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Living close to the railway: On the associations of vibration and noise on sleep disturbances.

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ABSTRACT (250)

Railway is considered a sustainable transportation mode, and traffic is expected to increase. Rail transportation emits noise and vibration, with highest level vibration generated by freight trains predominantly trafficking during night-time, hence there is a risk for sleep disturbances. While experimental studies indicate a high risk for physiological sleep being acutely affected, there is a lack of knowledge on how long-term exposure to vibration and noise affect sleep. This cross-sectional study therefore aimed to investigate the associations between railway vibration and noise and self reported sleep.

The study population (N=7280) was randomly selected from residents living within 1km of a trafficked railway in Sweden. Sleep, health and possible moderating factors were assessed using a questionnaire. Exposures were modelled and linked to respondents' addresses

Exposure response relationships were derived between exposure to noise and vibration and sleep disturbance due to vibration. The fully adjusted odds ratio for sleep disturbance was 1.39 (95% CI 1.34-1.45) per 0.1 mm/s Vmax, whereas it was 1.21 (95%CI 1.18-1.24) per 1dB Lnight. Findings suggest an interaction between noise and vibration. The probability of sleep disturbance to vibration increased with vibration level, particularly for low noise levels, while at higher vibration levels, an increase in noise level did not seem to add to the probability of sleep disturbance.

In conclusion: Sleep disturbance was significantly associated with vibration and noise levels. The proportion of highly sleep disturbed showed an increase already from 0.2 mm/s Vmax and from 45 dB Lnight. The interactions need to be further explored.

Keywords: Sleep, noise, vibration, railway