14th ICBEN 2023 18 - 22 JUNE BELGRADE

14th ICBEN Congress on Noise as a Public Health Problem

Aircraft noise effect on self-reported health through noise annoyance: causal mediation analysis in the DEBATS longitudinal study in France

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ABSTRACT

Transportation noise seems to impair self-reported health (SRHS). However, the causal effect of noise on health remains poorly identified and few studies have considered the role of noise annoyance in this deleterious effect in a longitudinal study. This study aims to investigate the noise annoyance as mediator in the causal effect of noise on health using a causal inference approach.

The DEBATS longitudinal study included in 2013, 1,244 participants aged over 18 years and living around three French airports. These participants were followed up in 2015 and 2017. They self-reported their perceived health status, aircraft noise annoyance, and noise sensitivity via a questionnaire during the three visits. Noise maps were used to estimate outdoor aircraft noise levels in four zones: <50, 50-54, 55-59 and ≥ 60 dBA in L_{den}. A causal mediation analysis based on inverse probability weighting was performed to evaluate the mediation effect of aircraft noise annoyance.

The total effect of aircraft noise levels on impaired SRHS was OR=1.39, 95%CI: 1.06 to 2.12, for 50-54 dBA vs <50 dBA. About 48% of this total effect was mediated by aircraft noise annoyance (indirect effect: OR=1.17, 95%CI: 1.12 to 1.24). The effect of aircraft noise exposure on impaired SRHS increased with increasing noise levels. The proportion of this effect mediated by noise annoyance remained relatively stable when comparing noise levels to <50 dBA.

The results of this study strengthens those of previous cross-sectional studies in supporting the mediating role of noise annoyance in the effect of aircraft noise on impaired SRHS.

Keywords: epidemiology; aircraft noise exposure; general health; self-reported health; mediation analysis.