# Ultradian modulation of cortical arousals during sleep: effects of age and exposure to nighttime transportation noise

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The present study aimed at assessing the temporal non-rapid eye movement (NREM) EEG arousal distribution within and across sleep cycles and its modifications with aging and nighttime transportation noise exposure, factors that typically increase the incidence of EEG arousals.; Twenty-six young (19-33 years, 12 women) and 16 older (52-70 years, 8 women) healthy volunteers underwent a 6-day polysomnographic laboratory study. Participants spent two noise-free nights and four transportation noise exposure nights, two with continuous and two characterized by eventful noise (average sound levels of 45 dB, maximum sound levels between 50 and 62 dB for eventful noise). Generalized mixed models were used to model the time course of EEG arousal rates during NREM sleep and included cycle, age, and noise as independent variables.; Arousal rate variation within NREM sleep cycles was best described by a u-shaped course with variations across cycles. Older participants had higher overall arousal rates than the younger individuals with differences for the first and the fourth cycle depending on the age group. During eventful noise nights, overall arousal rates were increased compared to noise-free nights. Additional analyses suggested that the arousal rate time course was partially mediated by slow wave sleep (SWS).; The characteristic u-shaped arousal rate time course indicates phases of reduced physiological sleep stability both at the beginning and end of NREM cycles. Small effects on the overall arousal rate by eventful noise exposure suggest a preserved physiological within- and across-cycle arousal evolution with noise exposure, while aging affected the shape depending on the cycle.
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