

SUPPLEMENTARY

Supplementary figure 1: Mutually exclusive weekly activity patterns. ¹ tertile 1 and ² tertiles 2 or 3 of average proportion of time spent in moderate-to-vigorous physical activity; ³ tertiles 1 or 2 and ⁴ tertile 3 of the ratio between average proportion of time spent in moderate-to-vigorous physical activity on weekend days and average proportion of time spent in moderate-to-vigorous physical activity on week days.

	Low physical activity ¹ <i>1st tertile of MVPA</i>	High physical activity ² <i>2nd & 3rd tertile of MVPA</i>
Physical activity mainly on week-ends ⁶ <i>3rd tertile of MVPA weekend/week</i>	Inactive	Weekend warrior
Physical activity throughout the week ⁵ <i>1st & 2nd tertile of MVPA weekend/week</i>	Inactive	Regularly active

Supplementary table 1: Additional analysis for the association between physical activity and sedentary behaviour status with sleep parameters. The CoLaus study, Switzerland, 2014-2017.

	Physical activity			Sedentary behaviour		
	Low	High	P-value	High	Low	P-value
Objective sleep duration (h) §	6.8 ± 0.06	6.7 ± 0.04	0.73	6.8 ± 0.06	6.7 ± 0.04	0.79
Objective sleep efficiency (%) §	70.4 ± 0.60	73.0 ± 0.42	<0.01	70.1 ± 0.59	73.2 ± 0.42	<0.01
Excessive daytime sleepiness †	1 (ref)	0.91 (0.67; 1.25)	0.57	1 (ref)	1.07 (0.78; 1.46)	0.68

Multivariable analysis including all participants irrespective of objective sleep duration and efficiency, and of missing items in daytime sleepiness questionnaire. For continuous variables (§), statistical analyses were performed using ANOVA and results were expressed as multivariable-adjusted average ± standard error. For categorical variables (†), statistical analyses were performed using logistic regression and results were expressed as multivariable-adjusted odds-ratio and (95% confidence interval). All multivariable models were adjusted for age (continuous), gender (male/female), self-rated health (very good/good/average or bad), alcohol consumption (low/high), psychotropic medication (no/yes) and professional occupation (no/yes).

Supplementary table 2: Multivariable association of physical activity and sedentary behaviour status with sleep parameters, with a further adjustment for body mass index. The CoLaus study, Switzerland, 2014-2017.

	Physical activity			Sedentary behaviour		
	Low	High	P-value	High	Low	P-value
Objective sleep duration (h) §	7.1 ± 0.03	7.1 ± 0.02	0.43	7.1 ± 0.03	7.0 ± 0.02	0.20
Objective sleep efficiency (%) §	74.0 ± 0.29	76.5 ± 0.20	<0.01	73.8 ± 0.29	76.6 ± 0.20	<0.01
Self-reported sleep duration (h) §	6.9 ± 0.05	7.0 ± 0.03	0.50	6.9 ± 0.05	7.0 ± 0.03	0.34
Short sleep †	1 (ref)	0.92 (0.71; 1.18)	0.49	1 (ref)	0.89 (0.70; 1.14)	0.37
Poor sleep quality †	1 (ref)	1.06 (0.83; 1.36)	0.64	1 (ref)	1.02 (0.80; 1.31)	0.86
Excessive daytime sleepiness †	1 (ref)	0.99 (0.71; 1.37)	0.95	1 (ref)	1.23 (0.88; 1.70)	0.22
Increased risk of sleep apnea †	1 (ref)	0.93 (0.72; 1.20)	0.60	1 (ref)	0.99 (0.77; 1.27)	0.91
Insomnia †	1 (ref)	1.55 (0.97; 2.48)	0.07	1 (ref)	1.46 (0.92; 2.31)	0.11
Chronotype						
Morning	1 (ref)	1.06 (0.77; 1.46)	0.72	1 (ref)	1.17 (0.86; 1.61)	0.32
Evening	1 (ref)	0.71 (0.52; 0.98)	0.04	1 (ref)	0.64 (0.47; 0.87)	<0.01

For continuous variables (§), statistical analyses were performed using ANOVA and results were expressed as multivariable-adjusted average ± standard error. For dichotomous categorical variables (†), statistical analyses were performed using logistic regression and results were expressed as multivariable-adjusted odds-ratio and (95% confidence interval). For chronotype, statistical analyses were performed using multinomial logistic regression comparing the ‘Morning’ and ‘Evening’ groups to the ‘Intermediate’ one and results were expressed as multivariable-adjusted relative-risk ratio and (95% confidence interval). All multivariable models were adjusted for age (continuous), gender (male/female), self-rated health (very good/good/average or bad), body mass index (continuous), alcohol consumption (low/high), psychotropic medication (no/yes) and professional occupation (no/yes).

Supplementary table 3: Association of physical activity and sedentary behaviour status with sleep parameters, with a further adjustment for diabetes. The CoLaus study, Switzerland, 2014-2017.

	Physical activity			Sedentary behaviour		
	Low	High	P-value	High	Low	P-value
Objective sleep duration (h) §	7.1 ± 0.03	7.1 ± 0.02	0.68	7.1 ± 0.03	7.1 ± 0.02	0.45
Objective sleep efficiency (%) §	73.9 ± 0.29	76.5 ± 0.20	<0.01	73.7 ± 0.28	76.7 ± 0.20	<0.01
Self-reported sleep duration (h) §	6.9 ± 0.05	7.0 ± 0.03	0.48	6.9 ± 0.05	7.0 ± 0.03	0.35
Short sleep †	1 (ref)	0.89 (0.70; 1.14)	0.37	1 (ref)	0.88 (0.69; 1.12)	0.29
Poor sleep quality †	1 (ref)	1.07 (0.83; 1.37)	0.60	1 (ref)	1.04 (0.82; 1.33)	0.74
Excessive daytime sleepiness †	1 (ref)	0.97 (0.70; 1.34)	0.84	1 (ref)	1.17 (0.85; 1.62)	0.34
Increased risk of sleep apnea †	1 (ref)	0.75 (0.59; 0.95)	0.02	1 (ref)	0.74 (0.59; 0.94)	0.01
Insomnia †	1 (ref)	1.61 (1.00; 2.58)	0.05	1 (ref)	1.51 (0.95; 2.39)	0.08
Chronotype						
Morning	1 (ref)	1.08 (0.78; 1.47)	0.65	1 (ref)	1.18 (0.86; 1.62)	0.29
Evening	1 (ref)	0.71 (0.52; 0.97)	0.03	1 (ref)	0.64 (0.47; 0.87)	<0.01

For continuous variables (§), statistical analyses were performed using ANOVA and results were expressed as multivariable-adjusted average ± standard error. For dichotomous categorical variables (†), statistical analyses were performed using logistic regression and results were expressed as multivariable-adjusted odds-ratio and (95% confidence interval). For chronotype, statistical analyses were performed using multinomial logistic regression comparing the ‘Morning’ and ‘Evening’ groups to the ‘Intermediate’ one and results were expressed as multivariable-adjusted relative-risk ratio and (95% confidence interval). All multivariable models were adjusted for age (continuous), gender (male/female), self-rated health (very good/good/average or bad), diabetes (no/yes), alcohol consumption (low/high), psychotropic medication (no/yes) and professional occupation (no/yes).

Supplementary table 4: Multivariable association of physical activity and sedentary behaviour status with sleep parameters, with a further adjustment for depression risk. The CoLaus study, Switzerland, 2014-2017.

	Physical activity			Sedentary behaviour		
	Low	High	P-value	High	Low	P-value
Objective sleep duration (h) §	7.1 ± 0.04	7.1 ± 0.03	0.78	7.1 ± 0.04	7.1 ± 0.03	0.83
Objective sleep efficiency (%) §	73.8 ± 0.31	76.6 ± 0.21	<0.01	73.6 ± 0.30	76.7 ± 0.21	<0.01
Self-reported sleep duration (h) §	6.9 ± 0.05	7.0 ± 0.03	0.48	6.9 ± 0.05	7.0 ± 0.03	0.30
Short sleep †	1 (ref)	0.89 (0.69; 1.14)	0.36	1 (ref)	0.86 (0.68; 1.10)	0.24
Poor sleep quality †	1 (ref)	1.06 (0.82; 1.37)	0.67	1 (ref)	1.00 (0.78; 1.29)	0.99
Excessive daytime sleepiness †	1 (ref)	0.93 (0.67; 1.29)	0.65	1 (ref)	1.15 (0.82; 1.60)	0.42
Increased risk of sleep apnea †	1 (ref)	0.74 (0.58; 0.95)	0.02	1 (ref)	0.74 (0.59; 0.94)	0.02
Insomnia †	1 (ref)	1.62 (0.99; 2.65)	0.06	1 (ref)	1.61 (0.99; 2.62)	0.06
Chronotype						
Morning	1 (ref)	1.07 (0.77; 1.48)	0.68	1 (ref)	1.20 (0.88; 1.65)	0.25
Evening	1 (ref)	0.74 (0.54; 1.01)	0.06	1 (ref)	0.66 (0.49; 0.91)	0.01

For continuous variables (§), statistical analyses were performed using ANOVA and results were expressed as multivariable-adjusted average ± standard error. For dichotomous categorical variables (†), statistical analyses were performed using logistic regression and results were expressed as multivariable-adjusted odds-ratio and (95% confidence interval). For chronotype, statistical analyses were performed using multinomial logistic regression comparing the ‘Morning’ and ‘Evening’ groups to the ‘Intermediate’ one and results were expressed as multivariable-adjusted relative-risk ratio and (95% confidence interval). All multivariable models were adjusted for age (continuous), gender (male/female), self-rated health (very good/good/average or bad), increased depression risk (no/yes), alcohol consumption (low/high), psychotropic medication (no/yes) and professional occupation (no/yes).

Supplementary table 5: Multivariate analysis of the effect of a 10%-increment in the proportion of time spent in physical activity and sedentary behaviour on sleep parameters. The CoLaus study, Switzerland, 2014-2017.

	Physical activity	P-value	Sedentary behaviour	P-value
Objective sleep duration (h) §	-0.01 (-0.05; 0.04)	0.81	0.03 (-0.01; 0.07)	0.14
Objective sleep efficiency (%) §	1.95 (1.58; 2.33)	<0.01	-1.75 (-2.06; -1.44)	<0.01
Self-reported sleep duration (h) §	0.01 (-0.05; 0.08)	0.70	-0.00 (-0.06; 0.05)	0.86
Short sleep †	0.93 (0.80; 1.07)	0.30	1.05 (0.93; 1.18)	0.40
Poor sleep quality †	0.93 (0.81; 1.08)	0.33	1.07 (0.95; 1.20)	0.27
Excessive daytime sleepiness †	1.14 (0.96; 1.36)	0.14	0.87 (0.76; 1.01)	0.07
Increased risk of sleep apnea †	0.77 (0.67; 0.89)	<0.01	1.20 (1.07; 1.35)	<0.01
Insomnia †	1.07 (0.84; 1.35)	0.60	0.94 (0.77; 1.14)	0.51
Chronotype				
Morning	1.08 (0.92; 1.27)	0.36	0.90 (0.78; 1.03)	0.13
Evening	0.78 (0.66; 0.92)	<0.01	1.19 (1.04; 1.37)	0.01

For continuous variables (§), statistical analyses were performed using linear regression and results were expressed as multivariable-adjusted coefficient and (95% confidence interval). For dichotomous categorical variables (†), statistical analyses were performed using logistic regression and results were expressed as multivariable-adjusted odds-ratio and (95% confidence interval). For chronotype, statistical analyses were performed using multinomial logistic regression comparing the ‘Morning’ and ‘Evening’ groups to the ‘Intermediate’ one and results were expressed as multivariable-adjusted relative-risk ratio and (95% confidence interval). All multivariable models were adjusted for age (continuous), gender (male/female), self-rated health (very good/good/average or bad), alcohol consumption (low/high), psychotropic medication (no/yes) and professional occupation (no/yes).

Supplementary table 6: Multivariate analysis of the effect of a 10h-increment in weekly hours of physical activity on sleep parameters. The CoLaus study, Switzerland, 2014-2017.

	Weekly physical activity	P-value
Objective sleep duration (h) §	-0.04 (-0.08; -0.00)	0.05
Objective sleep efficiency (%) §	1.62 (1.28; 1.95)	<0.01
Self-reported sleep duration (h) §	-0.00 (-0.06; 0.06)	0.98
Short sleep †	0.95 (0.83; 1.08)	0.41
Poor sleep quality †	0.94 (0.82; 1.07)	0.36
Excessive daytime sleepiness †	1.15 (0.98; 1.34)	0.08
Increased risk of sleep apnea †	0.81 (0.71; 0.93)	<0.01
Insomnia †	1.05 (0.84; 1.30)	0.69
Chronotype		
Morning	1.08 (0.93; 1.25)	0.34
Evening	0.80 (0.68; 0.93)	<0.01

For continuous variables (§), statistical analyses were performed using linear regression and results were expressed as multivariable-adjusted coefficient and (95% confidence interval). For dichotomous categorical variables (†), statistical analyses were performed using logistic regression and results were expressed as multivariable-adjusted odds-ratio and (95% confidence interval). For chronotype, statistical analyses were performed using multinomial logistic regression comparing the ‘Morning’ and ‘Evening’ groups to the ‘Intermediate’ one and results were expressed as multivariable-adjusted relative-risk ratio and (95% confidence interval). All multivariable models were adjusted for age (continuous), gender (male/female), self-rated health (very good/good/average or bad), alcohol consumption (low/high), psychotropic medication (no/yes), professional occupation (no/yes), and diurnal wearing time (continuous).

Supplementary table 7: Additional analysis for the association between weekly activity patterns and sleep parameters. The CoLaus study, Switzerland, 2014-2017.

	Inactive	Weekend warrior	Regularly active	P-value
Objective sleep duration (h) §	6.8 ± 0.06	6.8 ± 0.07	6.7 ± 0.05	0.66
Objective sleep efficiency (%) §	70.4 ± 0.60 ^a	73.2 ± 0.71 ^b	72.9 ± 0.51 ^b	<0.01
Excessive daytime sleepiness †	1 (ref)	1.13 (0.78; 1.63)	0.80 (0.57; 1.13)	

Multivariable analysis including all participants irrespective of objective sleep duration and efficiency, and of missing items in daytime sleepiness questionnaire. For continuous variables (§), statistical analyses were performed using ANOVA and results were expressed as multivariable-adjusted average ± standard error. For dichotomous categorical variables (†), statistical analyses were performed using logistic regression and results were expressed as multivariable-adjusted odds-ratio and (95% confidence interval). All multivariable models were adjusted for age (continuous), gender (male/female), self-rated health (very good/good/average or bad), alcohol consumption (low/high), psychotropic medication (no/yes) and professional occupation (no/yes). Post-hoc pairwise comparisons of averages were performed using the method of Scheffe; values with differing superscripts differ at p<0.05.

Supplementary table 8: Association of weekly activity patterns with sleep parameters, with a further adjustment for body mass index. The CoLaus study, Switzerland, 2014-2017.

	Inactive	Weekend warrior	Regularly active
Objective sleep duration (h) §	6.9 ± 0.05	7.0 ± 0.05	7.0 ± 0.04
Objective sleep efficiency (%) §	7.1 ± 0.03	7.1 ± 0.04	7.1 ± 0.03
Self-reported sleep duration (h) §	74.1 ± 0.29 ^a	76.2 ± 0.34 ^b	76.6 ± 0.24 ^b
Short sleep †	1 (ref)	0.87 (0.64; 1.20)	0.94 (0.72; 1.22)
Poor sleep quality †	1 (ref)	1.04 (0.76; 1.43)	1.07 (0.82; 1.40)
Excessive daytime sleepiness †	1 (ref)	1.26 (0.85; 1.86)	0.86 (0.60; 1.23)
Increased risk of sleep apnea †	1 (ref)	0.87 (0.62; 1.22)	0.96 (0.74; 1.26)
Insomnia †	1 (ref)	1.46 (0.81; 2.64)	1.58 (0.97; 2.59)
Chronotype			
Morning	1 (ref)	0.97 (0.66; 1.44)	1.11 (0.79; 1.55)
Evening	1 (ref)	0.64 (0.43; 0.94) *	0.75 (0.54; 1.05)

For continuous variables (§), statistical analyses were performed using linear regression and results were expressed as multivariable-adjusted coefficient and (95% confidence interval). For dichotomous categorical variables (†), statistical analyses were performed using logistic regression and results were expressed as multivariable-adjusted odds-ratio and (95% confidence interval). For chronotype, statistical analyses were performed using multinomial logistic regression comparing the ‘Morning’ and ‘Evening’ groups to the ‘Intermediate’ one and results were expressed as multivariable-adjusted relative-risk ratio and (95% confidence interval). All multivariable models were adjusted for age (continuous), gender (male/female), self-rated health (very good/good/average or bad), body mass index (continuous), alcohol consumption (low/high), psychotropic medication (no/yes) and professional occupation (no/yes). Post-hoc pairwise comparisons of averages were performed using the method of Scheffe; values with differing superscripts differ at $p < 0.05$. Significant ($p < 0.05$) odds ratios or relative-risk ratios are indicated with *.

Supplementary table 9: Multivariate analysis of the effect of a 10%-increment in standard deviation of daily proportion of time spent in physical activity on sleep parameters. The CoLaus study, Switzerland, 2014-2017.

	Standard deviation of daily PA	P-value
Objective sleep duration (h) §	0.14 (-0.04; 0.32)	0.13
Objective sleep efficiency (%) §	0.61 (-0.87; 2.09)	0.42
Self-reported sleep duration (h) §	-0.07 (-0.31; 0.17)	0.57
Short sleep †	1.00 (0.58; 1.72)	0.99
Poor sleep quality †	1.02 (0.59; 1.77)	0.93
Excessive daytime sleepiness †	1.22 (0.66; 2.26)	0.52
Increased risk of sleep apnea †	0.94 (0.55; 1.60)	0.82
Insomnia †	2.15 (0.92; 5.04)	0.08
Chronotype		
Morning	0.87 (0.47; 1.63)	0.67
Evening	1.25 (0.67; 2.35)	0.48

PA, physical activity. For continuous variables (§), statistical analyses were performed using linear regression and results were expressed as multivariable-adjusted coefficient and (95% confidence interval). For dichotomous categorical variables (†), statistical analyses were performed using logistic regression and results were expressed as multivariable-adjusted odds-ratio and (95% confidence interval). For chronotype, statistical analyses were performed using multinomial logistic regression comparing the ‘Morning’ and ‘Evening’ groups to the ‘Intermediate’ one and results were expressed as multivariable-adjusted relative-risk ratio and (95% confidence interval). All multivariable models were adjusted for age (continuous), gender (male/female), self-rated health (very good/good/average or bad), alcohol consumption (low/high), psychotropic medication (no/yes) professional occupation (no/yes), and average proportion of time spent in PA (continuous).

Supplementary table 10: Distribution of age groups in included participants and in the Lausanne population, stratified by gender.

Age (years)	Included participants		Lausanne population ¹	
	Male	Female	Male	Female
45-54	28.2	33.3	40.0	35.1
55-64	32.9	33.0	29.2	26.9
65-74	28.0	23.3	19.3	22.1
78-84	11.0	10.4	11.5	15.9

Proportions expressed as percentage. ¹Data from Statistical Office of Canton Vaud (<http://www.scris.vd.ch/>).