**SUPPLEMENTARY FIGURES**



***Supplementary Figure S1: Association between effort and variation in additional subjective measures.*** *Time course of subjective metrics (left panels), relationships with effort in all individuals (middle panels), and in younger (< 60y) and older (≥ 60y) individuals of our sample (right panels): joy (****A-C****), sociability (****D-F****) stress (****G-I****) and anguish (****J-L****).**Colours of the dots correspond to the circadian phases of data collection during the 20h wake extension protocol as indicated in the inset legend. Regression in middle panels display the associations between effort and cognitive metrics across all measurements, i.e. irrespective of circadian phase (thick black line), when significant, and for each circadian phase (according to legend inset colour code), when significant at least for one specific phase. Regressions lines are displayed for illustration purposes of the significant associations yielded by the GLMM and do not substitute GLMM outputs. Refer to Table S1 for output of GLMMs. All values are reported relative to individual melatonin onset which was used as reference time point for internal circadian phase (i.e., 0°, 15° = 1h) and subjective metrics, including effort, are expressed in arbitrary unit (a. u.).*

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***Supplementary figure S2: Association between effort and additional PVT performance measures during the wake extension protocol.*** *Time course of cognitive metrics (left panels) and their relationship with effort according to circadian phase (middle panels) and according age groups (<60y or ≥ 60y; right panels).**PVT mean slower reaction time –SRT- (****A-C****), PVT mean faster reaction time –FRT- (****D-F****), PVT lapse (****G-I****). Regression in middle panels display the associations between effort and cognitive metrics across all measurements, i.e. irrespective of circadian phase (thick black line), when significant, and for each circadian phase (according to legend inset colour code), when significant at least for one specific phase. Regressions lines are displayed for illustration purposes of the significant associations yielded by the GLMM and do not substitute GLMM outputs. Refer to Table S2 for output of GLMMs. All values are reported relative to individual melatonin onset, which was used as reference time point for internal circadian phase (i.e., 0°, 15° = 1h). Due to insufficient valid data point, circadian 100° for d-prime of 3 back task was not included in the statistical analyses reported in the main text*

**SUPPLMENTARY TABLES**

**Supplementary Table S1. Associations between perceived effort and additional subjective measures.**

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
|  | *SM*  | *SM x age* |  *phase* | *SM x phase* | *age* | *sex* | *education* |
| *Joy**(N=99)* | **F(1,815.6)= 22.33*****p*<.0001**  | **F(1,815.8)= 15.36****p<.0001**  | **F(8,725.8)= 47.66****p<.0001**  | F(8,724.4)=.36 *P*=.94 | F(1,109)=1.26P=.26 | F(1,93.8)=.65P=.42  | F(1,95.7)=.7P=.15  |
| *Sociability**(N=99)* | **F(1,793.1)= 6.68*****P*=.009**  | **F(1,791.2)= 3.75****P=.05**  | **F(8,713.5)= 9.08****p<.001**  | **F(8,712.4)=3.41** ***p=*.0007** | F(1,206)=1.76P=.19 | F(1,92.9)=.07P=.8  | F(1,92)=1.41P=.24  |
| *Stress**(N=99)* | **F(1,710)= 5.87*****P*=.015**  | F(1,692.1)= 2.28P=.13 | **F(8,717.7)= 19.77****p<.0001**  | **F(8,715.5)=2.17** ***P*=.03** | F(1,151.1)=1.05P=.31  | F(1,89.9)=.08P=.78  | F(1,89.2)=2.84P=.09 |
| *Anguish**(N=99)* | F(1,788.2)= 2.23*P*=.13  | F(1,778.9)= .68P=.41 | **F(8,722.2)= 14.11****p<.0001**  | F(8,720.6)=1.75 *P*=.08 | F(1,190.3)=.32P=.57  | F(1,92.6)=.1P=.75 | F(1,91.8)=2.49P=.12 |

Outputs of GLMM using effort measure as dependent variable and SM as independent variable.

SM: subjective dimension (i.e. sleepiness, fatigue or motivation). Complementary to Figure S1.

**Supplementary Table S2. Associations between perceived effort and additional PVT performance metrics.**

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
|  | *Effort* | *Effort x age* |  *phase* | *Effort x phase* | *age* | *sex* | *education* |
| *mean slow RT (PVT)**(N=99)* | F(1,809.9)= .83*P=*.36 | F(1,717.2)= .00P= 1 | **F(8,724.5)=22.64****p<.0001** | F(8,739)=1.8 *P=*.073  | F(1,92)=.24P=.62 | **F(1,92.2)= 10.09****P=.002**  | F(1,92)=.24P=.62 |
| *mean fast RT (PVT)**(N=99)* | F(1,396.6)= 3.94*P=*.17 | F(1,327.6)= 2.72P=.10 | **F(8,710.6)=14.04****p<.0001** | F(8,674.7)=.96 *P=*.47 | F(1,92,2)=1.82P=.18  | **F(1,92,3)= 7.14****P=.008**  | F(1,92.2)=.7P=.4 |
| *Lapses (PVT)**(N=99)* | F(1,670.3)= .39*P=*.53  | F(1,665.5)= 0.00P=1 | **F(8,678.4)= 11.89****p<.0001**  | F(8,699.6)=1.79 *P=*.07 | F(1,90.8)=1.15P=.29 | **F(1,91.3)=9.3****P=.003**  | F(1,91.6)=1.17P=.28 |

Performance was set as the dependent variable and effort as independent variable. Complementary to Figure S2.

**Publications from the dataset COFITAGE – June 2022**

Chylinski D., Van Egroo M., Narbutas J., Muto V., Bahri M.A., Berthomier C., Salmon E., Bastin C., Phillips C., Collette F., Maquet P., Carrier J., Jean Marc Lina J-M., Vandewalle G. (2022). Timely coupling of sleep spindles and slow waves is linked to early amyloid-β burden and predicts memory decline. *Elife,* 11*,* e78191

Chilinsky D., Van Egroo M., Narbutas J., Koshmanova, E., Berthomier C., Berthomier P., Brandewinder M., Salmon E. Barri M., Bastin C., Collette F.., Phillips C., Maquet P., Muto V., Vandewalle G. (2021). Heterogeneity in the links between sleep arousals, amyloid-beta and cognition. *JCI Insight,* 6(24):e152858.

Van Egroo M., Chylinski D.O., Narbutas J., Besson G., Muto V., Schmidt C., Marzoli D., Cardone P., Vandeleene N., Grignard M., Luxen A., Salmon E., Lambert C., Bastin C., Collette F., Phillips C., Maquet P., Bahri M.A., Balteau E., Vandewalle G.. (2021). Early brainstem [18F]THK5351 uptake is linked to cortical hyper-excitability in healthy aging. *JCI Insight*, *6*(2):e142514.

Narbutas J., Van Egroo M., Chylinski D., Bahri M.A., Koshmanova E., Talwar P. Besson G., Muto V., Schmidt C., Luxen A., Balteau E., Phillips C., Maquet P., Salmon E., Vandewalle G., Bastin C., Collette F. (2021). Associations between cognitive complaints, memory performance, mood and amyloid-β accumulation in healthy amyloid negative late-midlife individuals. *Journal of Alzheimer’s disease,* 83, 127-141 (I.F.:3.909)

Narbutas J., Chylinski D., Van Egroo M., Bahri M.A., Koshmanova E., Besson G., Muto V., Schmidt C., Luxen A., Balteau E., Phillips C., Maquet P., Salmon E., Vandewalle G., Bastin C., Collette F. (2021). Positive Effect of Cognitive Reserve on Episodic Memory, Executive and Attentional Functions Taking Into Account Amyloid-Beta, Tau, and Apolipoprotein E Status. *Frontiers in Aging Neuroscience*, 13, 245. F.I: 4.504

Rizzolo L., Narbutas J., Van Egroo M., Chylinski D., Besson D., Baillet M., Bahri M.A., Salmon E., Maquet P., Vandewalle G., Bastin C., Collette F. (2021) Relationship between brain AD biomarkers and episodic memory performance in healthy aging.  *Brain and Cognition, 148,* 105680*.*

Van Egroo M., Narbutas J., Chylinski D, Villar González P., Ghaemmaghami P., Muto V., Schmidt C., Gaggioni G., Besson G., Pépin X., Tezel E., Marzoli D., Le Goff C., Cavalier E., Luxen A., Salmon E., Maquet P., Bahri M.A., Phillips C., Bastin C., Collette F., Vandewalle G. (2019). Preserved wake-dependent cortical excitability dynamics predict cognitive fitness beyond age-related brain alterations. *Communications Biology, 2(1),* 449.

Narbutas J., Van Egroo M., Chylinski D., Villar González P., Garcia Jimenez C., Besson G., Ghaemmaghami P., Hammad G., Muto M., Schmidt C., Luxen A., Salmon E., Maquet P., Bastin C., Vandewalle G., Collette F. (2019). Cognitive efficiency in late midlife is linked to lifestyle characteristics and allostatic load. *Aging, 11,* 7169-7186.