

Aircraft Noise and Health Effects – a six monthly update

CAP 2113



Published by the Civil Aviation Authority, 2021

Aviation House,
Beehive Ring Road,
Crawley,
West Sussex
RH6 0YR

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Chapter 1

Introduction

- 1.1 This report is an update on recent work and findings in the field of aircraft noise and health effects. It covers published research from September 2020 – March 2021. There were no relevant acoustics Congresses held during this period, so the report will provide an overview of the recently published papers in the area of noise and health, and includes a summary of the Neighbourhood Environmental Survey, conducted by the Federal Aviation Administration (FAA).
- 1.2 The aim of the report is to provide a succinct overview of new work relating to aviation noise and health, and such updates are published on a six-monthly basis. This report has been published to provide the public and the aviation industry with a concise and accessible update on recent noise and health developments. It should be noted that the CAA has not validated any of the analysis reported at the conference, nor takes any view on their applicability to UK policy making. The authors would like to thank Bernard Berry (Bel acoustics) for his valued contribution to the source material.

Chapter 2

Research findings

- 2.1 The following research findings were published during the past six months since September 2021. They are presented in this chapter according to subject area.

Aircraft Noise and Mental Health

- 2.2 Li et al. published a paper examining aircraft noise control policy and mental health. The study focused on older adults and included data on the impact of environmental noise policy on depressive symptoms from a national experiment provided by the New Deal aircraft noise control policy, which was introduced in Schiphol Amsterdam in 2008.
- 2.3 The study focused on adults aged between 57-102 years old. The rationale for examining this age range was that noise studies are often conducted on younger adults or the general population. Older people may be at increased risk due to environmental noise due to their lower residential mobility, increased time spent at home and higher sensitivity to environmental influences on sleep disturbance and annoyance.
- 2.4 In response to the EU Noise Directive, which requires countries to produce noise maps and action plans every 5 years, there have been new noise control policies introduced across European countries. In Schiphol, Amsterdam, a noise control policy was approved in 2008, called the 'Nuisance Limit and Schiphol Development Deal'. This resulted in changes to flight routes and night procedures. The Schiphol Deal aimed to reduce by 5% the number of individuals experiencing disturbance inside the 48 dBA Day-evening-night level (L_{den}) noise contour.
- 2.5 Over 1,700 participants were included in the study in each of the three waves (2005/2006, 2008/2009 and 2011/2012) of the Longitudinal Aging Study Amsterdam (LASA). Depressive symptoms were measured with the Centre for Epidemiologic Studies—Depression (CES-D) scale, a validated 20-item measure to detect both clinical and non-clinical depressive symptoms. The 0-60-point scale measures features of depression, for example: mood, feeling worthlessness, helplessness and hopelessness. These symptoms were measured before and after the new noise policy was implemented, in people living less than 15 km from the airport, and those living further away (>15 km).
- 2.6 The address-level aircraft noise data for 2005, 2008 and 2012 were first aggregated at six-digit postcode level and then linked to LASA participants in the 2005/2006, 2008/2009 and 2011/2012 waves. Information on participants' age,

marital status, employment, retirement, household income and physical functioning were also included.

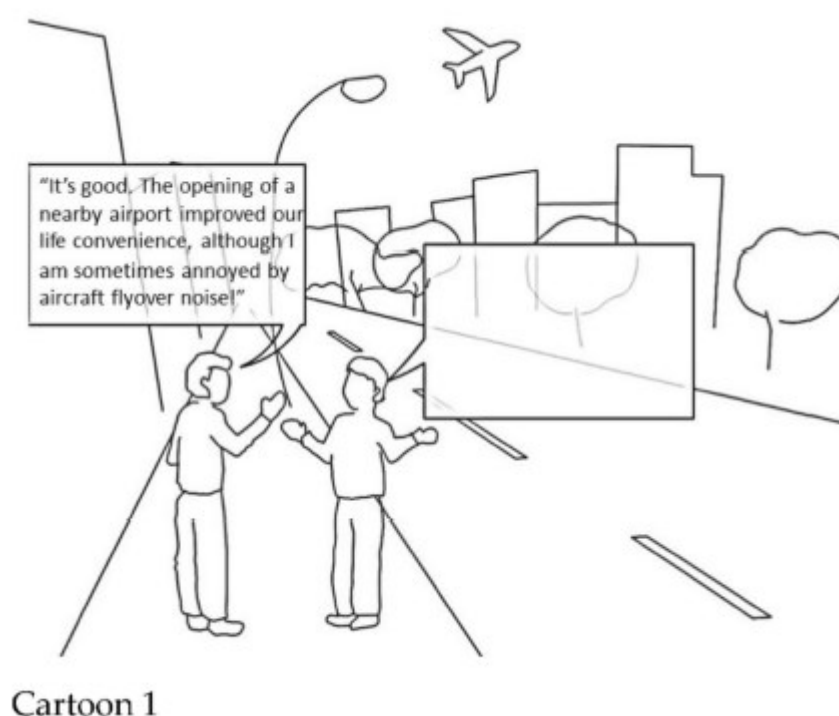
- 2.7 A difference-in-differences (DiD) approach was used by the researchers to assess the impact of the Schiphol New Deal policy. An estimation of the impact of the policy on aircraft noise levels was made, by comparing changes in noise levels before and after the implementation of the policy for individuals in households located close to the airport (treatment group), and compared these to changes in noise levels for individuals living far from the airport (control group). Treatment was defined as living closer than 15 km from Schiphol Airport.
- 2.8 The results indicated that participants living closer to the airport were exposed to higher levels of aircraft noise and reported higher average levels of depressive symptoms relative to those living further away. Noise levels remained constant in control areas (far from the airport), while they decreased in 2009 before increasing again in 2012 in treatment areas (close to the airport). Levels of depressive symptoms remained constant in treated areas, while control areas experienced a reduction over the study period, leading to a widening gap between the two groups.
- 2.9 The authors concluded that the study found no evidence that a policy that aimed to reduce aircraft noise around Schiphol airport resulted in reduced noise levels. There was also no evidence that the policy reduced depressive symptoms in older people living close to the airport.
- 2.10 It was suggested that existing approaches for reducing aircraft noise may not be effective at making further reductions over what has already been achieved, and therefore have a limited potential to impact the mental well-being of older people.
- 2.11 The authors explain that these findings suggest that existing noise control policies may need to be revised or expanded to generate significant changes. Further research should examine whether more comprehensive policies in other airports may have had larger effects on noise and the mental wellbeing of older people.

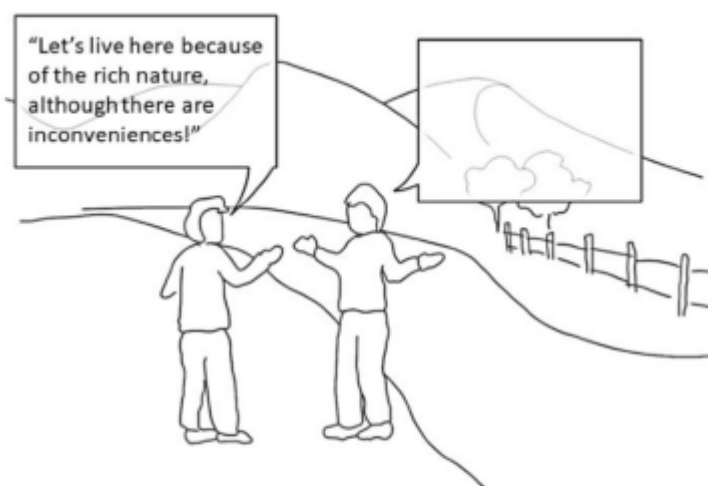
Attitudes to Aircraft Noise

- 2.12 Nguyen et al published a paper on the assessment of residents' attitudes to aircraft noise around Hanoi Noi Bai International Airport, in Vietnam. A new terminal building at the Hanoi Noi Bai International Airport (NBIA) was completed and opened in December 2014 with plans to increase the airport capacity to cope with the growing demand for aircraft movements. This study was conducted after the opening of a new terminal building in September 2015, with the aim of investigating people's attitudes toward the airport, aircraft noise, their living environment, and their awareness of environmental protection of their

communities, as well as to clarify a variety of public opinions related to the Airport.

- 2.13 In this study, in addition to a questionnaire, the researchers used the Rosenzweig Picture-Frustration test (P-F test), which is a tool to explore an individual's real feelings toward frustrating situations using cartoons and uses open-ended questions and allows participants to imagine their circumstances.
- 2.14 The test involves a participant responding verbally to a semi-ambiguous picture scenario. The test form consists of 24 comic strip pictures that portray a situation that might induce frustration to assess how the participant responds to frustration and frustrating situations. The test assumes that the way that the participant responds to each frustrating situation depicts how they behave in the face of frustration. The aim of the test is to measure the type of reaction, not the type of personality.
- 2.15 In the P-F test, the reactions to the pictures must be written down. Therefore, it is expected to reveal respondents' real thought content more directly than if respondents must rate their response on a verbal or numeric scale used in the questionnaire surveys. In this study, a set of cartoons for the P-F test were developed as a new means to examine the environmental attitudes of residents living near an airport, concerning their desires and preferences of life convenience and environmental protection. The aim was then to use the findings to assist with the employment of effective noise-abatement programs that not only focus on decreasing noise emission, but also seek solutions to enhance the co-existence of an airport and local communities. The cartoons 1-5 below are examples of those included in the P-F test in this study.





Cartoon 2



Cartoon 3



Cartoon 4



Cartoon 5

Figure 1: Examples of cartoons included in the P-F test to assess attitudes to aircraft noise and the environment.