

Inter-individual differences in the effects of aircraft noise on sleep fragmentation

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Environmental noise exposure has been shown to disturb sleep and impair recuperation, and may contribute to the increased risk for (cardiovascular) disease. Noise policy and regulation are usually based on average responses, although substantial inter-individual differences in the effects of traffic noise on sleep have been demonstrated even in relatively homogeneous and healthy populations. In this analysis, we investigated what percentage of the total variance in noise-induced awakening reactions can be explained by stable inter-individual differences. It is based on 72 healthy subjects (age range 18-71 years, 32 male) who participated in a polysomnographic laboratory study on the effects of traffic noise on sleep and were investigated for 11 consecutive nights. This analysis concentrates on 4 exposure nights where subjects were exposed to 80 noise events from air, road, and/or rail traffic noise with maximum sound pressure levels varying between 45 and 65 dB(A). Mixed-effects models of variance controlling for age, gender, study phase, study night, noise exposure in the previous night, and awakening probability in noise-free nights showed that 53.7% of the total variance was explained by inter-individual differences. The results thus demonstrate that a considerable amount of the variance observed in noise-induced sleep disturbance can be explained by inter-individual differences that cannot be explained by age, gender, or specific study design aspects. It will be important to identify those at higher risk for noise induced sleep disturbance. Furthermore, the custom to base noise policy and legislation on average responses should be re-assessed based on these findings.