Online Supplement

Physical activity as a moderator for OSA and cardiometabolic risk in EPISONO study

Marcos Mônico-Neto[1], Hanna Karen Moreira Antunes[1,2], Ronaldo Vagner Thomatieli dos Santos[1,2], Vânia D'Almeida[1], Altay Alves Lino de Souza[1], Lia Rita Azeredo Bittencourt[1], Sergio Tufik[1]

[1] Department of Psychobiology, Universidade Federal de São Paulo, Sao Paulo, Brazil

[2] Department of Bioscience, Universidade Federal de São Paulo, Santos, Brazil

***Take Home*:**
Physical activity reduces OSA incidence and protects against cardiometabolic diseases.

Table S1. Sample description at baseline and follow up.

	Groups									
	Total sample		**Non-OSA**		**Mild OSA**		**Moderate OSA**		**Severe OSA**	
	Baseline (n=992)	**Follow-up** (n=658)	**Baseline** (n=619)	**Follow-up** (n=211)	**Baseline** (n=211)	**Follow-up** (n=201)	**Baseline** (n=101)	**Follow-up** (n=123)	**Baseline** (n=61)	**Follow-up** (n=123)
Age (years)	42±13	50±13	34±0.6	42±0.7	41±0.8	49±0.8	47±1.2	55±1.1	50±1.3	58±1.2
BMI (kg/m^2)	28.1±0.28	29.3±0.29	24.6±0.3	26.2±0.3*	28.8±0.9	28.5±0.8	30.6±0.7	30.6±0.8	32±1.3	33.6±1.1
Sex (men/women)#	440/552†	291/367†	230/389†	61/150†	108/103	91/110	65/36†	69/54	37/24	70/53†
Waist circumference (cm)	91.5±08	100.9±0.9*	78.3±0.7	90.3±0.8*	91.2±2.3	99.2±2*	98.5±1.8	103.7±1.6	96.3±4.2	108.6±2.5
Sleep parameters										
Total sleep time (min.)	334±8	336±5	363±5	371±5	349±11	368±15	360±16	337±14	336±10	318±13
Sleep latency (min.)	17±1.1	15.9±1.3	13.4±1.1	16.1±1.7	17±2.9	11.8±2.2	19.4±5.4	32±5.4	23±1.7	27.3±3.6
Sleep efficiency (%)	79.9±1.2	77.6±0.8*	85.8±0.8	83.5±0.7	81.4±1.8	80.9±1.9	81.9±2.6	77.4±3.1	79.2±1.8	73.2±2.7
REM sleep latency (min.)	109.4±3.9	103.2±4.4	92.1±2.8	88.8±3.1	103.7±9.5	114.3±11.6	116.6±17.7	98.4±17	112.9±11.6	123±12.3
Apnea/hypopnea index (n/h)	14.5±0.4	17.2±0.7*	1.8±0.07	2.3±0.09*	8.1±0.3 [a]	9.7± 0.4	19±0.6	22.1± 0.9	47.9±2.3	53.4±3.1
Stage N1 of Sleep (%)	5.01±0.2	16.2±0.9*	4.1±0.2	9.9±0.4*	4.3±0.4	12.8±1.3*	4.3±0.5	13.2±1.2*	6.5±0.7	27.4±2.5*
Stage N2 of Sleep (%)	55.7±0.6	39.2±0.8*	53.9±0.5	42±0.5*	54.8±1	41.8±1.4*	55.7±2.5	39±2.3*	60.3±2.2	36.3±1.8*
Stage N3 (%)	20.8±0.4	24±1*	22.5±0.5	25.8±0.5*	21.2±1.1	26±1.8	19.8±1.7	26.9±2	16.5±1.4	20.7±1.4
REM Sleep (%)	18.8±0.3	19.2±0.5	19.4±0.4	22.4±0.4*	20±0.9	19.2±1.2	19.7±1.7	20.8±1.5	17.1±1	16.5±1.4
Blood Markers										
Homocysteine (µmol/L)	10.1±0.1	9.7±0.2	8.9±0.1	8.5±0.2	10.4±0.6	10.5±1	10.1±0.7	9.7±0.7	11.9±0.9	12.6±1.3
CRP (mg/dL)	0.37±0.02	0.4±0.03	0.26±0.02	0.30±0.04	0.31±0.04	0.24±0.04	0.35±0.06	0.32±0.06	0.48±0.15	0.33±0.06
IL-6 (pg/mL)	3.7±0.3	10.7±0.6*	3±0.2	8.3±0.8*	3.1±0.15	9.8±0.7	3.2±0.3	9.7±1.5*	3.1±0.3	10.6±3.3
Insulin (mmol/L)	11.8±0.3	11.4±0.7	9.8±0.4	8.5±0.3	10.5±0.4	10±0.3	13.3±1.6	11.9±1.4	13.9±2.2	12.5±1.4
Blood glucose (mg/dL)	104.4±2.2	115.8±2.3*	91.4±0.6	98.6±1.4*	99.3±3.3	105.1±3.8	110.7±7.2	115±3.9	112.7±3.3	109±3.6
IPAQ Classification##										
High activity (n / %)	41 / 4.12	32 / 4.86	30 / 4.84	18 / 8.53	7 / 3.31	10 / 4.97	2 / 1.98	3 / 2.43	2 / 3.27	1 / 0.81
Moderate activity (n / %)	304 / 30.61	238 / 36.17	206 / 33.27	85 / 40.28	63 / 29.85	75 / 37.31	25 / 24.75	42 / 34.14	10 / 16.39	35 / 28.45
Low activity (n / %)	647 / 65.15	388 / 58.96	383 / 61.87	108 / 51.18	141 / 66.82	116 / 57.71	74 / 73.26	78 / 63.41	49 / 80.32	87 / 70.73

Comparisons between baseline and follow up made through generalized estimating equation (GEE) test, whit gamma distribution and Bonferroni post hoc test. Data presented as mean±standard deviation, except # (data presented as absolute number) and ## (data presented as absolute number/percentage). * indicate difference between baseline and follow up in the same group. Differences between groups are shown in table 1.

Table S2. Duration of activity at different intensities during the week.

	Non-OSA		Mild OSA		Moderate OSA		Severe OSA		
	Mean±SD	(95%CI)	Mean±SD	(95%CI)	Mean±SD	(95%CI)	Mean±SD	(95%CI)	*P*
Low activity (min/week)	260±17	(228 – 297)	305±34	(244 – 380)	258±42	(187 – 356)	226±43	(155 – 327)	>0.05
Moderate activity (min/week)	307±24	(263 – 359)	183±25 [a]	(139 – 241)	180±36 [a]	(121 – 266)	118±28 [a]	(73 – 187)	**<0.001**
Vigorous activity (min/week)	34±2	(29 – 39)	40±5.2	(31 – 52)	14±3.7 [a,b]	(8 – 23)	9±3.4 [a,b]	(4 – 17)	**<0.001**

Applied GzLM from gamma distribution to compare groups, using Bonferroni post hoc test. The mean values were obtained from the number of times that each activity was performed during the week multiplied by the time (min) of each activity. (a) Different from Non-OSA and (b) different from Mild OSA.

Table S3. IPAQ classification criteria

Categorical Score	Criteria
Category 1. Low active	No activity is reported OR a. Some activity is reported but not enough to meet Categories 2 or 3.
Category 2. Moderate active	Either of the following 3 criteria: **a.** 3 or more days of vigorous-intensity activity of at least 20 minutes per day OR **b.** 5 or more days of moderate-intensity activity and/or walking of at least 30 minutes per day OR **c.** 5 or more days of any combination of walking, moderate-intensity or vigorous-intensity activities achieving a minimum of at least 600 MET-min/week.
Category 3. High active	Any one of the following 2 criteria: • Vigorous-intensity activity on at least 3 days and accumulating at least 1500 MET-minutes/week OR • 7 or more days of any combination of walking, moderate- or vigorous- intensity activities accumulating at least 3000 MET-minutes/week

Validation based on Craig et al. (2003), Brazilian validation based on Matsudo et al. (2001). Criteria taken from https://sites.google.com/site/theipaq/scoring-protocol. MET (metabolic equivalent).

Figure S1.

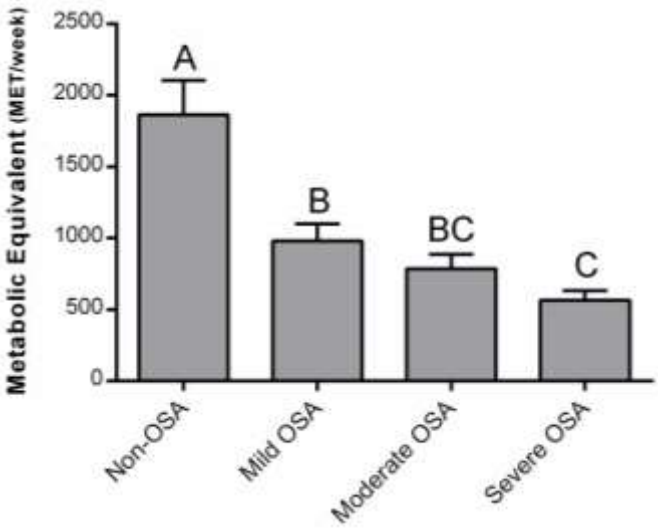

Figure S1. Metabolic equivalent (MET) for week in different groups, adjusted by body mass index. GzLM was applied from gamma distribution and MET at follow up was used as dependent variable, covariate by basal MET. Data shown as mean±standard deviation. OSA (obstructive sleep apnea). Bars with different letters are significantly different ($P \leq 0.05$).

MET calculation:

Walking MET-minutes/week = 3.3 * walking minutes * walking days

Moderate MET-minutes/week = 4.0 * moderate-intensity activity minutes * moderate days

Vigorous MET-minutes/week = 8.0 * vigorous-intensity activity minutes * vigorous-intensity days

Total physical activity MET (minutes/week) = sum of Walking + Moderate + Vigorous MET (minutes/week scores).