

Supplementary Material

Acute Sleep Restriction has Differential Effects on Components of Attention

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1 Supplementary Figures and Tables.

Statistically significant differences are highlighted in bold text.

Table S1. Results of mixed design ANOVA analyses of Profile of Mood States (POMS) and Stanford Sleepiness Scale (SSS) data for Control and Sleep Restriction participants on mornings 1 and 2.

Scale/Item	Control		Sleep Restriction		Main Effects	Interactions
	Morning 1 Mean (SD)	Morning 2 Mean (SD)	Morning 1 Mean (SD)	Morning 2 Mean (SD)		
POMS Fatigue	3.4 (3.3)	3.4 (3.5)	4.3 (3.1)	9.0 (4.9)	Group: $F_{(1, 36)}=9.1, p=4.6 \times 10^{-3}$ Time: $F_{(1, 36)}=14.9, p=4.5 \times 10^{-4}$	Group x Time: $F_{(1, 36)}=13.4, p=7.9 \times 10^{-4}$
POMS Vigor	-8.0 (6.1)	-6.0 (8.9)	-6.3 (4.2)	-3.9 (4.9)	Group: $F_{(1, 36)}=1.2, p=2.9 \times 10^{-1}$ Time: $F_{(1, 36)}=5.4, p=2.6 \times 10^{-2}$	Group x Time: $F_{(1, 36)}=0.04, p=8.4 \times 10^{-1}$
POMS Depression	0.3 (0.7)	0.4 (0.9)	0.9 (1.7)	1.5 (2.4)	Group: $F_{(1, 36)}=3.6, p=6.7 \times 10^{-2}$ Time: $F_{(1, 36)}=1.2, p=2.8 \times 10^{-1}$	Group x Time: $F_{(1, 36)}=0.5, p=4.9 \times 10^{-1}$
POMS Confusion	5.1 (3.2)	4.7 (3.6)	5.0 (1.8)	6.8 (3.7)	Group: $F_{(1, 36)}=1.1, p=3.0 \times 10^{-1}$ Time: $F_{(1, 36)}=2.5, p=1.2 \times 10^{-1}$	Group x Time: $F_{(1, 36)}=5.9, p=2.0 \times 10^{-2}$
POMS Anger	0.2 (0.5)	0.5 (0.7)	0.7 (1.2)	1.0 (1.4)	Group: $F_{(1, 36)}=2.6, p=1.1 \times 10^{-1}$ Time: $F_{(1, 36)}=2.0, p=1.7 \times 10^{-1}$	Group x Time: $F_{(1, 36)}=2.9 \times 10^{-3}, p=9.6 \times 10^{-1}$
POMS Tension	2.5 (1.3)	3.6 (2.0)	4.1 (2.7)	5.1 (3.1)	Group: $F_{(1, 36)}=4.6, p=3.8 \times 10^{-2}$ Time: $F_{(1, 36)}=8.3, p=6.5 \times 10^{-3}$	Group x Time: $F_{(1, 36)}=6.0 \times 10^{-3}, p=9.4 \times 10^{-1}$
SSS	2.9 (1.2)	3.0 (1.2)	3.1 (0.9)	4.5 (1.4)	Group: $F_{(1, 37)}=6.4, p=1.6 \times 10^{-2}$ Time: $F_{(1, 37)}=14.8, p=4.5 \times 10^{-4}$	Group x Time: $F_{(1, 37)}=12.2, p=1.3 \times 10^{-3}$

Table S2. Results of Tukey's Honestly Significant Differences (HSD) tests with 95% confidence intervals, for Profile of Mood States (POMS) and Stanford Sleepiness Scale (SSS) data.

	Comparison Group 1	Comparison Group 2	Difference	95% CI (lower, upper)	Adjusted p-value
Fatigue					
	SR Morn. 2	C Morn. 2	5.5	2.3, 8.7	1.5x10⁻⁴
	C Morn. 1	C Morn. 2	8.88x10 ⁻¹⁶	-3.3, 3.3	1.0
	SR Morn. 1	SR Morn. 2	-4.7	-7.8, -1.6	1.0x10⁻³
	SR. Morn. 1	C Morn. 1	0.8	-2.4, 4.0	0.9
Vigor					
	SR Morn. 2	C Morn. 2	2.1	-3.2, 7.4	0.7
	C Morn. 1	C Morn. 2	-2.0	-7.4, 3.4	0.8
	SR Morn. 1	SR Morn. 2	-2.4	-7.5, 2.7	0.6
	SR. Morn. 1	C Morn. 1	1.7	-3.6, 7.0	0.8
Depression					
	SR Morn. 2	C Morn. 2	1.0	-0.4, 2.4	0.2
	C Morn. 1	C Morn. 2	-0.1	-1.5, 1.3	1.0
	SR Morn. 1	SR Morn. 2	-0.6	-1.9, 0.8	0.7
	SR. Morn. 1	C Morn. 1	0.6	-0.8, 1.9	0.7
Confusion					
	SR Morn. 2	C Morn. 2	2.1	-0.6, 4.8	0.2
	C Morn. 1	C Morn. 2	0.4	-2.3, 3.2	1.0
	SR Morn. 1	SR Morn. 2	-1.8	-4.4, 0.8	0.3
	SR. Morn. 1	C Morn. 1	-0.2	-2.8, 2.5	1.0
Anger					
	SR Morn. 2	C Morn. 2	0.5	-0.4, 1.3	0.6
	C Morn. 1	C Morn. 2	-0.3	-1.2, 0.6	0.9
	SR Morn. 1	SR Morn. 2	-0.3	-1.2, 0.6	0.8
	SR. Morn. 1	C Morn. 1	0.4	-0.5, 1.3	0.6
Tension					
	SR Morn. 2	C Morn. 2	1.5	-0.6, 3.6	0.2
	C Morn. 1	C Morn. 2	-1.1	-3.2, 1.1	0.6
	SR Morn. 1	SR Morn. 2	-1.0	-3.0, 1.0	0.6
	SR. Morn. 1	C Morn. 1	1.6	-0.5, 3.6	0.2
SSS					
	SR Morn. 2	C Morn. 2	1.5	0.5, 2.5	9.8x10⁻⁴
	C Morn. 1	C Morn. 2	0.05	-1.0, 1.1	1.0
	SR Morn. 1	SR Morn. 2	1.4	0.4, 2.4	2.0x10⁻³
	SR. Morn. 1	C Morn. 1	0.2	-0.8, 1.1	1.0

Table S3. Results of mixed design ANOVA analyses of DalCAB RT data for Control and Sleep Restriction participants on mornings 1 and 2.

Task	Control		Sleep Restriction		Main Effects	Interactions
	Morning 1 Mean (SD)	Morning 2 Mean (SD)	Morning 1 Mean (SD)	Morning 2 Mean (SD)		
Simple RT	259.6 (77.4)	264.3 (75.7)	260.7 (68.8)	283.1 (79.6)	Group: $F_{(1, 37)}=0.98$, $p=0.33$ Time: $F_{(1, 37)}=7.53$, $p=9.32 \times 10^{-3}$ RSI*: $F_{(2, 74)}=94.61$, $p=4.07 \times 10^{-21}$	Group x Time: $F_{(1, 37)}=3.16$, $p=0.08$ Group x RSI: $F_{(2, 74)}=0.36$, $p=0.70$ RSI x Time: $F_{(2, 74)}=4.74$, $p=1.16 \times 10^{-2}$ Group x RSI x Time: $F_{(2, 74)}=0.58$, $p=0.56$
Choice RT	426.2 (135.8)	385.8 (113.4)	425.6 (125.2)	413.3 (120.9)	Group: $F_{(1, 37)}=0.81$, $p=0.37$ Time: $F_{(1, 37)}=20.96$, $p=5.15 \times 10^{-5}$ Response Switch: $F_{(1, 37)}=115.03$, $p=6.57 \times 10^{-13}$	Group x Time: $F_{(1, 37)}=5.99$, $p=1.92 \times 10^{-2}$ Group x Response Switch: $F_{(1, 37)}=0.45$, $p=0.51$ Response Switch x Time: $F_{(1, 37)}=0.69$, $p=0.41$ Group x Response Switch x Time: $F_{(1, 37)}=0.33$, $p=0.57$
Feature Visual Search	676.5 (304.0)	597.0 (163.5)	651.1 (172.1)	619.8 (166.2)	Group: $F_{(1, 37)}=4.08 \times 10^{-3}$, $p=0.95$ Time: $F_{(1, 37)}=35.61$, $p=6.95 \times 10^{-7}$ Set Size: $F_{(2, 74)}=3.16$, $p=4.84 \times 10^{-2}$	Group x Time: $F_{(1, 37)}=6.91$, $p=1.24 \times 10^{-2}$ Group x Set Size: $F_{(2, 74)}=7.50 \times 10^{-3}$, $p=0.99$ Set Size x Time: $F_{(2, 74)}=2.71$, $p=0.07$ Group x Set Size x Time: $F_{(2, 74)}=0.02$, $p=0.98$
Conjunction Visual Search	1428.7 (797.1)	1230.2 (643.3)	1455.8 (927.4)	1333.4 (828.6)	Group: $F_{(1, 37)}=1.00$, $p=0.32$ Time: $F_{(1, 37)}=67.70$, $p=7.02 \times 10^{-10}$ Set Size:	Group x Time: $F_{(1, 37)}=3.71$, $p=6.18 \times 10^{-2}$ Group x Set Size:

					$F_{(2, 74)}=255.07, p=6.31 \times 10^{-34}$	$F_{(2, 74)}=2.07, p=0.13$
						Set Size x Time: $F_{(2, 74)}=7.64, p=9.64 \times 10^{-4}$
						Group x Set Size x Time: $F_{(2, 74)}=0.03, p=0.97$
Dual Task - Primary	512.0 (218.1)	470.3 (193.3)	535.8 (226.8)	487.7 (198.8)	Group: $F_{(1, 37)}=0.19, p=0.67$ Time: $F_{(1, 37)}=27.95, p=5.80 \times 10^{-6}$ Response Switch: $F_{(1, 37)}=313.16, p=1.20 \times 10^{-19}$	Group x Time: $F_{(1, 37)}=0.72, p=0.40$ Group x Response Switch: $F_{(1, 37)}=3.52 \times 10^{-2}, p=0.85$ Response Switch x Time: $F_{(1, 37)}=2.33, p=0.13$ Group x Response Switch x Time: $F_{(1, 37)}=0.12, p=0.73$
Dual Task - Secondary	1627.2 (777.7)	1477.6 (633.5)	1679.5 (887.6)	1554.6 (931.3)	Group: $F_{(1, 37)}=0.80, p=0.38$ Time: $F_{(1, 37)}=7.23, p=0.01$	Group x Time: $F_{(1, 37)}=0.05, p=0.82$
Flanker Task	461.2 (128.6)	437.1 (131.7)	463.0 (118.0)	466.1 (128.8)	Group: $F_{(1, 37)}=0.54, p=0.47$ Time: $F_{(1, 37)}=2.73, p=0.11$ Congruency: $F_{(1, 37)}=28.28, p=5.26 \times 10^{-6}$	Group x Time: $F_{(1, 37)}=6.49, p=1.52 \times 10^{-2}$ Group x Congruency: $F_{(1, 37)}=0.11, p=0.75$ Congruency x Time: $F_{(1, 37)}=0.02, p=0.88$ Group x Congruency x Time: $F_{(1, 37)}=4.84, p=0.03$
Go/No-Go	326.8 (83.3)	316.6 (83.1)	340.1 (81.6)	355.3 (95.1)	Group: $F_{(1, 37)}=6.84, p=0.01$ Time: $F_{(1, 37)}=2.94, p=0.09$ Go Frequency: $F_{(1, 37)}=181.64, p=7.58 \times 10^{-16}$	Group x Time: $F_{(1, 37)}=23.25, p=2.44 \times 10^{-5}$ Group x Go Frequency: $F_{(1, 37)}=1.36, p=0.25$ Go Frequency x Time: $F_{(1, 37)}=3.54, p=0.07$ Group x Go Frequency x Time: $F_{(1, 37)}=3.97, p=0.05$
Item Memory	1005.5 (439.2)	882.4 (377.7)	876.3 (374.6)	829.1 (348.1)	Group: $F_{(1, 37)}=3.43, p=0.07$ Time: $F_{(1, 37)}=17.61, p=1.63 \times 10^{-4}$ Set Size:	Group x Time: $F_{(1, 37)}=4.60, p=3.85 \times 10^{-2}$ Group x Set Size:

					$F_{(2, 74)}=158.35, p=1.83 \times 10^{-27}$	$F_{(2, 74)}=1.61, p=0.21$ Set Size x Time: $F_{(2, 74)}=0.26, p=0.78$ Group x Set Size x Time: $F_{(2, 74)}=0.15, p=0.86$
					Group: $F_{(1, 37)}=0.02, p=0.88$ Time: $F_{(1, 37)}=2.78, p=0.10$ Set Size: $F_{(2, 74)}=38.68, p=3.18 \times 10^{-12}$	Group x Time: $F_{(1, 37)}=1.05, p=0.31$ Group x Set Size: $F_{(2, 74)}=0.95, p=0.39$ Set Size x Time: $F_{(2, 74)}=1.12, p=0.33$ Group x Set Size x Time: $F_{(2, 74)}=1.13, p=0.33$
Location Memory	840.6 (340.0)	787.3 (307.0)	833.0 (337.2)	810.0 (338.4)		

*Response Stimulus Interval.

Table S4. Results of Tukey's Honestly Significant Differences (HSD) tests with 95% confidence intervals for DalCAB RT data.

	Comparison Group 1	Comparison Group 2	Difference	95% CI (lower, upper)	Adjusted p-value
Simple RT					
	C Morn. 2	C Morn. 1	4.8	-3.5, 13.0	0.45
	SR Morn. 1	C Morn. 1	1.1	-7.0, 9.2	0.99
	SR Morn. 2	C Morn. 2	18.8	10.7, 26.9	5.89x10⁻⁸
	SR. Morn. 2	SR. Morn. 1	22.5	14.5, 30.5	4.20x10⁻⁸
Choice RT					
	C Morn. 2	C Morn. 1	-40.3	-50.0, -30.7	0.00
	SR Morn. 1	C Morn. 1	-0.5	-10.0, 9.0	1.00
	SR Morn. 2	C Morn. 2	27.5	17.9, 37.0	0.00
	SR. Morn. 2	SR. Morn. 1	-12.3	-21.7, -2.9	0.00
Feature					
Visual Search	C Morn. 2	C Morn. 1	-79.5	-96.7, -62.3	2.57x10⁻¹¹
	SR Morn. 1	C Morn. 1	-25.4	-42.4, -8.4	7.07x10 ⁻⁴
	SR Morn. 2	C Morn. 2	22.8	5.7, 39.8	3.35x10 ⁻³
	SR. Morn. 2	SR. Morn. 1	-31.4	-48.2, -14.6	9.58x10⁻⁶
Conjunction					
Visual Search	C Morn. 2	C Morn. 1	-198.6	-264.8, -132.4	2.52x10⁻¹¹
	SR Morn. 1	C Morn. 1	27.1	-38.3, 92.5	0.71
	SR Morn. 2	C Morn. 2	103.3	37.9, 168.7	2.94x10⁻⁴
	SR. Morn. 2	SR. Morn. 1	-122.4	-187.0, -57.8	6.83x10⁻⁶
Dual Task - Primary					
	C Morn. 2	C Morn. 1	-41.7	-54.4, -28.9	8.75x10⁻⁹
	SR Morn. 1	C Morn. 1	23.9	11.3, 36.4	5.96x10 ⁻⁶
	SR Morn. 2	C Morn. 2	17.4	4.8, 30.0	2.24x10 ⁻³
	SR. Morn. 2	SR. Morn. 1	-48.1	-60.5, -35.8	8.75x10⁻⁹
Dual Task - Secondary					
	C Morn. 2	C Morn. 1	-149.6	-313.4, 14.3	8.80x10 ⁻²
	SR Morn. 1	C Morn. 1	52.4	-113.7, 218.4	0.85
	SR Morn. 2	C Morn. 2	77.0	-84.0, 237.9	0.61
	SR. Morn. 2	SR. Morn. 1	-125.0	-288.1, 38.2	0.20
Flanker Task					
	C Morn. 2	C Morn. 1	-24.1	-35.0, -13.2	8.26x10⁻⁸
	SR Morn. 1	C Morn. 1	1.8	-8.9, 12.6	0.97
	SR Morn. 2	C Morn. 2	29.0	18.2, 39.8	3.84x10⁻¹¹
	SR. Morn. 2	SR. Morn. 1	3.1	-7.6, 13.7	0.88
Go/No-Go					
	C Morn. 2	C Morn. 1	-10.2	-17.4, -3.0	1.50x10⁻³
	SR Morn. 1	C Morn. 1	13.4	6.3, 20.4	7.82x10 ⁻⁶
	SR Morn. 2	C Morn. 2	38.7	31.6, 45.8	2.01x10 ⁻¹¹
	SR. Morn. 2	SR. Morn. 1	15.2	8.2, 22.2	1.59x10⁻⁷

Item					
Memory	C Morn. 2	C Morn. 1	-123.1	-168.1, -78.1	2.09x10⁻⁸
	SR Morn. 1	C Morn. 1	-129.2	-174.1, -84.4	2.09x10⁻⁸
	SR Morn. 2	C Morn. 2	-53.3	-98.0, -8.6	1.18x10⁻²
	SR. Morn. 2	SR. Morn. 1	-47.2	-91.8, -2.7	0.03
Location					
Memory	C Morn. 2	C Morn. 1	-53.3	-92.6, -14.0	2.82x10⁻³
	SR Morn. 1	C Morn. 1	-7.7	-46.9, 31.6	0.96
	SR Morn. 2	C Morn. 2	22.6	-16.7, 62.0	0.45
	SR. Morn. 2	SR. Morn. 1	-23.0	-62.2, 16.3	0.43