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A field study of effects of road traffic and railway noise on polysomnographic sleep parameters

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ABSTRACT

The aim of this study was to explore and compare the effect of noise from railway and road traffic on sleep in subjects habitually exposed to road traffic noise. Forty young and middle-aged healthy subjects were studied with polysomnography (PSG) during two consecutive nights in their own bedroom. Noise measurements and recordings were conducted concurrently outside of the bedroom façades as well as inside the bedroom of each participant. Different noise exposure parameters were calculated ($L_{Aeq,night}$, $L_{max,night}$, and $L_{max,fast}$) and evaluated in relation to sleep stage and awakenings. The group exposed to railway noise had significantly less Rapid eye movement (REM) sleep than the group exposed to road traffic noise. A significant association was found between the maximum level ($L_{max,fast}$) of railway noise and time spent in REM sleep. REM sleep was significantly correlated to the number of awakenings to railway noise event above 50 dB inside the bedroom. These results, obtained in an ecological valid setting, support previous laboratory findings that railway noise has a stronger impact than road traffic noise on physiological parameters during sleep, and that the maximum noise level is an important predictor of noise effects on sleep assessed by PSG, at least for railway noise.

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