i>	Odds Ratio (95% Confidence Interval)					
Per hour social jetlag	1.0 (ref)	1.01 (0.72, 1.40)	1.62 (1.02, 2.56)	1.0 (ref)	0.81 (0.56, 1.18)	1.24 (0.88, 1.73)
Evening preference	1.0 (ref)	1.01 (0.88, 1.16)	1.13 (0.95, 1.34)	1.0 (ref)	1.03 (0.89, 1.20)	1.09 (0.93, 1.27)

¹ Social jetlag is computed as the difference in average sleep midpoint on weekend days minus the average sleep midpoint on weekdays in hours

² Morningness-Eveningness scales are derived from five questions regarding adolescents' preferences for when to get into bed and out of bed, what time of day they had the most energy and how easy it was to get up in the morning; here the extreme quintiles were categorized as strong evening and morning preferences, respectively, while the middle three quintiles were designated as intermediate preference

³ Models adjust for adolescent age, race/ethnicity, pubertal status, season of measurement, parental socioeconomic status, actigraphy-measured sleep duration, parent-report of adolescent physical activity, and adolescent report of TV-viewing and indicators of diet quality (weekly consumption of sugary drinks and fast food)

eFigure. Participants in Project Viva Analyses of Social Jetlag, Chronotype, and Cardiometabolic Health

