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## Night time aircraft noise exposure and children's cognitive performance

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### Abstract

Chronic aircraft noise exposure in children is associated with impairment of reading and long-term memory. Most studies have not differentiated between day or nighttime noise exposure. It has been hypothesized that sleep disturbance might mediate the association of aircraft noise exposure and cognitive impairment in children. This study involves secondary analysis of data from the Munich Study and the UK Road Traffic and Aircraft Noise Exposure and Children's Cognition and Health (RANCH) Study sample to test this. In the Munich study, 330 children were assessed on cognitive measures in three measurement waves a year apart, before and after the switchover of airports. Self-reports of sleep quality were analyzed across airports, aircraft noise exposure and measurement wave to test whether changes in nighttime noise exposure had any effect on reported sleep quality, and whether this showed the same pattern as for changes in cognitive performance. For the UK sample of the RANCH study, night noise contour information was linked to the children's home and related to sleep disturbance and cognitive performance. In the Munich study, analysis of sleep quality questions showed no consistent interactions between airport, noise, and measurement wave, suggesting that poor sleep quality does not mediate the association between noise exposure and cognition. Daytime and nighttime aircraft noise exposure was highly correlated in the RANCH study. Although night noise exposure was significantly associated with impaired reading and recognition memory, once home night noise exposure was centered on daytime school noise exposure, night noise had no additional effect to daytime noise exposure. These analyses took advantage of secondary data available from two studies of aircraft noise and cognition. They were not initially designed to examine sleep disturbance and cognition, and thus, there are methodological limitations which make it less than ideal in giving definitive answers to these questions. In conclusion, results from both studies suggest that night aircraft noise exposure does not appear to add any cognitive performance decrement to the cognitive decrement induced by daytime aircraft noise alone. We suggest that the school should be the main focus of attention for protection of children against the effects of aircraft noise on school performance.

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