SUPPLEMENTAL MATERIAL

The effect of a dynamic lighting schedule on neurobehavioral performance during a 45-day simulated space mission

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Light measurements across the HERA habitat for the SLS and DLS conditions

Light measurements were taken in the horizontal plane at a height of 72" for the following conditions and locations:

- SLS Level 1: Irradiance 1.47 ± 1.88 μW/cm^2; photon density 18.27 ± 0.60 log photons/cm^2/second; photopic lux 467 ± 614 lux; S-cone α-opic equivalent daylight index (EDI) lux 266 ± 333; M-cone α-opic EDI lux 409 ± 533; L-cone α-opic EDI lux 466 ± 612; rhodopic α-opic EDI lux 316 ± 400 lux; melanopic α-opic EDI lux 284 ± 354.

- SLS Level 2: irradiance 0.36 ± 0.19 μW/cm^2; photon density 17.95 ± 0.25 log photons/cm^2/second; photopic lux 108 ± 60 lux; S-cone α-opic equivalent daylight index (EDI) lux 61 ± 31; M-cone α-opic EDI lux 93 ± 51; L-cone α-opic EDI lux 109 ± 60; rhodopic α-opic EDI lux 69 ± 37 lux; melanopic α-opic EDI lux 62 ± 33.

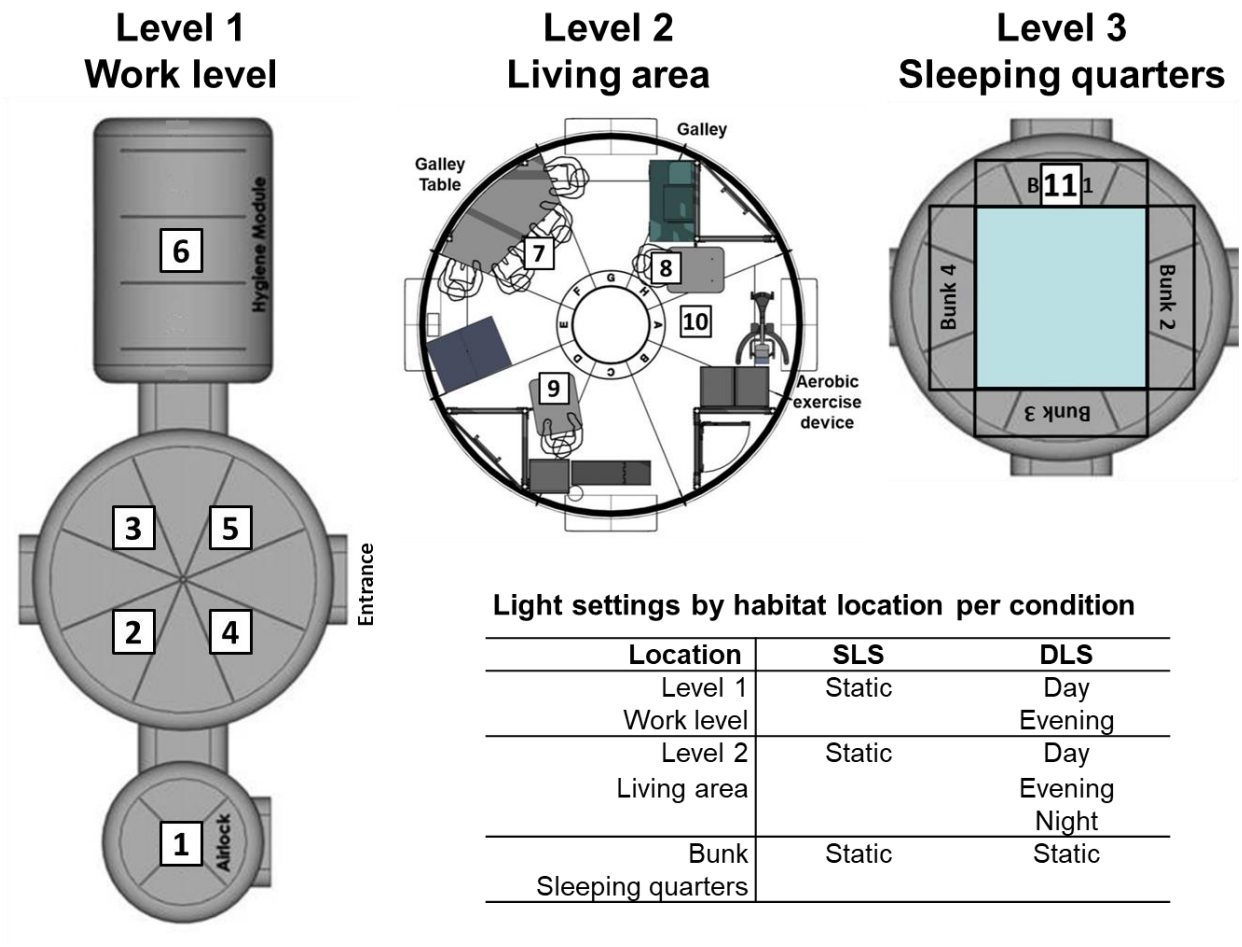
- DLS Level 1 daytime setting: irradiance 3.97 ± 2.80 μW/cm^2; photon density 18.93 ± 0.34 log photons/cm^2/second; photopic lux 1210 ± 870 lux; S-cone α-opic equivalent daylight index (EDI) lux 1150 ± 807; M-cone α-opic EDI lux 1180 ± 845; L-cone α-opic EDI lux 1198 ± 857; rhodopic α-opic EDI lux 1099 ± 775 lux; melanopic α-opic EDI lux 1079 ± 748.

- DLS Level 1 evening/nighttime setting: irradiance 0.13 ± 0.14 μW/cm^2; photon density 17.41 ± 0.40 log photons/cm^2/second; photopic lux 44 ± 48 lux; S-cone α-opic equivalent daylight index (EDI) lux 15 ± 15; M-cone α-opic EDI lux 35 ± 38; L-cone α-opic EDI lux 44 ± 49; rhodopic α-opic EDI lux 25 ± 27 lux; melanopic α-opic EDI lux 21 ± 22.

- DLS Level 2 daytime setting: irradiance 0.34 ± 0.13 μW/cm^2; photon density 17.95 ± 0.16 log photons/cm^2/second; photopic lux 111 ± 44 lux; S-cone α-opic equivalent daylight index (EDI) lux 92 ± 38; M-cone α-opic EDI lux 103 ± 40; L-cone α-opic EDI lux 108 ± 42; rhodopic α-opic EDI lux 84 ± 32 lux; melanopic α-opic EDI lux 76 ± 28.

- DLS Level 2 evening setting: irradiance 0.01 ± 0.01 μW/cm^2; photon density 16.54 ± 0.31 log photons/cm^2/second; photopic lux 4 ± 3 lux; S-cone α-opic equivalent daylight index (EDI) lux 2 ± 1; M-cone α-opic EDI lux 4 ± 2; L-cone α-opic EDI lux 4 ± 3; rhodopic α-opic EDI lux 3 ± 2 lux; melanopic α-opic EDI lux 2 ± 1.

- DLS Level 2 nighttime setting: irradiance 0.01 ± 0.00 μW/cm^2; photon density 16.41 ± 0.25 log photons/cm^2/second; photopic lux 3 ± 1 lux; S-cone α-opic equivalent daylight index (EDI) lux 2 ± 1; M-cone α-opic EDI lux 2 ± 1; L-cone α-opic EDI lux 3 ± 1; rhodopic α-opic EDI lux 2 ± 1 lux; melanopic α-opic EDI lux 2 ± 1.



Light settings by habitat location per condition

Location	SLS	DLS
Level 1 Work level	Static	Day Evening
Level 2 Living area	Static	Day Evening Night
Bunk Sleeping quarters	Static	Static

Figure S1. HERA habitat floor plans for Levels 1, 2 and 3. The location of light readings in each level are denoted by a numbered box. The light settings available on each habitat level are listed in the table by lighting condition.

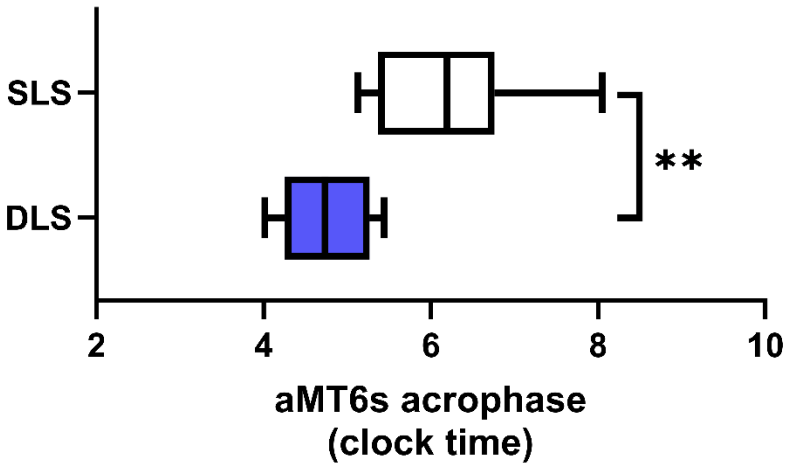


Figure S2. Acrophase of the urinary melatonin metabolite 6-sulphatoxymelatonin (aMT6s) by lighting condition (n=8 / condition). DLS = dynamic lighting schedule; SLS = standard lighting schedule; ** $p < 0.01$.

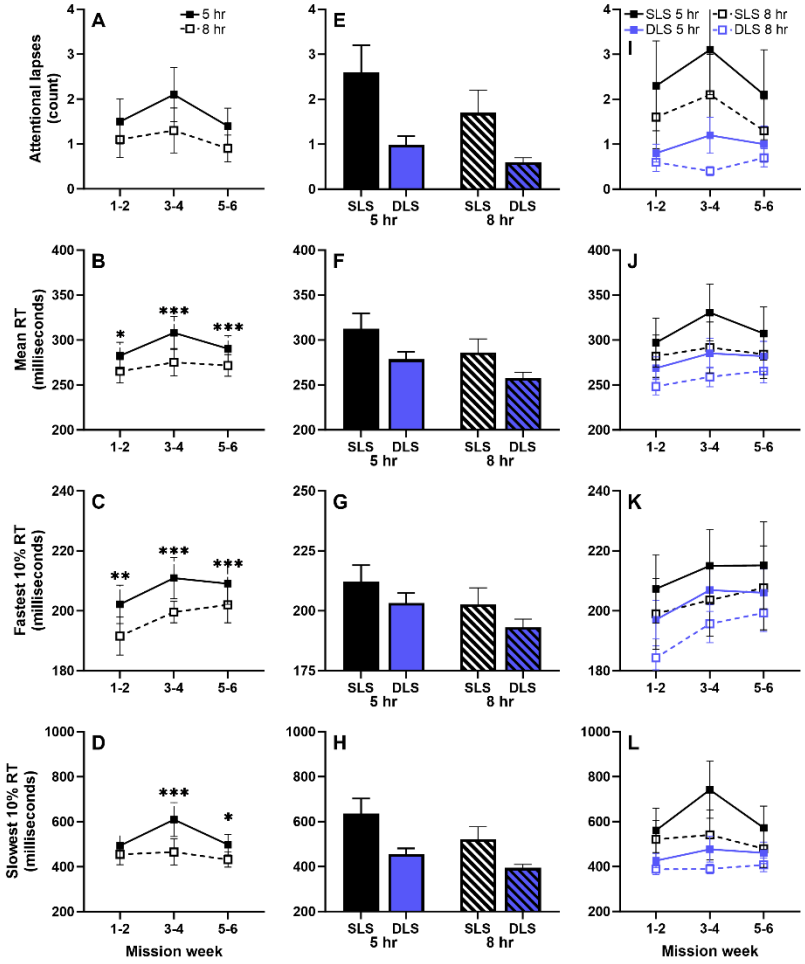


Figure S2. Interaction effects of light, sleep and time into mission on Psychomotor Vigilance Task (PVT) performance in 16 crewmembers (n=8 / lighting condition). Mean ± SEM of attentional lapses (top), mean reaction time (RT; center-top), 10% fastest RT (centre-bottom) and 10% slowest RT (bottom) are shown for the interaction between sleep condition and mission tertile (A-D), light condition by sleep condition (E-H) and light condition by sleep condition by mission tertile (I-L). Unadjusted data are plotted. DLS = dynamic lighting schedule; SLS = standard lighting schedule; * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$.