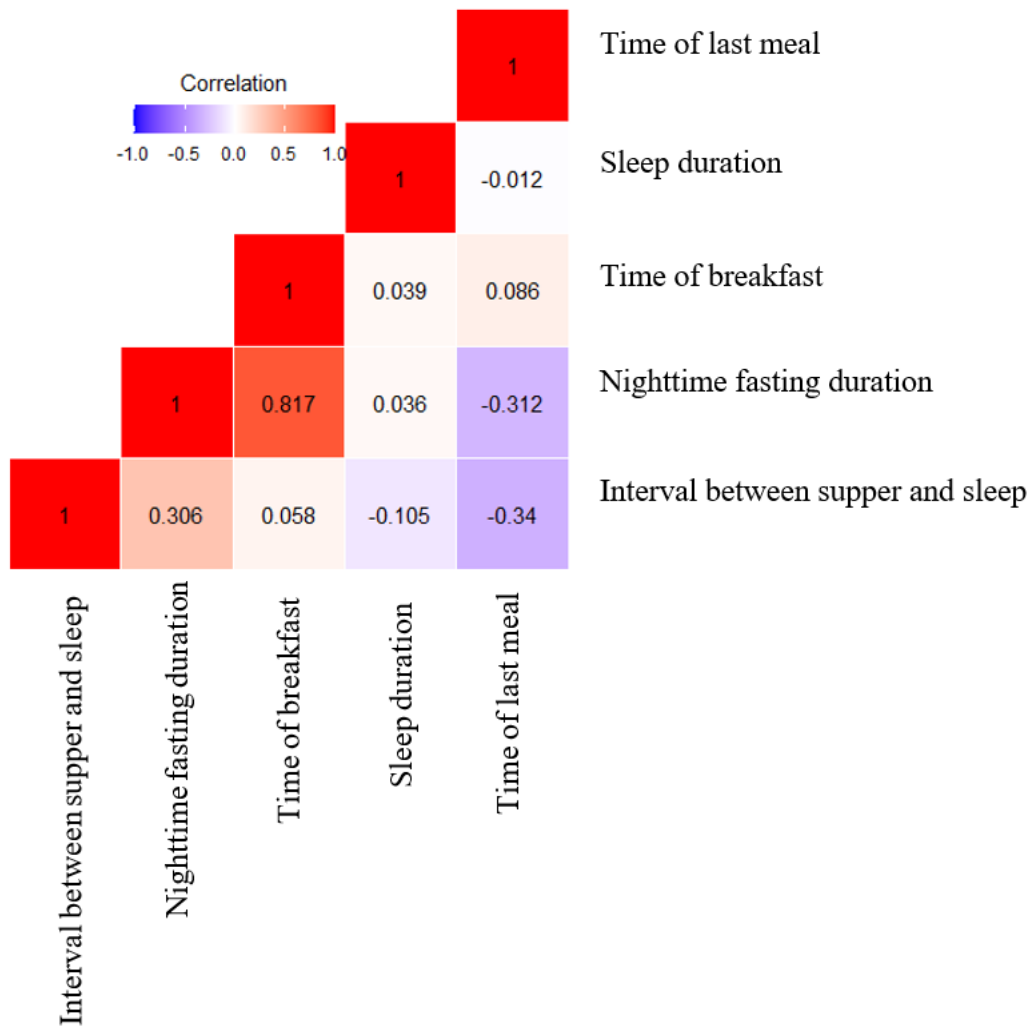


Supplementary Material

Supplementary figure 1. Heat map of correlations among circadian behaviors. Values in the figure correspond to Spearman's correlation coefficient.



Variable	Premenopausal women		Postmenopausal women	
	Controls (N = 386) Mean (SD) or N (%)	Cases (N = 436) Mean (SD) or N (%)	Controls (N = 940) Mean (SD) or N (%)	Cases (N = 745) Mean (SD) or N (%)
Age (years)	43.9 (5.9)	44.3 (6.3)	64.3 (9.2)	61.9 (8.7)
BMI (kg/m²)	24.2 (4.3)	24.0 (3.7)	26.3 (4.7)	27.1 (5.0)
Education				
Less than primary school	10 (2.6)	10 (2.3)	183 (19.5)	127 (17.0)
Primary school	66 (17.1)	92 (21.1)	346 (36.8)	311 (41.7)
Secondary school	163 (42.2)	198 (45.4)	275 (29.3)	209 (28.1)
University	147 (38.1)	136 (31.2)	136 (14.5)	98 (13.2)
Score socioeconomic				
Low	46 (11.9)	60 (13.8)	311 (34.6)	274 (36.8)
Medium	221 (57.3)	270 (61.9)	475 (52.8)	390 (52.3)
High	119 (30.8)	106 (24.3)	113 (12.6)	81 (10.9)
Family history of breast cancer				
Yes	21 (5.4)	63 (14.4)	103 (11.0)	112 (15.0)
No	365 (94.6)	373 (85.6)	837 (89.0)	633 (85.0)
Diabetes				
Yes	8 (2.1)	6 (1.4)	92 (9.8)	66 (8.9)
No	376 (97.9)	428 (98.6)	846 (90.2)	676 (91.1)
Age at menarche (years)	12.7 (1.4)	12.6 (1.5)	12.9 (1.6)	12.8 (1.6)
Number of children				
Nulliparous	97 (25.3)	110 (25.2)	139 (14.8)	133 (17.9)
1-2 children	251 (65.5)	287 (65.8)	494 (52.6)	407 (54.7)
3 children or more	35 (9.1)	39 (8.9)	307 (32.7)	204 (27.4)
Age at first child				
First child < 20 years old	22 (7.7)	20 (6.2)	30 (3.8)	26 (4.3)
First child 20 to 35 years old	220 (76.9)	257 (79.1)	737 (92.1)	554 (91.1)
Parous ≥35 years old	44 (15.4)	48 (14.8)	33 (4.1)	28 (4.6)
Breastfeeding				
Parous without breastfeeding	40 (14.0)	46 (14.5)	126 (15.8)	95 (16.1)
Parous breastfeeding for less than 6 months	92 (32.3)	101 (31.8)	202 (25.3)	168 (28.4)
Parous breastfeeding for 6 to 24 months	122 (42.8)	148 (46.5)	374 (46.9)	275 (46.5)
Parous breastfeeding for more than 24 months	31 (10.9)	23 (7.2)	95 (11.9)	53 (9.0)
Contraceptive use				
Never	111 (28.8)	153 (35.2)	537 (57.1)	450 (60.4)
Ever	274 (71.2)	282 (64.8)	403 (42.9)	295 (39.6)
Hormonal replacement therapy				
Never	NA	NA	793 (88.6)	638 (88.1)
Ever	NA	NA	102 (11.4)	86 (11.9)
Smoking				
Never smoker	162 (42.0)	177 (40.6)	616 (65.5)	485 (65.2)
Past smoker	108 (28.0)	155 (35.6)	184 (19.6)	156 (21.0)
Current smoker	116 (30.1)	104 (23.9)	140 (14.9)	103 (13.8)
Alcohol intake (g ethanol)	5.6 (8.7)	6.1 (10.8)	6.1 (10.5)	7.4 (13.7)
Daily caloric intake (Kcal)	1743.5 (554.7)	1913.9 (667.3)	1707.4 (530.2)	1771.9 (566.2)
Daily consumption of vegetables and fruits (g)	479.3 (252.1)	503.2 (293.4)	588.4 (262.9)	587.0 (300.1)
Physical activity^a				
Inactive	153 (39.6)	297 (45.2)	363 (38.7)	303 (40.7)
Poorly active	95 (24.6)	92 (21.1)	160 (17.0)	111 (14.9)
Moderately active	49 (12.7)	55 (12.6)	118 (12.6)	92 (12.3)
Very active	89 (23.1)	92 (21.1)	298 (31.7)	239 (32.1)
Chronotype				
Morning	134 (34.7)	154 (35.6)	374 (40.5)	272 (37.0)
Intermediate	166 (43.0)	172 (39.8)	362 (39.2)	292 (39.7)
Evening	86 (22.3)	106 (24.5)	187 (20.3)	172 (23.4)

Sleep duration (hours)	7.1 (1.2)	7.2 (1.0)	6.9 (1.3)	7.0 (1.4)
Breakfast				
Never	2 (0.5)	9 (2.1)	7 (0.8)	12 (1.6)
Only weekends	1 (0.3)	4 (0.9)	9 (1.0)	2 (0.3)
Only weekdays	6 (1.6)	7 (1.6)	14 (1.5)	17 (2.3)
Always	376 (97.7)	415 (95.4)	903 (96.8)	714 (95.8)
Time of breakfast	8.2 (1.3)	8.6 (1.6)	8.5 (1.4)	8.5 (1.3)
Nighttime fasting duration (hours)	10.6 (1.5)	11.0 (1.7)	11.2 (1.6)	11.2 (1.5)

^a Physical activity was classified according to the annual mean of METS h / week. Inactive = 0 METS h/week; Poorly active = 0.0001 to 8 METS h/week; Moderately active = 8.0001 to 16 METS h/week; Very active = More than 16.0001 METS h/week. BMI= Body mass index; N= Sample size; OR= odds ratio; SD=Standard deviation.

Supplementary table 2. Logistic regression models investigating the association between nighttime fasting and time of breakfast with breast cancer risk in a combined exposure variable.

ALL WOMEN			
	Controls N (%)	Cases N (%)	OR (95% CI)^a
Short nighttime fasting and late breakfast^b	176 (13.3)	191 (16.2)	<i>Ref</i>
Short nighttime fasting and early breakfast	603 (45.5)	483 (40.9)	0.78 (0.61 – 1.00)
Long nighttime fasting and late breakfast	467 (35.2)	441 (37.3)	0.97 (0.75 – 1.26)
Long nighttime fasting and early breakfast	80 (6.0)	66 (5.6)	0.72 (0.47 – 1.09)
PREMENOPAUSAL WOMEN			
	Controls N (%)	Cases N (%)	OR (95% CI)^a
Short nighttime fasting and late breakfast	56 (12.8)	75 (15.6)	<i>Ref</i>
Short nighttime fasting and early breakfast	213 (41.5)	189 (39.5)	0.66 (0.43 – 1.01)
Long nighttime fasting and late breakfast	99 (39.1)	154 (38.5)	1.03 (0.65 – 1.61)
Long nighttime fasting and early breakfast	18 (4.7)	18 (4.1)	0.68 (0.31 – 1.50)
POSTMENOPAUSAL WOMEN			
	Controls N (%)	Cases N (%)	OR (95% CI)^a
Short nighttime fasting and late breakfast	120 (12.8)	116 (15.6)	<i>Ref</i>
Short nighttime fasting and early breakfast	390 (41.5)	294 (39.5)	0.78 (0.57 – 1.08)
Long nighttime fasting and late breakfast	368 (39.1)	287 (38.5)	0.93 (0.67 – 1.28)
Long nighttime fasting and early breakfast	62 (6.6)	48 (6.4)	0.72 (0.43 – 1.19)

^a Adjusted for age, center, education, family history of breast cancer, menarche, number of children, BMI, contraceptive use, hormonal replacement therapy and menopausal status, breastfeeding and age at first child. ^b Nighttime fasting: short interval ≤ 11 hr.; long interval >11 hr. Time of breakfast: Early breakfast $\leq 8:00$ AM; Late breakfast $>8:00$ AM.

Supplementary table 3. Logistic regression models exploring further adjustment of the association between nighttime fasting and time of breakfast with breast cancer risk for other lifestyle factors. Complete case analysis including subjects with information on all covariates.

ALL WOMEN									
	Controls	(N=1107)	Cases	(N=993)	OR (95% CI)^a	OR (95% CI)^b	OR (95% CI)^c	OR (95% CI)^d	OR (95% CI)^e
	mean (SD)		mean (SD)						
Nighttime fasting (hours)	11.0 (1.6)		11.0 (1.6)		1.01 (0.92-1.11)	1.02 (0.93-1.12)	1.02 (0.92-1.12)	1.02 (0.93-1.12)	1.01 (0.92-1.11)
Time of breakfast	8.4 (1.4)		8.5 (1.4)		1.05 (0.94-1.17)	1.04 (0.93-1.16)	1.04 (0.93-1.16)	1.04 (0.93-1.16)	1.05 (0.94-1.17)
PREMENOPAUSAL WOMEN									
	Controls	(N=337)	Cases	(N=381)	OR (95% CI)^a	OR (95% CI)^b	OR (95% CI)^c	OR (95% CI)^d	OR (95% CI)^e
	mean (SD)		mean (SD)						
Nighttime fasting (hours)	10.6 (1.5)		10.9 (1.7)		0.98 (0.84-1.13)	0.98 (0.85-1.14)	0.98 (0.85-1.14)	0.98 (0.85-1.14)	0.97 (0.84-1.12)
Time of breakfast	8.2 (1.2)		8.5 (1.5)		1.19 (1.00-1.42)	1.19 (1.00-1.42)	1.18 (0.99-1.41)	1.17 (0.98-1.41)	1.21 (1.01-1.44)
POSTMENOPAUSAL WOMEN									
	Controls	(N=770)	Cases	(N=612)	OR (95% CI)^a	OR (95% CI)^b	OR (95% CI)^c	OR (95% CI)^d	OR (95% CI)^e
	mean (SD)		mean (SD)						
Nighttime fasting (hours)	11.2 (1.7)		11.2 (1.5)		1.04 (0.92-1.18)	1.05 (0.93-1.19)	1.05 (0.93-1.19)	1.05 (0.93-1.19)	1.05 (0.92-1.19)
Time of breakfast	8.5 (1.5)		8.5 (1.3)		0.97 (0.84-1.12)	0.96 (0.83-1.11)	0.96 (0.83-1.11)	0.96 (0.83-1.11)	0.97 (0.84-1.12)

^a Basic model. Adjusted for age, center, education, family history of breast cancer, menarche, number of children, BMI, contraceptive use, hormonal replacement therapy and menopausal status, breastfeeding and age at first child. Both exposures were mutually adjusted.

^b Basic model adjusted for daily alcohol intake.

^c Basic model adjusted for physical activity.

^d Basic model adjusted for daily caloric intake.

^e Basic model adjusted for daily consumption of fruits and vegetables.

N= Sample size; OR= odds ratio; SD= Standard deviation.

Supplementary table 4. Logistic regression models exploring further adjustment of the association between nighttime fasting and time of breakfast with breast cancer risk for potential breast cancer risk factors. Complete cases analysis including subjects with information on all covariates included in the models.

ALL WOMEN						
	Controls (N=1143) mean (SD)	Cases (N=1032) mean (SD)	OR (95% CI)^a	OR (95% CI)^b	OR (95% CI)^c	OR (95% CI)^d
Nighttime fasting (hours)	11.0 (1.6)	11.1 (1.6)	1.02 (0.93-1.12)	1.02 (0.93-1.12)	1.02 (0.93-1.11)	1.02 (0.93-1.12)
Time of breakfast	8.4 (1.4)	8.6 (1.4)	1.04 (0.94-1.16)	1.04 (0.94-1.16)	1.05 (0.95-1.17)	1.04 (0.94-1.16)
PREMENOPAUSAL WOMEN						
	Controls (N=380) mean (SD)	Cases (N=423) mean (SD)	OR (95% CI)^a	OR (95% CI)^b	OR (95% CI)^c	OR (95% CI)^d
Nighttime fasting (hours)	10.6 (1.5)	11.0 (1.8)	0.99 (0.86-1.14)	0.99 (0.86-1.14)	0.98 (0.85-1.13)	NA
Time of breakfast	8.2 (1.3)	8.6 (1.6)	1.18 (1.01-1.40)	1.18 (1.01-1.40)	1.21 (1.03-1.44)	NA
POSTMENOPAUSAL WOMEN						
	Controls (N=763) mean (SD)	Cases (N=609) mean (SD)	OR (95% CI)^a	OR (95% CI)^b	OR (95% CI)^c	OR (95% CI)^d
Nighttime fasting (hours)	11.2 (1.6)	11.2 (1.5)	1.06 (0.94-1.20)	1.06 (0.94-1.21)	1.06 (0.93-1.20)	1.06 (0.94-1.21)
Time of breakfast	8.5 (1.5)	8.5 (1.3)	0.96 (0.83-1.11)	0.96 (0.83-1.10)	0.97 (0.84-1.11)	0.96 (0.83-1.11)

^aBasic model. Adjusted for age, center, education, family history of breast cancer, menarche, number of children, BMI, contraceptive use, hormonal replacement therapy and menopausal status, breastfeeding and age at first child. Both exposures were mutually adjusted.

^bBasic model adjusted for score socioeconomic.

^cBasic model adjusted for smoking.

^dBasic model adjusted for age at menopause.

NA=Not applicable; N= Sample size; OR= odds ratio; SD= Standard deviation.

Supplementary table 5. Logistic regression models exploring further adjustment of the association between nighttime fasting and time of breakfast with breast cancer risk for other circadian behaviors. Complete cases analysis including subjects with information on all covariates included in the models.

ALL WOMEN								
	Controls (N=1128) mean (SD)	Cases (N=1072) mean (SD)	OR (95% CI)^a	OR (95% CI)^b	OR (95% CI)^c	OR (95% CI)^d	OR (95% CI)^e	OR (95% CI)^f
Nighttime fasting (hours)	11.0 (1.6)	11.1 (1.6)	1.02 (0.93-1.11)	1.05 (0.99-1.11)	1.03 (0.94-1.14)	1.02 (0.93-1.12)	1.01 (0.93-1.11)	1.02 (0.93-1.12)
Time of breakfast	8.4 (1.4)	8.5 (1.4)	1.05 (0.94-1.16)	1.06 (1.00-1.14)	1.04 (0.93-1.15)	1.04 (0.94-1.16)	1.05 (0.94-1.16)	1.04 (0.93-1.16)
PREMENOPAUSAL WOMEN								
	Controls (N=363) mean (SD)	Cases (N=407) mean (SD)	OR (95% CI)^a	OR (95% CI)^b	OR (95% CI)^c	OR (95% CI)^d	OR (95% CI)^e	OR (95% CI)^f
Nighttime fasting (hours)	10.6 (1.6)	10.9 (1.7)	0.98 (0.85-1.13)	1.09 (0.99-1.20)	0.99 (0.86-1.14)	0.98 (0.85-1.13)	0.97 (0.84-1.12)	0.97 (0.84-1.12)
Time of breakfast	8.2 (1.3)	8.6 (1.5)	1.18 (1.00-1.40)	1.16 (1.04-1.30)	1.19 (1.00-1.41)	1.17 (0.99-1.38)	1.19 (1.01-1.41)	1.18 (1.00-1.41)
POSTMENOPAUSAL WOMEN								
	Controls (N=775) mean (SD)	Cases (N=672) mean (SD)	OR (95% CI)^a	OR (95% CI)^b	OR (95% CI)^c	OR (95% CI)^d	OR (95% CI)^e	OR (95% CI)^f
Nighttime fasting (hours)	11.1 (1.6)	11.2 (1.5)	1.06 (0.94-1.19)	1.03 (0.96-1.11)	1.07 (0.95-1.22)	1.05 (0.93-1.19)	1.05 (0.93-1.19)	1.07 (0.94-1.21)
Time of breakfast	8.5 (1.4)	8.5 (1.3)	0.96 (0.83-1.10)	1.01 (0.93-1.10)	0.95 (0.82-1.09)	0.96 (0.84-1.10)	0.96 (0.93-1.10)	0.95 (0.83-1.10)

^a Basic model. Adjusted for age, center, education, family history of breast cancer, menarche, number of children, BMI, contraceptive use, hormonal replacement therapy and menopausal status, breastfeeding and age at first child. Both exposures were mutually adjusted.

^b Basic model adjusted for time of last meal. In this case, both exposures were not mutually adjusted to avoid over adjustment of circadian variables.

^c Basic model adjusted for interval between dinner and sleep.

^d Basic model adjusted for indoor ALAN.

^e Basic model adjusted for sleep duration.

^f Basic model adjusted for chronotype.

N= Sample size; OR= odds ratio; SD= Standard deviation.

Supplementary table 6. Logistic regression models of the association between nighttime fasting and time of breakfast with breast cancer risk using data corresponding to behaviors the year previous to the inclusion in the study.

ALL WOMEN			
	Controls (N=1266) mean (SD)	Cases (N=1130) mean (SD)	OR (95% CI)^a
Nighttime fasting (hours)	11.2 (1.5)	11.3 (1.7)	0.96 (0.89-1.04)
Time of breakfast	8.7 (1.2)	8.9 (1.4)	1.19 (1.08-1.31)
PREMENOPAUSAL WOMEN			
	Controls (N=381) mean (SD)	Cases (N=423) mean (SD)	OR (95% CI)^a
Nighttime fasting (hours)	10.6 (1.5)	11.0 (1.8)	1.01 (0.88-1.16)
Time of breakfast	8.3 (1.3)	8.7 (1.5)	1.21 (1.03-1.43)
POSTMENOPAUSAL WOMEN			
	Controls (N=885) mean (SD)	Cases (N=707) mean (SD)	OR (95% CI)^a
Nighttime fasting (hours)	11.5 (1.5)	11.5 (1.6)	0.95 (0.87-1.05)
Time of breakfast	8.9 (1.2)	9.0 (1.2)	1.18 (1.04-1.33)

^a Adjusted for age, center, education, family history of breast cancer, menarche, number of children, BMI, contraceptive use, hormonal replacement therapy and menopausal status, breastfeeding and age at first child. Both exposures were mutually adjusted.
N= Sample size; OR= odds ratio; SD= Standard deviation.