Airport noise and cardiovascular disease
The link seems real: planners take note

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Environmental noise is an understudied environmental pollutant that has important implications for public health and policy. Although studies of exposure to aircraft noise have examined the risk of hypertension, few have examined the risk of cardiovascular disease. One early study suggested that exposure to aircraft noise around Schiphol airport, Amsterdam, was related to medical treatment for heart disease and hypertension and the use of cardiovascular drugs after adjusting for age, sex, smoking, height and weight, and socioeconomic status. Two linked BMJ studies have investigated the association between cardiovascular disease and airport noise. The study by Hansell and colleagues (doi:10.1136/bmj.f5432) found an increased risk of stroke, coronary heart disease, and cardiovascular disease for both hospital admissions and mortality in relation to daytime and night-time exposure to aircraft noise in people living around Heathrow airport, London. The results were adjusted for area level ethnicity, social deprivation, lung cancer as a proxy for smoking, road traffic noise exposure, and air pollution. A dose-response association was seen between admissions to hospital for cardiovascular disease and the level of aircraft noise.

In a separate study around 89 North American airports, Correia and colleagues (doi:10.1136/bmj.f5561) found that airport noise, characterised by the 90th centile of noise exposure within zip code tabulation areas, was significantly associated with a higher relative risk of hospital admission for cardiovascular disease in older American Medicare recipients. The results were adjusted for age, sex, and race as well as area level socioeconomic status and ethnicity.

These new studies add to the research evidence linking noise exposure and cardiovascular disease. The largest comparable recent study was a follow-up of the Swiss national cohort in which aircraft noise was associated with mortality from myocardial infarction, in a dose-response manner according to the level and duration of exposure. Exposure to aircraft noise was linked to cardiovascular risk factors, such as hypertension, in an dose-response manner in the HYENA (Hypertension and Exposure to Noise near Airports) study. This is the largest study of aircraft noise and hypertension to date, involving 4861 participants living around seven European airports. A linked substudy on acute noise found an increase in participants’ blood pressure when they were sleeping regardless of the source of the noise (road traffic noise, aircraft noise, or noise from inside the home).

Increased rates of prescription for cardiovascular drugs and antihypertensive drugs have also been related to exposure to aircraft noise, although the results for antihypertensive drugs were inconsistent. A meta-analysis of five studies of hypertension and exposure to aircraft noise reported a pooled estimate odds ratio of 1.13 for an increase of 10 dB (95% confidence interval 1.00 to 1.28; range 45-70 dB). However, only one aircraft noise study has shown an increased incidence of hypertension.

More studies have looked at exposure to road traffic noise than aircraft noise. Road traffic noise was linked to hypertension in men, but not women, in the HYENA study. It was also associated with hypertension in people aged 45-55 years (odds ratio 1.2) and at higher exposure (exposure weighted for each period over 24 hours >55 dB) in the Groningen study (PREVEND cohort). Road traffic noise was also associated with myocardial infarction in two prospective studies in case-control studies in men resident in Germany for more than 10 years, and in a subsample from a Swedish study after excluding hearing impaired participants and those exposed to other noise sources. A recent meta-analysis reported a dose-response association between daytime road traffic noise and myocardial infarction (odds ratio 1.47, 0.79 to 2.76 for those exposed to >75 dB <55 dB). Exposure to road traffic noise was also related to mortality from coronary heart disease after adjusting for air pollution in two studies, although associations diminished after adjustment for black smoke concentrations and traffic intensity in one.

The two new studies are better powered than earlier studies, using advanced statistical methods for area level analyses, adjusting for confounding factors such as air pollution, and including high levels of exposure around Heathrow airport. They also found new associations with hospital admissions for cardiovascular disease as well as mortality. The link between aircraft noise and death from stroke is new and fits with...
associations between aircraft noise and hypertension and between road traffic noise and death from stroke.\(^{30}\)

Inevitably, these ecological level analyses cannot include individual level confounding factors, such as smoking and household income, and both exposure and outcome misclassification will reduce the precision of associations. There is a need for prospective cohort studies of exposure to aircraft and road traffic noise and links with cardiovascular disease that assess risk factors for cardiovascular disease, morbidity and mortality, and that also take account of air pollution, social disadvantage, and migration in and out of study areas. It would be good to separate out the effects of daytime and night-time noise, the influence of occupational noise exposure, and the possible ameliorative effect of access to quiet areas and sound insulation of buildings.

These studies provide preliminary evidence that aircraft noise exposure is not just a cause of annoyance, sleep disturbance, and reduced quality of life but may also increase morbidity and mortality from cardiovascular disease. The results imply that the siting of airports and consequent exposure to aircraft noise may have direct effects on the health of the surrounding population. Planners need to take this into account when expanding airports in heavily populated areas or planning new airports.

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