

Science for Environment Policy

Aircraft noise at night can result in dysfunction of blood vessels and cause long-term cardiovascular disease

Recent research into the impact of different levels of noise on 75 volunteers reveals that disturbed sleep caused by night-time aircraft noise can damage blood vessels and increase the levels of stress hormones. As these physical changes are potential pathways to high blood pressure, heart and circulatory disease over the long term, reducing night-time aircraft noise is important for preventing cardiovascular disease in people living near airports.

Aircraft noise tends to be more annoying and disruptive to sleep than road and rail traffic noise, and long-term night-time exposure to aircraft noise is implicated in cardiovascular disease (such as heart attacks and strokes) more than day-time exposure to aircraft noise.

People need sleep to maintain normal good health and this depends not only on the length of a night's sleep but also its quality. Repeated noise disturbances, with or without waking up, interrupt the restorative powers of sleep, and cause a person's blood pressure to fluctuate in response to the noise.

In this study, the researchers tested the impact of night-time aircraft noise on 75 healthy volunteers aged between 20 and 60 years. All the participants were exposed to recordings of different patterns of aircraft noise in their own homes. On one night the volunteers were exposed to background noise, as a control, and on the other two nights they were exposed to repeated aircraft noise either 30 or 60 times during the night. Volunteers kept to their normal sleep patterns and on the nights of exposure to aircraft noise, the noise event sequence lasted for 415 minutes. The researchers monitored the blood pressure and heart rate of the volunteers during the night.

The following morning, the volunteers visited a laboratory where the researchers used ultrasound to measure changes to the diameter of the main artery in the arm, which affects bloodflow. The results revealed that the arteries were stiffer (also called endothelial dysfunction) after an aircraft noise night, and the more severe the noise, the less flexible the blood vessels became. This suggests that the blood vessels were affected by poor sleep as a result of the aircraft noise.

In those volunteers who were first exposed to 30 episodes of aircraft noise, the effect on their arteries became worse (the arteries became less flexible) when they were then exposed to 60 noise episodes during the night. Thus, the vessel does not adapt to noise, but becomes more sensitive. Moreover, blood pressure increased in response to the aircraft noise.

The researchers also tested the volunteers' blood for stress (fight-or-flight) hormones, and found there was a significant increase in adrenaline levels after exposure to nights where the volunteers were exposed to the aircraft noise. Volunteers also reported poor sleep quality on the noise nights. Over a long period of time, this repeated exposure to aircraft noise can result in permanently high blood pressure due to more rigid blood vessels, potentially leading to cardiovascular disease.

In further tests, five volunteers, who had been exposed to a 60-event aircraft noise night, were given Vitamin C in the laboratory. The researchers detected an improvement in arterial flexibility. Vitamin C is a powerful anti-oxidant, and the researchers suggest the mechanism by which the arteries become less flexible is related to oxidative stress of the blood vessels as a result of exposure to the aircraft noise.

Taken together, the observed stiffening of the arteries (even in young healthy adults), and the increase in adrenaline levels, combined with volunteers' reported poor sleep quality, indicate that their raised blood pressure was most likely related to the aircraft noise at night, suggest the researchers. As this can lead to cardiovascular disease, night-time aircraft noise may be considered as a new risk factor. Reducing noise from aircraft at night would help prevent heart and circulatory problems in people living near airports.



January 2015
Thematic Issue 47

Noise impacts
on health

Subscribe to free
weekly News Alert

Source: Schmidt, F.P., Basner, M., Kröger, G. *et al.* (2013) Effect of nighttime aircraft noise exposure on endothelial function and stress hormone release in healthy adults. *European Heart Journal*. DOI:10.1093/eurheartj/eh269

Contact: tmuenzel@uni-mainz.de

Read more about:
[Environment and health, Noise](#)

The contents and views included in *Science for Environment Policy* are based on independent, peer-reviewed research and do not necessarily reflect the position of the European Commission.

To cite this article/service: "[Science for Environment Policy](#)": European Commission DG Environment News Alert Service, edited by SCU, The University of the West of England, Bristol.