Conclusions: These findings indicate that sex and *APOE* genotype interact to impact OSA expression and sleep-dependent episodic memory consolidation, and that the relationship between OSA expression during REM sleep and memory depends on both sex and *APOE* genotype. Taken together, the findings suggest that both sex and *APOE* genotype should be considered when examining relationships between sleep and cognitive impairment in older adults.

APOE-ε4 GENOTYPE AND SLEEP DISTURBANCE IN INDIVIDUALS WITH AND WITHOUT DEMENTIA

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Introduction: Apolipoprotein E Epsilon 4 (*APOE*-ε4) carrier status is an established risk factor for Alzheimer's Disease (AD) Dementia. It has also been linked with sleep disturbance in healthy older adults, increased insomnia risk and sleep disordered breathing in adults and children. This association may be driven by the effect of *APOE*-ε4 on AD pathological change, itself associated with sleep abnormalities. However, here we test the hypothesis that *APOE*-ε4 exerts an independent effect on sleep disturbance separate from its effects on AD pathology through evaluation of post-mortem histopathological findings in a cohort with and without cognitive impairment which underwent extensive pre-mortem clinical assessment.
Materials and Methods: This retrospective cohort study utilised UK Brain Banks Network data. Eligible subjects were aged over 50 and underwent pre-mortem neuropsychological assessments comprising the Neuropsychiatry Inventory measure of sleep disturbance (NPI-K), neurocognitive testing and functional cognitive status assessment through use of the Clinical Dementia Rating scale within 12 months of post-mortem. Neuropathological status was determined by full pathological evaluation of Thal phase, Braak tangle stage and CERAD scores (measures of Aβ plaque distribution, tangle distribution and neuritic plaque density respectively). Participants with significant intracerebral pathology or pathological features of non-AD dementia were excluded.
Multivariate linear regression was performed with NPIK Global Score consisting of the NPIK frequency score multiplied by severity score as the dependent variable and *APOE*-ε4 heterozygosity and homozygosity as independent variables. Covariates included age, gender, *APOE*-ε2 status, NPI measures reflecting depression and anxiety and the NIA-AA ABC Score reflecting AD neuropathology. Further models stratified by ABC score and functional cognitive status were also produced.
Results: 728 records were identified with 202 participants included in final analysis, mean (SD) age 84.0 (9.2) and MMSE 14.0 (11.8). Mean sleep disturbance scores were highest in those homozygous for *APOE*-ε4 (n=11), 4.55 (5.4), intermediate in those heterozygous for *APOE*-ε4 (n=95), 2.03 (4.0) and lowest in non *APOE*-ε4 carriers (n=96), 1.36 (3.3). Full multivariate regression controlling for pathological status, age, gender, depression, anxiety and CDR-SOB status, revealed *APOE*-ε4 homozygosity as independently associated with sleep disturbance (Est 2.53, p=0.034) and *APOE*-ε4 heterozygosity similarly independently associated in individuals without significant cognitive impairment (Est 1.21, p=0.048).
Conclusions: These findings lend weight to the hypothesis that *APOE*-ε4 genotype confers effects on sleep independent from those arising directly from intracerebral AD pathological change. There are a range of plausible mechanisms by which this effect could be exerted, further systematic testing of which would enhance understanding of sleep disturbance pathways and potentially provide treatment targets for this distressing symptom also linked to AD progression.
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INFANT SLEEP AS A MARKER OF NEURODEVELOPMENT

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Introduction: The brain develops rapidly during infancy and early childhood and sleep plays a crucial role in this development. Sleep patterns, as viewed on the EEG, evolve as a consequence of brain maturation and quantitative features of sleep may represent biomarkers of neurodevelopment. In this study we analysed macrostructural, sleep spindle and quantitative features (qEEG) of the sleep EEGs of infants at 4-months of age to identify features that are associated with neurodevelopment at 18 months.
Materials and Methods: Neonates born at term were recruited at Cork University Maternity Hospital, Ireland. EEGs were recorded during a nap at 4-months. Sleep was staged according to AASM criteria and spindles were identified manually. Macrostructural features analysed included: latencies to sleep and to REM, duration of 1st cycle sleep stages. Sleep spindle features analysed included: number, density, mean frequency, Brain Symmetry Index (spindles only), synchrony and spectral power. qEEG features analysed included: range-EEG, spectral power, interhemispherical coherence and Brain Symmetry Index. qEEG results were compartmentalised into sleep stages and frequency ranges. At 18 months of age, the participants had a Griffiths-III neurodevelopmental assessment evaluating the following domains: A – Foundations of Learning, B - Language and communication; C - Eye and Hand Coordination; D – Personal-Social-Emotional and, E – Gross Motor; a general developmental score (GD) was also calculated from the subscales. Relationships between sleep features and neurodevelopmental outcome were assessed using Spearman's correlation coefficient and the Partial Rank correlation coefficient (adjusting for postnatal age of both EEG and Griffiths-III assessments, gestational age, and sex).
Results: A recorded sleep at 4 months with accompanying clinically normal EEG and a neurodevelopmental assessment at 18 months was available for 92 infants. The mean (SD) postnatal age was 19.6 (1.3) weeks at the sleep recording and 18.5 (0.4) months at neurodevelopmental assessment. Only infants who had a full first sleep cycle recorded (n=69) were included in sleep macrostructure and qEEG analysis. After adjusting for postnatal age of both EEG and Griffiths-III assessments, gestational age, and sex, sleep macrostructure parameters showed no association with neurodevelopmental outcomes at 18 months. Positive statistically significant correlations were observed between upper and lower range-EEG margins (similar to amplitude-integrated EEG) and, B subscale (r=[0.25-0.26]); positive significant correlations were found between EEG spectral power particularly between low-frequency delta and subscales: B, D, E and GD (r=[0.24-0.33]); interhemispherical coherence in beta and gamma frequencies during N2 sleep was positively correlated with subscale A and gamma with GD (r=[0.27,0.30]) whilst coherence in delta frequencies during REM showed negative correlation with subscale D (r=[-0.39,-0.30]). Sleep spindles synchrony was negatively correlated with subscales C, D, and E and GD (r=[-0.33,-0.24]); spindle duration was also negatively correlated with D and E subscales (r=[-0.32,-0.22]).
Conclusions: Several sleep features at 4-months age were associated with neurodevelopmental outcomes at 18-months. EEG analysis may be useful as an early biomarker for abnormal development, allowing early intervention. Further analysis should include similar EEG analyses of neurodiverse patient groups.
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INSOMNIA DISORDER PREDICTS SELF-REPORTED COGNITIVE DECLINE IN MIDDLE-AGED AND OLDER ADULTS

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