

Effects of sleep fragmentation and partial sleep restriction on heart rate variability during night

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Supplementary Table S1a-e: Heart rate and heart rate variability parameters and comparisons between nights

S1a: Heart Rate (HR)

Parameter	Stage	Mean $\pm$ SD		Friedman	Wilcoxon	Wilcoxon, Bonferroni-corrected	Effect size
HR [beats per minute]	N1	BF	F	0.014		1.000	
		55.21 $\pm$ 7.09	55.38 $\pm$ 6.23				
		BR	R		0.003	0.018	0.301
		54.52 $\pm$ 6.05	56.39 $\pm$ 5.41				
		R	F		0.028	0.169	0.223
		56.39 $\pm$ 5.41	55.38 $\pm$ 6.23				
	N2	BF	F	0.228			
		53.89 $\pm$ 6.51	54.63 $\pm$ 6.11				
		BR	R				
		53.70 $\pm$ 5.84	55.54 $\pm$ 6.28				
		R	F				
		55.54 $\pm$ 6.28	54.63 $\pm$ 6.11				
	N3	BF	F	0.108			
		55.38 $\pm$ 6.13	56.15 $\pm$ 5.83				
		BR	R				
		55.53 $\pm$ 6.22	56.83 $\pm$ 6.33				
		R	F				
		56.83 $\pm$ 6.33	56.15 $\pm$ 5.83				
	REM	BF	F	0.096			
		55.96 $\pm$ 7.26	56.84 $\pm$ 6.75				
		BR	R				
		55.79 $\pm$ 6.36	57.77 $\pm$ 6.78				
		R	F				
		57.77 $\pm$ 6.78	56.84 $\pm$ 6.75				
	WASO	BF	F	0.187			
		61.03 $\pm$ 7.35	61.19 $\pm$ 6.47				
		BR	R				
		59.66 $\pm$ 6.26	61.90 $\pm$ 6.44				
		R	F				
		61.90 $\pm$ 6.44	61.19 $\pm$ 6.47				
	Entire night	BF	F	0.182			
		55.14 $\pm$ 6.42	55.67 $\pm$ 5.92				
		BR	R				
		54.97 $\pm$ 6.10	56.47 $\pm$ 6.24				
		R	F				
		56.47 $\pm$ 6.24	55.67 $\pm$ 5.92				

S1b: Low Frequency Band (LF)

Parameter	Stage	Mean ± SD		Friedman	Wilcoxon	Wilcoxon, Bonferroni-corrected	Effect size
LF [ms ²]	N1	BF	F	0.559			
		30,849.56 ±18,437.68	28,343.89 ±13,607.99				
		BR	R				
		26,986.06 ±15,057.39	24,401.00 ±16,898.00				
		R	F				
		24,401.00 ±16,898.00	28,343.89 ±13,607.99				
	N2	BF	F	0.519			
		19,763.00 ±11,403.22	19,970.78 ±9,315.69				
		BR	R				
		19,749.89 ±11,374.42	22,346.39 ±16,809.02				
		R	F				
		22,346.39 ±16,809.02	19,970.78 ±9,315.69				
	N3	BF	F	0.221			
		12,753.22 ±7,480.26	14,705.06 ±9,418.12				
		BR	R				
		12,512.22 ±7,201.38	11,588.22 ±6,367.72				
		R	F				
		11,588.22 ±6,367.72	14,705.06 ±9,418.12				
	REM	BF	F	0.133			
		30,047.56 ±20,944.96	31,033.44 ±19,644.69				
		BR	R				
		26,507.50 ±18,269.69	27,545.33 ±20,186.97				
		R	F				
		27,545.33 ±20,186.97	31,033.44 ±19,644.69				
	WASO	BF	F	0.352			
		27,686.44 ±13,264.75	25,339.78 ±11,202.80				
		BR	R				
		23,877.39 ±13,872.92	23,227.17 ±13,898.55				
		R	F				
		23,227.17 ±13,898.55	25,339.78 ±11,202.80				
	Entire night	BF	F	0.005	0.606	1.000	
		20,556.56 ±11,791.69	20,850.89 ±9,779.16				
		BR	R		0.197	1.000	
		19,300.28 ±9,975.45	17,663.83 ±8,660.88				
		R	F		0.001	0.007	0.327
		17,663.83 ±8,660.88	20,850.89 ±9,779.16				

S1c: High Frequency Band (HF)

Parameter	Stage	Mean ± SD		Friedman	Wilcoxon	Wilcoxon, Bonferroni-corrected	Effect size
HF [ms²]	N1	BF	F	0.028	0.302	1.000	0.301
		10,106.89 ±2,514.10	10,329.83 ±3,181.16		0.071	0.424	
		BR	R				
		10,1146.67 ±4,139.78	9,017.56 ±2,771.12				
		R	F				
		9,017.56 ±2,771.12	10,329.83 ±3,181.16				
	N2	BF	F	0.013	0.439	1.000	0.314
		10,723.17 ±2,446.60	11,123.67 ±3,121.36		0.197	1.000	
		BR	R				
		11,150.22 ±3,924.60	10,296.94 ±3,858.07				
		R	F				
		10,296.94 ±3,858.07	11,123.67 ±3,121.36				
	N3	BF	F	0.115			
		12,273.89 ±4,202.50	12,707.89 ±4,892.20				
		BR	R				
		11,506.06 ±4,407.54	10,287.17 ±3,864.71				
		R	F				
		10,287.17 ±3,864.71	12,707.89 ±4,892.20				
	REM	BF	F	0.072			
		7,974.44 ±2,504.85	7,895.83 ±2,489.16				
		BR	R				
		7,684.00 ±2,009.08	6,880.22 ±1,678.46				
		R	F				
		6,880.22 ±1,678.46	7,895.83 ±2,489.16				
	WASO	BF	F	0.086			
		9,233.50 ±2,551.60	8,569.28 ±3,095.44				
		BR	R				
		8,752.33 ±3,290.30	9,187.72 ±3,236.92				
		R	F				
		9,187.72 ±3,236.92	8,569.28 ±3,095.44				
	Entire night	BF	F	0.122			
		9,930.89 ±2,145.52	10,459.94 ±2,777.89				
		BR	R				
		9,907.89 ±2,987.40	9,422.44 ±2,671.37				
		R	F				
		9,422.44 ±2,671.37	10,459.94 ±2,777.90				

S1d: Standard Deviation of NN-Intervals (SDNN)

Parameter	Stage	Mean $\pm$ SD		Friedman	Wilcoxon	Wilcoxon, Bonferroni-corrected	Effect size
SDNN [ms]	N1	BF	F	0.359			
		80.94 $\pm$ 33.27	75.58 $\pm$ 37.03				
		BR	R				
		95.03 $\pm$ 60.62	78.92 $\pm$ 33.21				
		R	F				
	N2	78.92 $\pm$ 33.21	75.58 $\pm$ 37.03	0.796			
		BF	F				
		62.92 $\pm$ 31.32	63.94 $\pm$ 34.08				
		BR	R				
		78.08 $\pm$ 69.25	66.14 $\pm$ 38.02				
	N3	R	F	0.618			
		66.14 $\pm$ 38.02	63.94 $\pm$ 34.08				
		BF	F				
		48.97 $\pm$ 22.86	66.75 $\pm$ 72.62				
		BR	R				
	REM	46.86 $\pm$ 23.92	49.42 $\pm$ 25.64	0.869			
		R	F				
		49.42 $\pm$ 25.64	66.75 $\pm$ 72.62				
		BF	F				
		71.42 $\pm$ 33.16	68.61 $\pm$ 30.67				
	WASO	BR	R	0.007			
		83.58 $\pm$ 68.13	69.50 $\pm$ 37.79				
		R	F				
		69.50 $\pm$ 37.79	68.61 $\pm$ 30.67				
		BF	F		0.478	1.000	
	Entire night	79.97 $\pm$ 33.97	81.94 $\pm$ 33.12	0.539	0.002	0.009	0.321
		BR	R				
		107.42 $\pm$ 71.44	65.25 $\pm$ 26.73				
		R	F		0.006	0.033	0.281
		65.25 $\pm$ 26.73	81.94 $\pm$ 33.12				
	Entire night	BF	F	0.539			
		62.08 $\pm$ 28.87	62.47 $\pm$ 31.61				
		BR	R				
		73.44 $\pm$ 54.12	59.78 $\pm$ 29.79				
		R	F				
		59.78 $\pm$ 29.79	62.47 $\pm$ 31.61				

S1e: Percent of NN-Intervals longer than 50 ms from previous NN-Interval

Parameter	Stage	Mean $\pm$ SD		Friedman	Wilcoxon	Wilcoxon, Bonferroni-corrected	Effect size
pNN50 [%]	N1	BF	F	0.027	0.107	0.639	0.255
		29.58 $\pm$ 21.66	26.88 $\pm$ 18.39				
		BR	R				
		30.94 $\pm$ 21.59	26.08 $\pm$ 21.18				
		R	F				
	N2	26.08 $\pm$ 21.18	26.88 $\pm$ 18.39	0.413	0.439	1.000	
		BF	F				
		29.88 $\pm$ 24.23	27.57 $\pm$ 22.81				
		BR	R				
		29.34 $\pm$ 24.04	27.27 $\pm$ 24.85				
	N3	R	F	0.307			
		27.27 $\pm$ 24.85	27.57 $\pm$ 22.81				
		BF	F				
		28.26 $\pm$ 25.54	24.10 $\pm$ 23.13				
		BR	R				
	REM	25.41 $\pm$ 24.50	24.99 $\pm$ 25.87	0.060			
		R	F				
		24.99 $\pm$ 25.87	24.10 $\pm$ 23.13				
		BF	F				
		24.19 $\pm$ 21.02	21.64 $\pm$ 18.42				
	WASO	BR	R	0.820			
		24.47 $\pm$ 22.57	20.06 $\pm$ 21.05				
		R	F				
		20.06 $\pm$ 21.05	21.64 $\pm$ 18.42				
		BF	F				
	Entire night	20.16 $\pm$ 20.50	19.10 $\pm$ 15.42	0.206			
		BR	R				
		24.82 $\pm$ 20.96	20.08 $\pm$ 19.19				
		R	F				
		20.08 $\pm$ 19.19	19.10 $\pm$ 15.42				
		BF	F				
		26.79 $\pm$ 23.26	24.68 $\pm$ 21.63				
		BR	R				
		26.63 $\pm$ 23.66	24.41 $\pm$ 24.02				
		R	F				
		24.41 $\pm$ 24.02	24.68 $\pm$ 21.63				

Note: Only if Friedman-Test was significant with a $p < 0.05$, post-hoc-test with pairwise comparisons (Wilcoxon-Test) were performed. Only if pairwise comparison showed a $p < 0.05$, effect size was calculated. Red indicates a significant difference between nights with Bonferroni-correction for familywise errors, blue indicates a significant difference between nights without Bonferroni-correction. BF=Baseline-night before fragmentation, F=Fragmentation-night, BR=Baseline-night before restriction, R=Restriction night