

Sleep Fragmentation And Increased Nocturnal Wake Time Recorded By A Sleep Tracking Mat Correlate With Alzheimer’s Disease

Yiying Wang, Anqi Li, Yue Cai, Jie Yang, Pan Sun, Mingxing Jiang, Zhengbo He, Yue Leng, Tengfei Guo

Identify key factors associated with sleep fragmentation and nocturnal wake time, and recognize relationships with Alzheimer’s disease–related biomarkers and cognitive performance



INTRODUCTION & METHODS

RESULTS

CONCLUSIONS

Sleep abnormalities are highly prevalent among Alzheimer’s disease (AD) patients. However, the association between objectively measured daily sleep characteristics, AD-related biomarkers, and cognitive decline remains insufficiently characterized. In this study, we aim to investigate the correlation between multiple sleep factors and AD pathologies, as well as cognitive performance, in Chinese older adults. A total of 51 cognitively unimpaired (CU) and 18 cognitively impaired (CI) participants were recruited from the Greater-Bay-Area Healthy Aging Brain Study (GHABS) and recorded their sleep data using one electric sleep monitor device. All participants underwent amyloid- β (A β) positron emission tomography (PET) imaging, plasma biomarker assessments, and neuropsychological assessments. We investigated how these multiple sleep indicators, measured by the electric sleep monitor device, differ across different clinical and biological stages of AD, as well as how they relate to A β PET, tau PET, and cognitive function using general linear models (GLMs), adjusting for age and sex

An elevated sleep fragmentation index (SFI) was observed in individuals who were plasma pTau217-positive, A β PET-positive, and cognitively impaired. Compared with plasma pTau217-negative individuals, pTau217-positive individuals exhibited significantly increased wake time (WT) (Figure 1). Higher SFI and WT were significantly associated with increased plasma pTau217 levels and greater A β burden (Figure 2).Regarding cognitive function, higher SFI, wake after sleep onset (WASO), and WT were associated with poorer cognitive performance. Specifically, elevated SFI was associated with slower processing speed and poorer language function. In contrast, longer REM sleep duration was associated with better language performance (Figure 3).

Sleep fragmentation and increased nocturnal wake time were significantly associated with AD-related biomarkers, particularly A β PET, plasma pTau217, and global cognition, suggesting that sleep disturbances are closely linked to the early pathophysiology of AD. These findings support the potential value of objective sleep assessment in early risk stratification and highlight sleep as a modifiable target for future preventive and therapeutic interventions. Future studies may include longitudinal data and additional sleep measures to further identify how specific sleep functions affect AD pathology.

References

Mander, B. A., Marks, S. M., Vogel, J. W., Rao, V., Lu, B., Saletin, J. M., Ancoli-Israel, S., Jagust, W. J., & Walker, M. P. (2015). β -amyloid disrupts human NREM slow waves and related hippocampus-dependent memory consolidation. *Nature Neuroscience*, 18(7), 1051–1057. <https://doi.org/10.1038/nn.4035>

Nolan, E., Sun, Y., Shi, H., Archer, D., Perry, A., Pechman, K., Shashikumar, N., Landman, B., Gogniat, M., Liu, D., Zhang, P., Hohman, T. J., Jefferson, A. L., & Full, K. M. (2025). The association between poor sleep health and Alzheimer’s disease structural neuroimaging biomarkers. *Alzheimer’s & Dementia*, 21(6), e70364. <https://doi.org/10.1002/alz.70364>

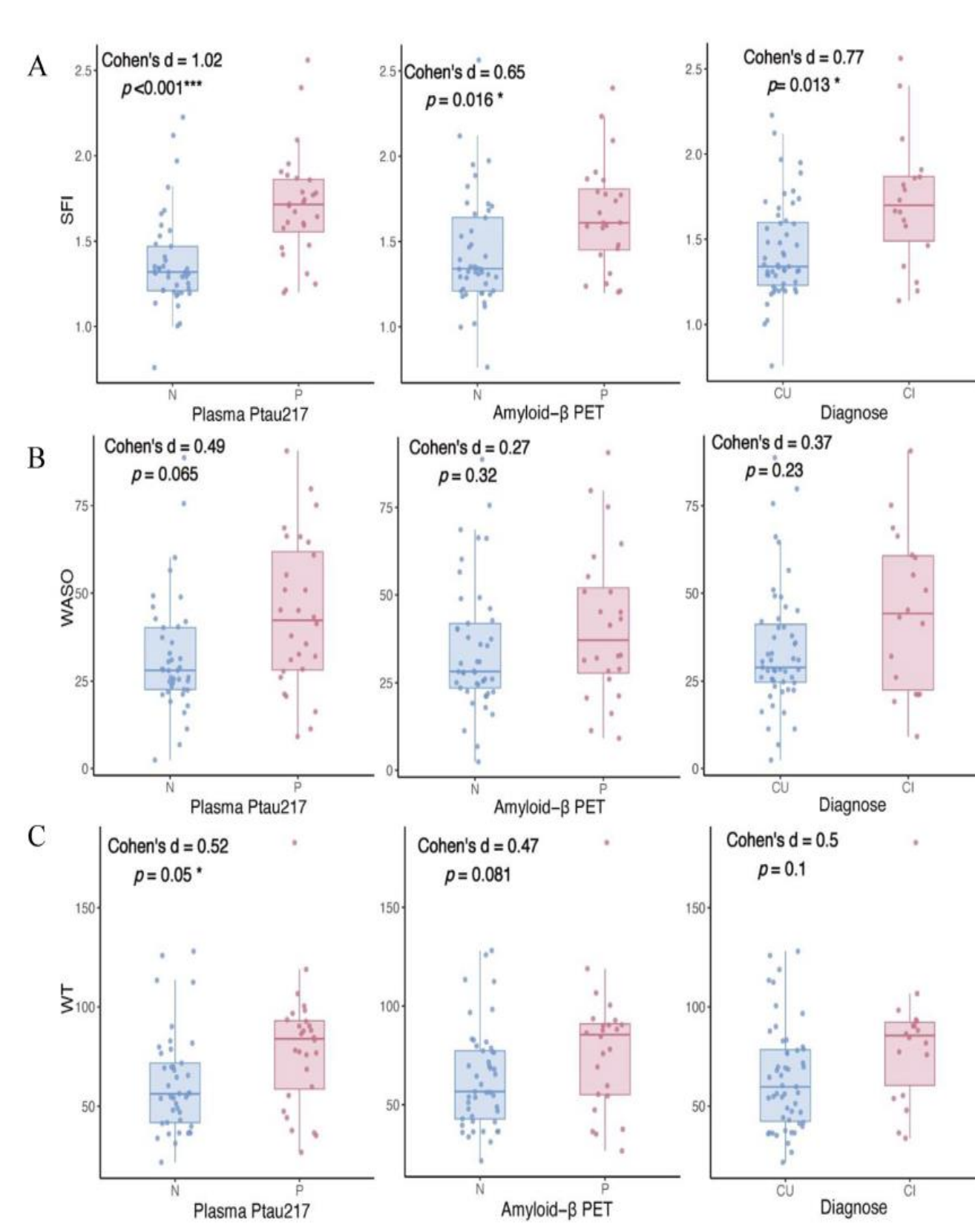


Figure1. Comparison of sleep measurements between Plasma biomarker and PET imaging markers. And clinical diagnostic groups

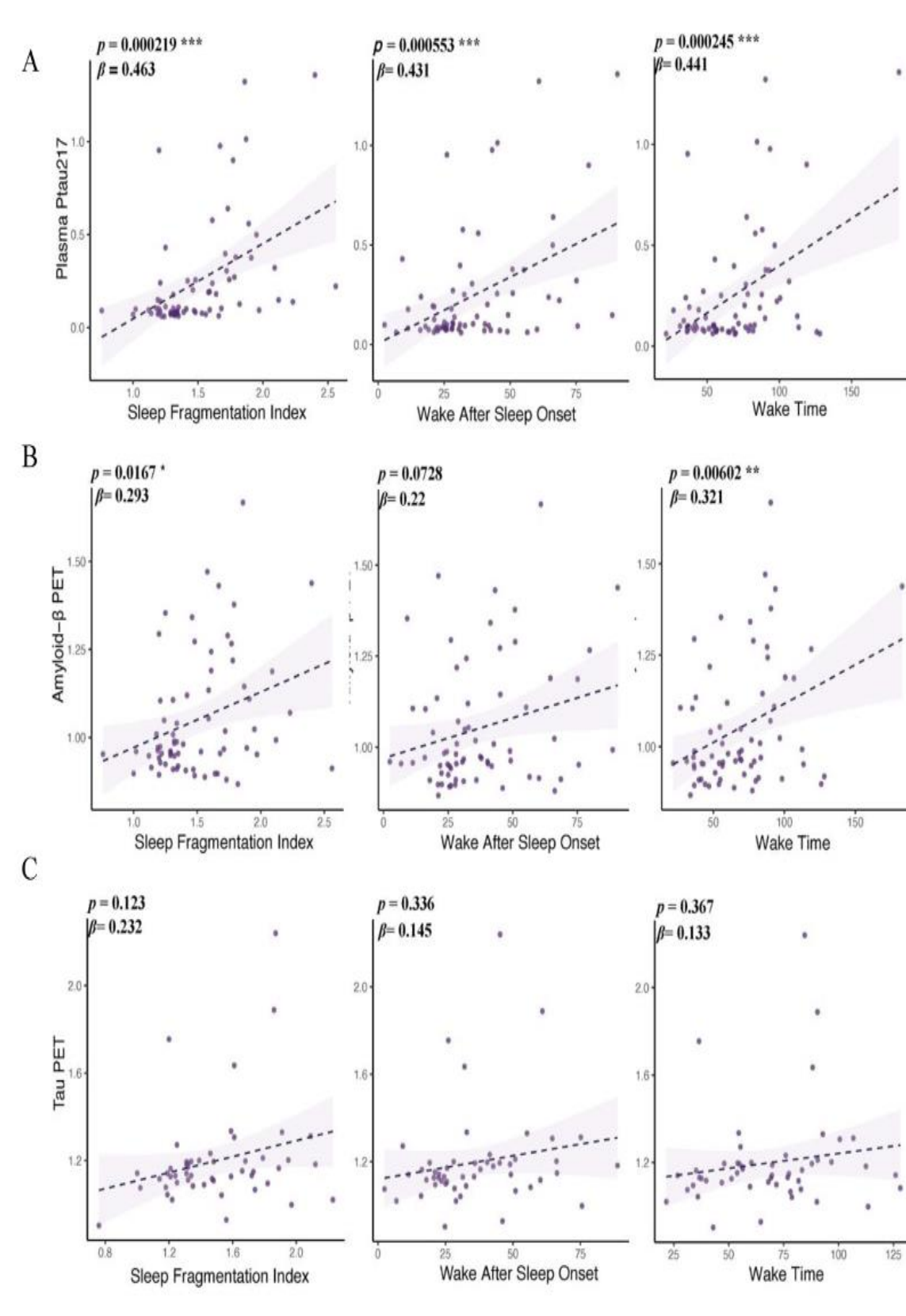


Figure2. Associations of sleep measurements and Alzheimer’s disease-related biomarker and PET imaging marker

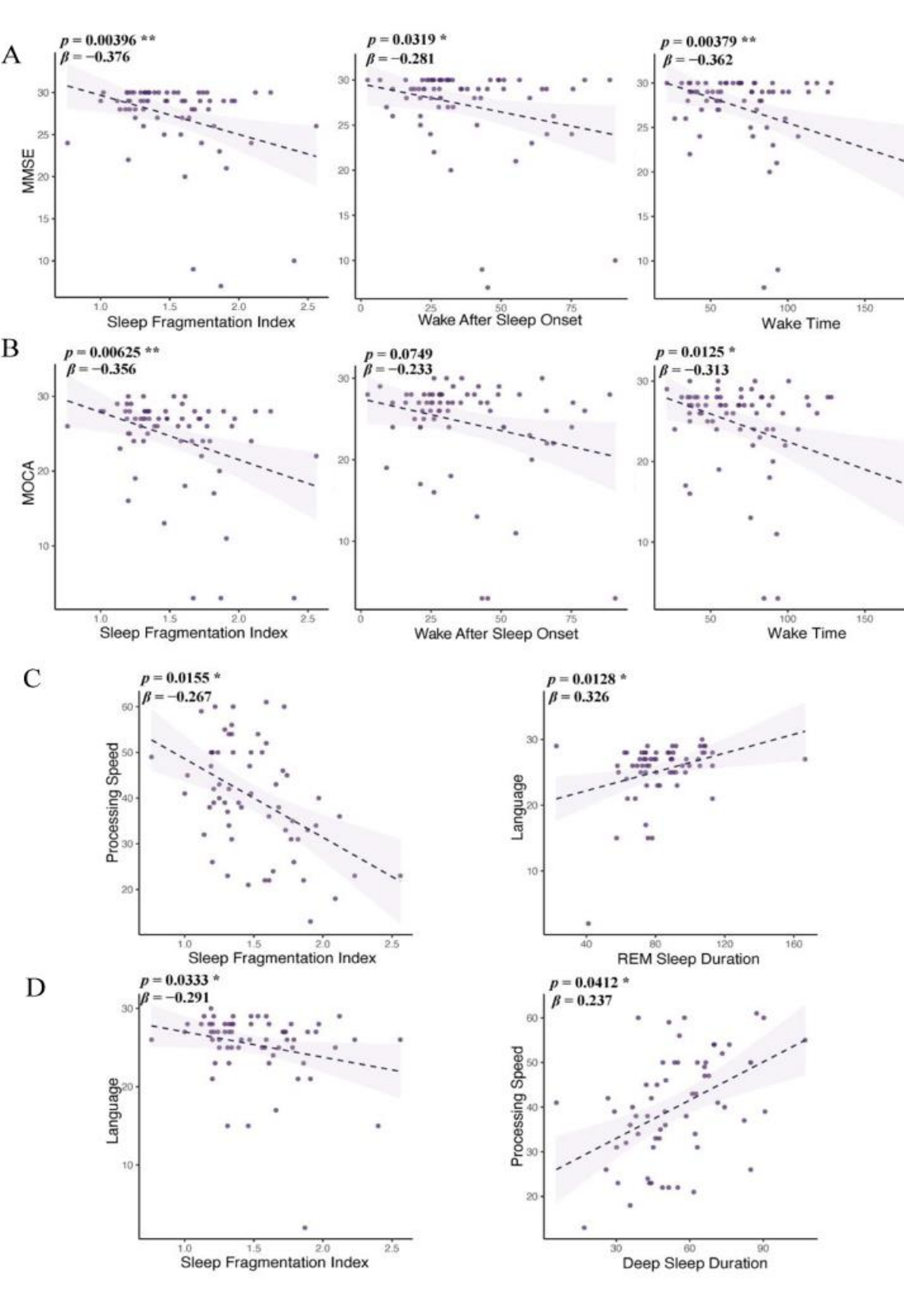


Figure3. Associations of sleep measurements with global cognition and Alzheimer’s disease-related specific Cognitive Function

Contact

Yiying Wang
Wangyiyingyep@icloud.com
Supervised By Prof. Tengfei Guo
Tengfei.guo@szbl.ac.cn

