

# Project 003

## Cardiovascular Disease and Aircraft Noise Exposure

### Motivation and Objectives

Noise and CVD in NHS
Use <b>Nurses' Health Studies</b> to study <ul style="list-style-type: none"> <li>Cardiovascular disease incidence &amp; mortality</li> <li>Hypertension</li> <li>Sleep</li> </ul>
New Cohorts
<ul style="list-style-type: none"> <li>Women's Health Initiative (WHI)</li> <li>Hispanic Community Health Study / Study of Latinos (HCHS/SOL)</li> <li>The National Longitudinal Study of Adolescent to Adult Health (Add Health)</li> </ul>
New Outcomes
<ul style="list-style-type: none"> <li>Intermediaries (e.g., adiposity &amp; diabetes)</li> <li>Mental health (e.g., depression)</li> </ul>
New Data Sets
<ul style="list-style-type: none"> <li>Additional airports (28)</li> <li>Additional time periods (2019)</li> </ul>

**Objective:**  
Evaluate relationships between aircraft noise exposure and human health in diverse populations

### Methods and Materials

#### Cohorts used to examine health effects of aircraft noise:



**Noise exposure:** Day-night average sound level (DNL) for 90 airports, 1995 – 2015 in 5-year intervals

#### Current outcomes studied:

- Depression\*
- Depressive symptoms (severity)
- Anxiety disorder
- Sleep quality & quantity
- Cardiometabolic outcomes

#### Statistical methods:

- Dependent on outcome of interest
- Linear mixed methods
- Generalize estimating equations
- Cox proportional hazards

#### Covariates:

- Age, time period, individual-level & neighborhood-level characteristics, air pollution, and other confounders depending on outcome of interest



### Summary

**This project is contributing to the body of knowledge of the potential health impacts of noise and addresses the gap of limited noise and health studies in the US, which is vital for informing policy and regulation.**

#### Recent publications resulting from Project 003:

- Peters et al. 2024. Long-term nighttime aircraft noise exposure and risk of hypertension in a prospective cohort of female nurses. *International Journal of Hygiene and Environmental Health*.
- Bozigar et al. 2024. Aircraft noise exposure and general obesity among female participants in two Nurses' Health Study prospective cohorts living around 90 airports in the United States. *Environment International*.
- Grady et al. 2023. Associations between long-term aircraft noise exposure, cardiovascular disease, and mortality in US cohorts of female nurses. *Environmental Epidemiology*.
- Bozigar et al. 2023. Associations between Aircraft Noise Exposure and Self-Reported Sleep Duration and Quality in the United States-Based Prospective Nurses' Health Study Cohort. *Environmental Health Perspectives*.
- Nguyen et al. 2022. Long-term aircraft noise exposure and risk of hypertension in postmenopausal women. *Environmental Research*.
- Simon et al. 2022. Sociodemographic Patterns of Exposure to Civil Aircraft Noise in the United States. *Environmental Health Perspectives*.
- Kim et al. 2021. Long-term aircraft noise exposure and risk of hypertension in the Nurses' Health Studies. *Environmental Research*.

**Lead investigator: Junenette Peters, ScD**

**Email: [petersj@bu.edu](mailto:petersj@bu.edu)**

**Boston University School of Public Health  
Project manager: David Senzig, FAA**

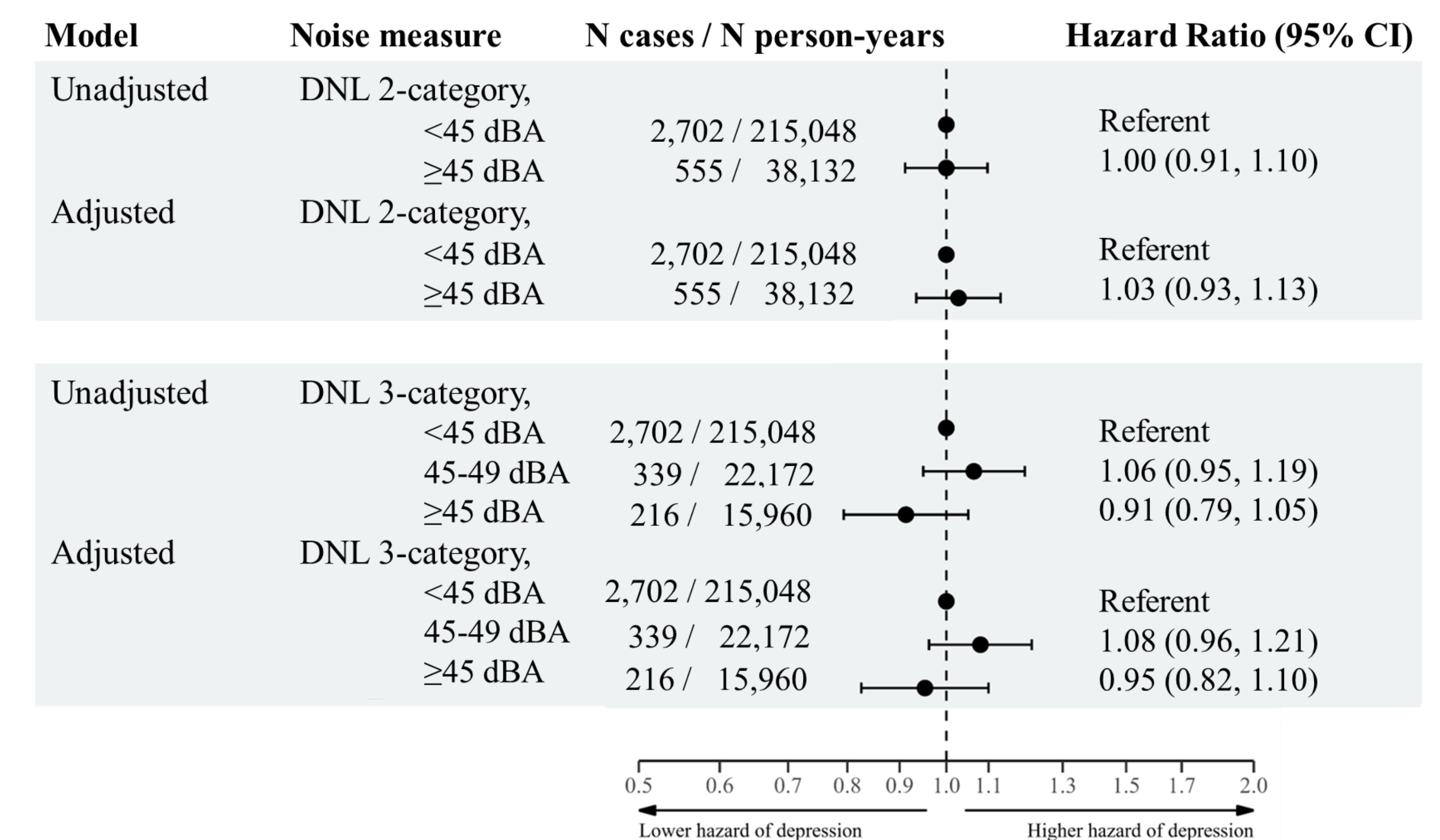
**October 15, 2025**

### Results



Nurses' Health Study

Hazard ratios (95% confidence intervals) for associations between aircraft noise operationalized as 2- and 3- categories and depression in NHS for unadjusted and multivariable adjusted variables



Multivariable adjusted models include age, time period, race/ethnicity, individual- and neighborhood-level socioeconomic status, region, air pollution, and population density

### Conclusions and Future Work

#### Conclusions for aircraft noise & incident depression in NHS II:

- Do not see consistent associations linking increasing aircraft noise and incident depression
- Analysis limited in number of depression cases who are exposed to high levels of aircraft noise
- With an average age of 54.2 years, incident depression may not reflect the most biologically relevant time of exposure
- Would be more informative to examine depressive symptom severity for an older population

#### Future work:

- Link noise estimates to HCHS/SOL cohorts
- Analyses underway examining associations of DNL & NL with depressive symptoms in older women (NHS I and NHS II) & young adults (Add Health)
- Analyses underway examining associations of DNL & NL with sleep measures in older women (WHI)