

Sleep in elderly experts in meditation practice

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INTRODUCTION

Sleep quantity, architecture and microstructure are altered in aging [1]. Sleep quality is also impaired by stress, anxiety and ruminations [2]. Meditation practice could be beneficial for sleep, through the improvement of psycho-affective health in older adults [3]. However, sleep data in individuals with a long-term experience in meditation practice are scarce and heterogeneous (especially in the elderly), and often limited to sleep architecture data [4,5].

AIM

To better understand the **effects of long-term meditation practice** on both **subjective** and **objective** sleep data.

METHODS

Participants			Measures	Statistical analyses for between-group comparisons
 Age-Well clinical trial (baseline data)	 Elderly expert meditators (> 10 000 h of lifetime meditation practice)	 Elderly meditation naive controls	1) Sleep questionnaires PSQI (sleep quality) ISI (insomnia) ESS (sleepiness)	ANCOVA (corrected for age and sex)
Age (years)	70.7 ± 5.0	69.3 ± 3.8	2) Sleep architecture Sleep latency, duration and efficiency Wake after sleep onset % sleep stages	
Sex ratio (% of women)	37%	61%	3) Sleep microstructure Sleep spindles (slow and fast) Slow waves	
Education (years)	15.2 ± 3.3	13.16 ± 3.1	4) EEG spectral power * (relative) Delta, theta, alpha, sigma, beta, gamma	Cluster-based permutation approach 1) T-test on each electrode on the real dataset and on 5000 permuted datasets 2) Identification of electrode clusters with significant between-group differences
 Sleep questionnaires	n = 27	n = 135	5) EEG complexity * Kolmogorov complexity (KC) Permutation entropy (PE)	
 Polysomnography	n = 24	n = 47		

Data are presented as mean ± SD.

** During N2-N3 sleep and REM sleep (separately)*

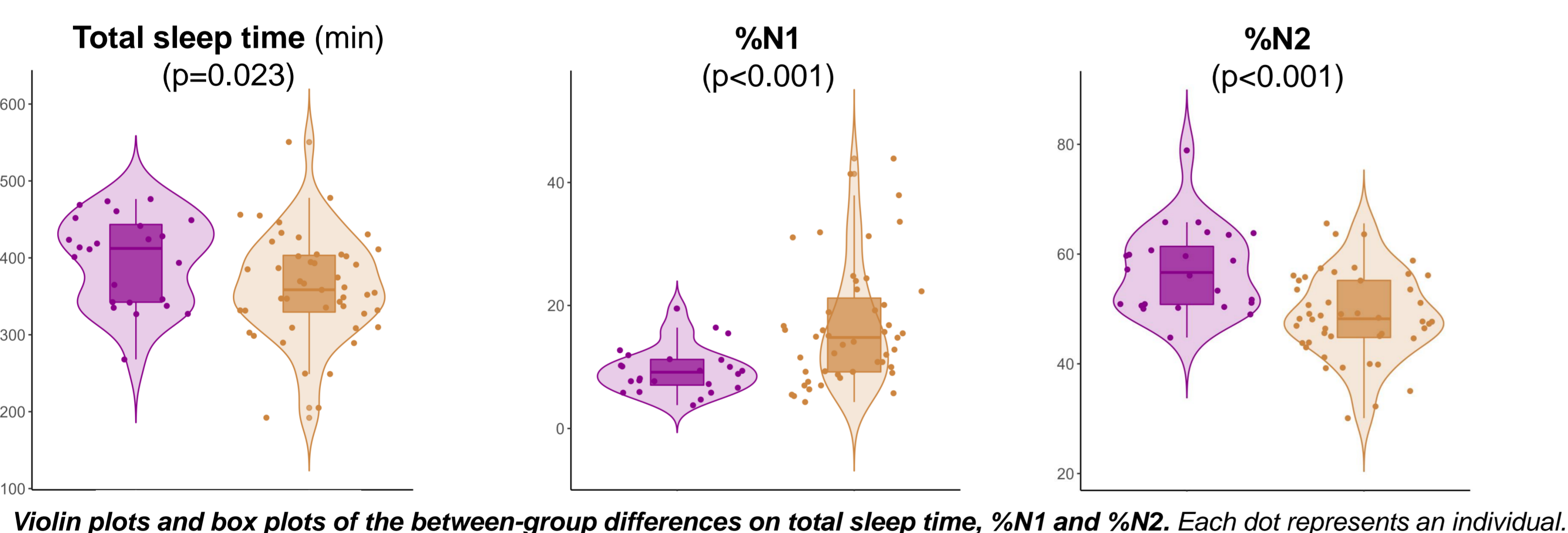
RESULTS

1) Sleep questionnaires

→ No between-group difference for PSQ, ISI, ESS.

2) Sleep architecture

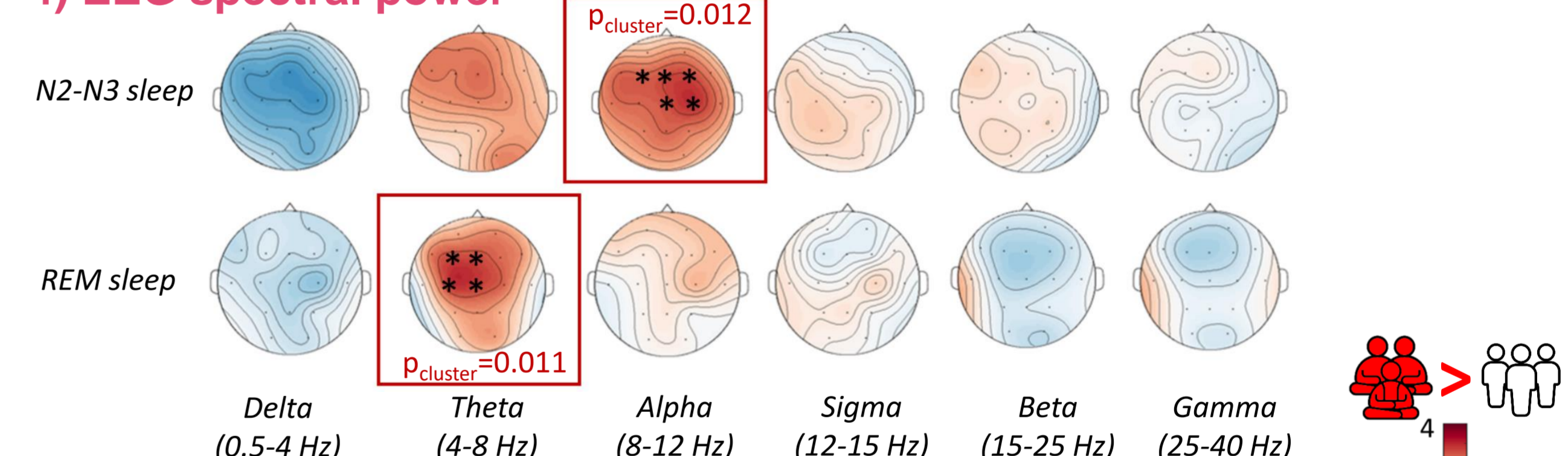
→ No between-group difference for sleep latency and efficiency, wake after sleep onset, %N3, %REM.
 → Compared to **controls**, **expert meditators** had higher total sleep time, lower %N1 and higher %N2.



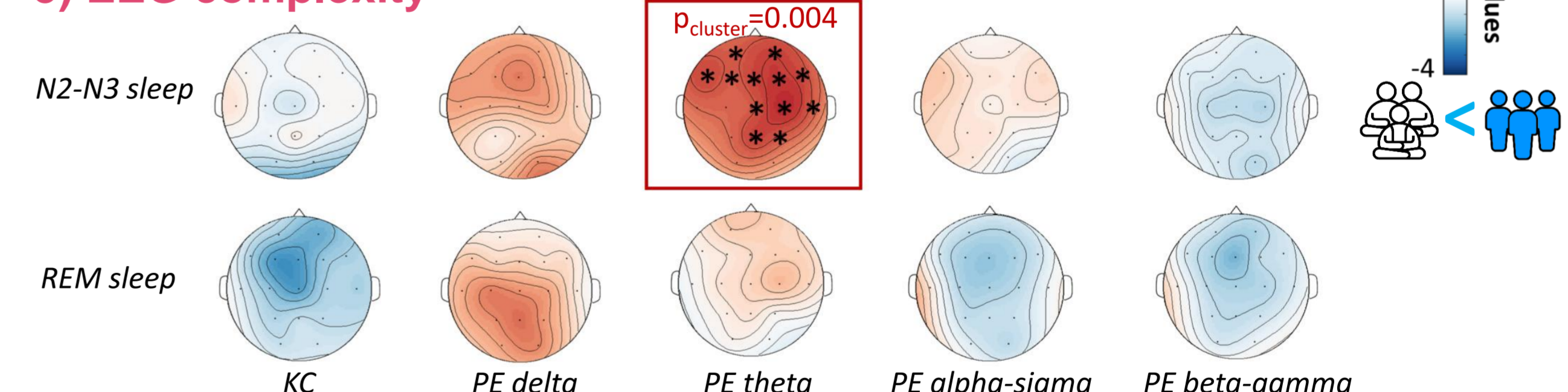
3) Sleep microstructure

→ No between-group difference for spindles and slow waves (density, amplitude, duration, frequency).

4) EEG spectral power



5) EEG complexity



Statistical maps (t-values) of the between-group differences on EEG power (top) and complexity (bottom). Red represents higher power (or complexity) values in the expert meditators compared to controls, and blue lower values. Stars denote significant clusters of electrodes.

→ During N2-N3 sleep, expert meditators had i) higher alpha power and ii) higher EEG complexity in theta band.

→ During REM sleep, expert meditators had higher theta power.

CONCLUSION

Our results suggest that **the effects of age on specific objective sleep parameters are less pronounced in elderly expert meditators** (total sleep time, %N1). Spectral and complexity differences may reflect higher level of awareness [6,7] during sleep and a potential modulation of emotional regulation processes [8] in expert meditators, but further studies are needed to confirm these hypotheses.

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ACKNOWLEDGEMENTS AND CONTACT

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 Websites: <https://silversantestudy.eu/> and <https://neuropresage.fr/>.

