



Project 003 Cardiovascular Disease and Aircraft Noise Exposure

Boston University

Project Lead Investigator

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University Participants

Boston University

- P.I.s: Prof. Jonathan Levy (university P.I.), Prof. Junenette Peters (project P.I.)
- FAA Award Number: 13-C-AJFE-BU-032
- Period of Performance: October 1, 2024, to September 30, 2025
- Tasks:
 1. Present on noise and health research in the United States (U.S.).
 2. Perform preliminary analyses of an intermediary risk factor (diabetes) and aircraft noise exposure.
 3. Develop a data analysis plan and perform preliminary analyses of generalized anxiety disorder and aircraft noise exposure.
 4. Develop a data analysis plan and perform preliminary analysis of incident depression and aircraft noise exposure.
 5. Develop analysis plan and submit manuscript proposal on sleep outcomes and aircraft noise exposure.
 6. Review and rerun analyses, and revise manuscript on cardiovascular disease and aircraft noise exposure.
 7. Receive participant addresses, perform data processing for linking with new cohort and develop data use procedures.
 8. Define request for noise data for additional year and airports.

Massachusetts Institute of Technology

- Sub-P.I. and co-P.I.: Prof. R. John Hansman (sub-P.I.), Dr. Florian Allroggen (sub-co-P.I.)
- Task (Boston University and Massachusetts Institute of Technology):
 1. Prepare a final draft of the report on study results related to 2018 Federal Aviation Administration (FAA) Reauthorization, Act Section 189 for policymakers.

Project Funding Level

Total funding (3-year funding): \$2,161,609

Matching funds: \$2,161,609

Sources of matching funds: Nonfederal donors to the Nurses' Health Study (NHS) and Women's Health Initiative (WHI) cohorts

Investigation Team

Boston University

Prof. Junenette Peters (P.I.)
Prof. Jonathan Levy (P.I.)





Dr. Levy participates in noise exposure assessment and provides expertise in the areas of predictive modeling and air pollution. Dr. Peters is responsible for directing all aspects of the proposed study, including study coordination, design and analysis plans, and co-investigator meetings.

Harvard University/Brigham and Women's Hospital

Prof. Francine Laden
Prof. Jaime Hart
Dr. Tianyi Huang (*now at the National Institutes of Health*)
Dr. Susan Redline

Dr. Laden and Dr. Hart are our NHS sponsors for this ancillary study. Dr. Hart assigns aircraft noise exposures to the geocoded address history coordinates of each cohort member. Dr. Laden and Dr. Hart also assist in documenting data from the NHS, on the basis of their previous experience in research on air pollution and chronic disease outcomes in these cohorts and in performing appropriate analyses of hypertension, cardiovascular, metabolic, and mental health outcomes. Dr. Redline and Dr. Tianyi Huang guide efforts related to noise and sleep disturbance in the NHS and WHI.

University of North Carolina

Dr. Eric Whitsel
James Stewart

Dr. Whitsel is our WHI, National Longitudinal Study of Adolescent to Adult Health (Add Health), and Hispanic Community Health Study/Study of Latinos (HCHS/SOL) sponsor for the ancillary studies. Along with James Stewart, Dr. Whitsel assigns aircraft noise exposure to the geocoded addresses of cohort members. Dr. Whitsel also assists in documenting data from these cohorts based on multiple years of combined leadership and service for the WHI and Add Health morbidity and mortality classification, outcomes adjudication, and ancillary study committees.

Massachusetts Institute of Technology

Prof. R. John Hansman (sub-P.I.)
Dr. Florian Allroggen (sub-co-P.I.)

Dr. Hansman and Dr. Allroggen are responsible for the economic impact analysis and visibility analysis (both analyses reported in previous reports) and participate in drafting the report for policymakers.

Project Overview

Exposure to aircraft noise has been associated with physiological responses and psychological reactions (Bluhm & Eriksson, 2011; Hatfield et al., 2001), including sleep disturbances, sleep-disordered breathing, nervousness, and annoyance (Hatfield et al., 2001; Rosenlund et al., 2001). However, the extent to which aircraft noise exposure increases the risk of adverse health outcomes is still not well understood. The literature, formerly primarily European studies, provided early evidence of a relationship between aircraft noise and self-reported hypertension (Rosenlund et al., 2001), increased blood pressure (Haralabidis et al., 2008; Jarup et al., 2008; Haralabidis et al., 2011; Evrard et al., 2017), antihypertensive medication use (Bluhm & Eriksson, 2011; Greiser et al., 2007; Franssen et al., 2004; Floud et al., 2011), and incidence of hypertension (Eriksson et al., 2010; Dimakopoulou et al., 2017; Kourieh et al., 2022). One study found that aircraft noise exposure was associated with incident diabetes (Eze et al., 2017). Other studies found a stronger but marginal association between aircraft noise and incident diabetes in women and an association with waist circumference (Eriksson et al., 2014; Sakhvidi et al., 2018). Experimental, community, and traffic noise exposures have been related to heart rate variability (El Aarbaoui & Chaix, 2020; El Aarbaoui et al., 2017; Sim et al., 2015; Walker et al., 2016; Kraus et al., 2013), and few studies have reported on heart rate variability relative to aircraft noise (Schmidt et al., 2021). Findings of a cardiovascular relationship were supported by a report by the World Health Organization European Centre for Environmental Health and later studies by researchers, which evaluated the association between residential exposure to environmental noise and cardiovascular disease and found substantial evidence for biological plausibility and positive associations between environmental noise and hypertension, myocardial infarction, and ischemic heart disease (Babisch & Kim, 2011; WHO, 2018, Münzel et al., 2024; Münzel et al., 2025).

The goal of this ongoing project is to continue to examine the potential health impacts attributable to noise exposure resulting from aircraft flights. This project also leverages other ongoing work within ASCENT and is responsive to



Section 189 of the FAA Reauthorization Act of 2018 (Pub. L. 115-254), which called for a study on the potential health and economic impacts attributable to aircraft overflight noise and an assessment of the relationship between a perceived increase in aircraft noise and increases in aircraft visibility. To date, our work has leveraged existing collaborations with well-recognized and respected studies that have followed over 250,000 participants through the course of their lives to understand factors that affect health. These studies include the NHS and Nurses' Health Study II (NHSII) as well as the Health Professionals Follow-Up Study. Furthermore, this work has aligned with a concluded effort funded by the National Institutes of Health to examine these associations in the WHI. The research team continues to leverage aircraft noise data for 90 U.S. airports from 1995 to 2019 and has linked these data to demographic, lifestyle, and health data for the participants of long-term health studies. These studies have provided considerable geographic coverage of the U.S., including all of the geographic areas specified in Section 189. Furthermore, our work to date has also included a first-of-its-kind empirical assessment of the economic impacts on businesses located beneath flight paths at selected U.S. airports responsive to the requirements set forth in Section 189 of the FAA Reauthorization Act of 2018.

Our team recently added to the literature by reporting on U.S. studies evaluating the degree to which aircraft noise affects health. A suggestive positive association was found between aircraft noise exposure and the risk of hypertension (Kim et al., 2022). However, there are fewer studies on the potential effect of noise on mental health (Seidler et al., 2017; Wright et al., 2018). Updated guidelines from the World Health Organization reported a lack of high-quality evidence for aircraft noise and mental health and highlighted the need for additional high-quality studies (WHO, 2018; Clark et al., 2020) with one high-quality study (Eze et al., 2020) and a review of evidence and mechanisms, thereafter (Hahad et al., 2025). Potential biological mechanisms of action of noise on health include induced release of stress hormones (Ising & Kruppa, 2004; Spreng, 2000; Selander et al., 2009; Lefevre et al., 2017) and markers of inflammation and oxidative stress, effects on vascular function (Münzel et al., 2017), and indirect effects on sympathetic activity, which is associated with adverse metabolic outcomes (Selander et al., 2009; Grassi, 2006; Mancia et al., 2006; Mancia et al., 2007). To better understand these potential relationships, our team increased the diversity of participants in our studies with a focus on vulnerable populations by adding the HCHS/SOL and Add Health cohorts. Furthermore, the potential impacts of aircraft noise on additional health outcomes beyond those previously explored are being evaluated, including cardiovascular intermediaries and mental health outcomes in NHS, NHSII, WHI, HCHS/SOL, and Add Health.

The overall aims for this multi-year project as it relates to our continuing efforts are as follows:

Tasks under Amendment No. 38:

1. Assign new aircraft noise exposures to geocoded participant addresses for NHS.
 - a. Intersect geocoded addresses with day-night average sound level (DNL) aircraft noise exposure levels newly available for 2019 for the currently included 90 airports and for 2015 and 2019 for additional airports.
2. Increase personnel effort (postdoctoral fellow) on noise and health analyses.

Tasks under Amendment No. 32:

1. Assign aircraft noise exposures over time to geocoded participant addresses for HCHS/SOL and Add Health.
 - a. Intersect geocoded addresses with DNL and equivalent sound levels for night (L_{night}) and day (L_{day}) aircraft noise exposure levels currently available from 1995 to 2015.
 - b. Estimate the percent of participants across noise exposure categories and assess overall trends in participant noise exposure levels over time, including an evaluation of sociodemographic and other predictors of aircraft noise exposure to facilitate the design and interpretation of epidemiological analyses.
2. Estimate the potential association between cardiovascular intermediaries and aircraft noise exposure.
 - a. Develop analysis plans and manuscript proposals to gain approval to investigate potential relationships between aircraft noise exposure and health intermediaries or cardiometabolic markers such as adiposity and heart rate variability in the NHS, WHI, HCHS/SOL, and Add Health cohorts.
 - b. Perform statistical analyses, undergo manuscript reviews, and present and publish results.
3. Investigate the potential impact of aircraft noise exposure on mental health.
 - a. Conduct an in-depth literature search to identify relevant mental health outcomes.
 - b. Determine the applicable assessments of these outcomes (i.e., depression and anxiety) within the various cohort studies.
 - c. For each cohort, develop an analysis plan and gain approval of manuscript proposals on the potential relationships between aircraft noise exposure and mental health outcomes.
 - d. Perform statistical analyses, undergo manuscript reviews, and present and publish results.
4. Explore the addition of noise-related survey questions to Nurses' Health Study 3 (NHS3).



Tasks under Amendment No. 16 as it relates to Section 189 are as follows:

1. Prepare a final draft of the study report related to Section 189 of the FAA Reauthorization Act of 2018 (Pub. L. 115-254) for policymakers.

Task 1 – Present on Aircraft Noise and Health Research in the United States

Boston University

Objective

The aim of this task is to present on U.S.-based research on aircraft noise exposure and health outcomes.

Research Approach

Presentations highlighting published, current, and planned research on aircraft noise exposure and health outcomes in U.S. cohorts were developed and delivered.

Milestone

- Presented on research efforts and results.

Major Accomplishments

- Presented on aircraft noise and health research to the following organizations (e.g., Figure 1):
 - International Society for Environmental Epidemiology (ISEE) Conference, Atlanta, GA, August 17-20, 2025.
 - International Society of Exposure Science (ISES) Conference (joint with ISEE), Atlanta, GA, August 17-20, 2025.
 - Aviation Noise and Emissions Symposium, Las Vegas, NV, March 11-12, 2025.

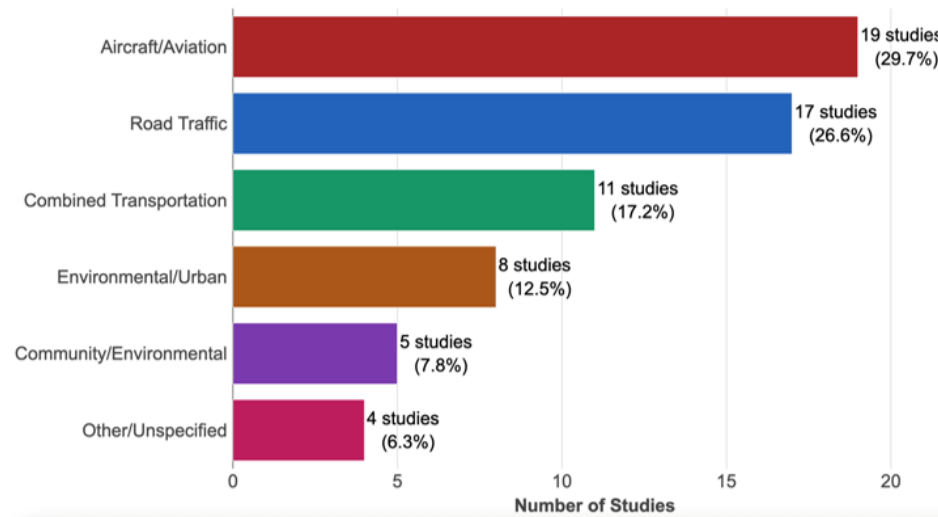


Figure 1. Chart of the number of U.S.-based studies by type of noise exposure



Task 2 – Perform Preliminary Analyses of an Intermediary Risk Factor (Diabetes) and Aircraft Noise Exposure

Boston University, Harvard University

Objective

The aim of this task is to generate preliminary results on aircraft noise and diabetes.

Research Approach

An analysis plan was developed for studying diabetes and aircraft noise and approval obtained from the NHS oversight committee. Statistical analysis was designed, and a large set of a priori variables were selected to be examined as confounders and/or effect modifiers. Appropriate datasets were compiled to perform descriptive statistics analysis. We ran preliminary analysis of the form of the relationship between aircraft noise and diabetes risk.

Milestone

- Produced preliminary results to investigate aircraft noise and the risk of diabetes.

Major Accomplishments

- Performed preliminary analyses on the relationship between aircraft noise and risk of diabetes (Table 1 and Table 2).

Table 1. Number of participants in the Nurses’ Health Study (NHS) and Nurses’ Health Study 2 (NHSII) at risk for diabetes (did not have diabetes at the time of the first noise measure) and those who developed diabetes during the study period according to day-night average sound level (DNL) categories.

Model	NHS		NHSII	
	At Risk	Cases	At Risk	Cases
<45	90,946	7,076	100,968	6,391
45–49	4,340	313	5,281	276
50–54	2,018	165	2,419	137
55–59	751	60	954	56
60–64	179	17	238	20
≥65	39	3	55	7
Total	98,273	7,634	109,915	6,887



Table 2. Table detailing preliminary results on the relationship between aircraft noise and the risk of diabetes with hazard ratios (95% confidence intervals) across day-night average sound level (DNL) in the Nurses’ Health Study (NHS), Nurses’ Health Study 2 (NHSII), and meta-analyzed across cohorts. Adjusted for age, race/ethnicity, individual-level and neighborhood-level socioeconomic status, and air pollution.

Cohort	Model	Exposure Category	Hazard Ratio (95% CI)
NHS	Unadjusted	≥45 vs <45 dB	1.04 (0.95 to 1.13)
		≥50 vs <50 dB	1.11 (0.98 to 1.27)
		≥55 vs <55 dB	1.14 (0.91 to 1.42)
	Adjusted	≥45 vs <45 dB	1.01 (0.92 to 1.11)
		≥50 vs <50 dB	1.06 (0.93 to 1.21)
		≥55 vs <55 dB	1.03 (0.82 to 1.29)
NHSII	Unadjusted	≥45 vs <45 dB	1.02 (0.92 to 1.11)
		≥50 vs <50 dB	1.12 (0.99 to 1.28)
		≥55 vs <55 dB	1.34 (1.08 to 1.65)
	Adjusted	≥45 vs <45 dB	1.01 (0.92 to 1.11)
		≥50 vs <50 dB	1.08 (0.94 to 1.23)
		≥55 vs <55 dB	1.23 (0.99 to 1.52)
Meta-Analysis	Unadjusted	≥45 vs <45 dB	1.03 (0.94 to 1.09)
		≥50 vs <50 dB	1.12 (1.02 to 1.23)
		≥55 vs <55 dB	1.24 (1.06 to 1.45)
	Adjusted	≥45 vs <45 dB	1.01 (0.94 to 1.08)
		≥50 vs <50 dB	1.07 (0.97 to 1.17)
		≥55 vs <55 dB	1.13 (0.95 to 1.35)

Task 3 – Develop Data Analysis Plan and Perform Preliminary Analyses of Generalized Anxiety Disorder and Aircraft Noise Exposure

Boston University, Harvard University

Objective

The aim of this task is to generate a data analysis plan and conduct preliminary results on aircraft noise and generalized anxiety disorder.

Research Approach

An analysis plan was developed for studying generalized anxiety disorder and aircraft noise. Approval was obtained from the NHS oversight committee. Statistical analysis was designed, and a large set of a priori variables were selected to be examined as confounders and/or effect modifiers. Appropriate datasets were compiled to perform descriptive statistics analysis. We ran preliminary analysis of the form of the relationship between aircraft noise and prevalence of generalized anxiety disorder.

Milestones

- Received approval of study aircraft noise and generalized anxiety disorder.



- Produced preliminary results to investigate these associations.

Major Accomplishments

- Submitted a research analysis plan and received approval from the NHS oversight committee.
- Generated preliminary descriptive characterization of the sample population and determined the number of individuals exposed to DNL (Table 3).
- Generated preliminary results on the relationship between aircraft noise and prevalence of generalized anxiety disorder (Figure 2).

Table 3. Number of participants in Nurses’ Health Study 2 (NHSII) with generalized anxiety disorder during the study period according to day-night average sound level (DNL) categories.

DNL (dB)	At Risk
<45	30,928
45-49	2,463
50-54	1,205
≥55	505
Total	35,101

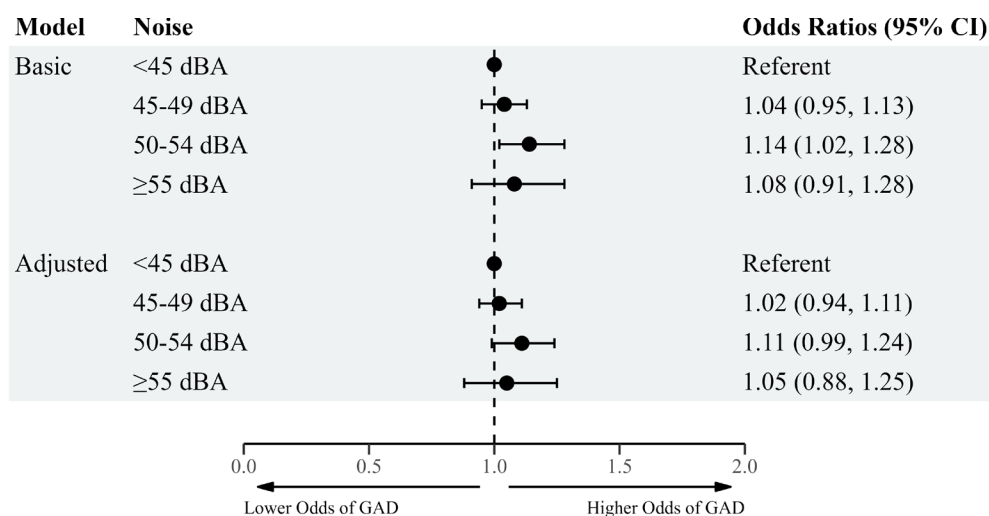


Figure 2. Preliminary results on the relationship between aircraft noise and prevalence of generalized anxiety disorder (GAD) with prevalence odds ratios (95% confidence intervals) across day-night average sound level (DNL) in the Nurses’ Health Study 2 (NHSII) cohort. Adjusted models include age, time period, race/ethnicity, individual- and neighborhood-level socioeconomic status, region, air pollution, and population density.

Task 4 – Develop Data Analysis Plan and Perform Preliminary Analysis of Incident Depression and Aircraft Noise Exposure

Boston University, Harvard University

Objective

The aim of this task is to generate a data analysis plan and conduct preliminary results on aircraft noise with incident depression and depressive symptoms.



Research Approach

An analysis plan was developed for studying incident depression and depressive symptoms with aircraft noise and approval obtained from the NHS oversight committee. Statistical analysis was designed, and a large set of a priori variables were selected to be examined as confounders and/or effect modifiers. Appropriate datasets were compiled to perform descriptive statistics analysis. We ran preliminary analysis of the form of the relationship between aircraft noise and incident depression.

Milestones

- Received cohort approval to study aircraft noise and incident depression.
- Produced preliminary results to investigate these associations.

Major Accomplishments

- Submitted a research analysis plan and obtained approval from the NHS oversight committee.
- Generated descriptive characteristics of the sample population and determined the number of individuals exposed to DNL at baseline (Table 4).
- Generated preliminary results on the relationship between aircraft noise and incident depression (Figure 3).

Table 4. Number of participants in Nurses’ Health Study 2 (NHSII) at risk of depression (have not been diagnosed with depression at the time of the first noise measure) and those who developed depression during the study period according to day-night average sound level (DNL) categories.

DNL (dB)	At Risk	Cases
<45	15,066	2,702
45–49	2,078	339
50–54	1,034	161
≥55	19	55
Total	18,705	3,257

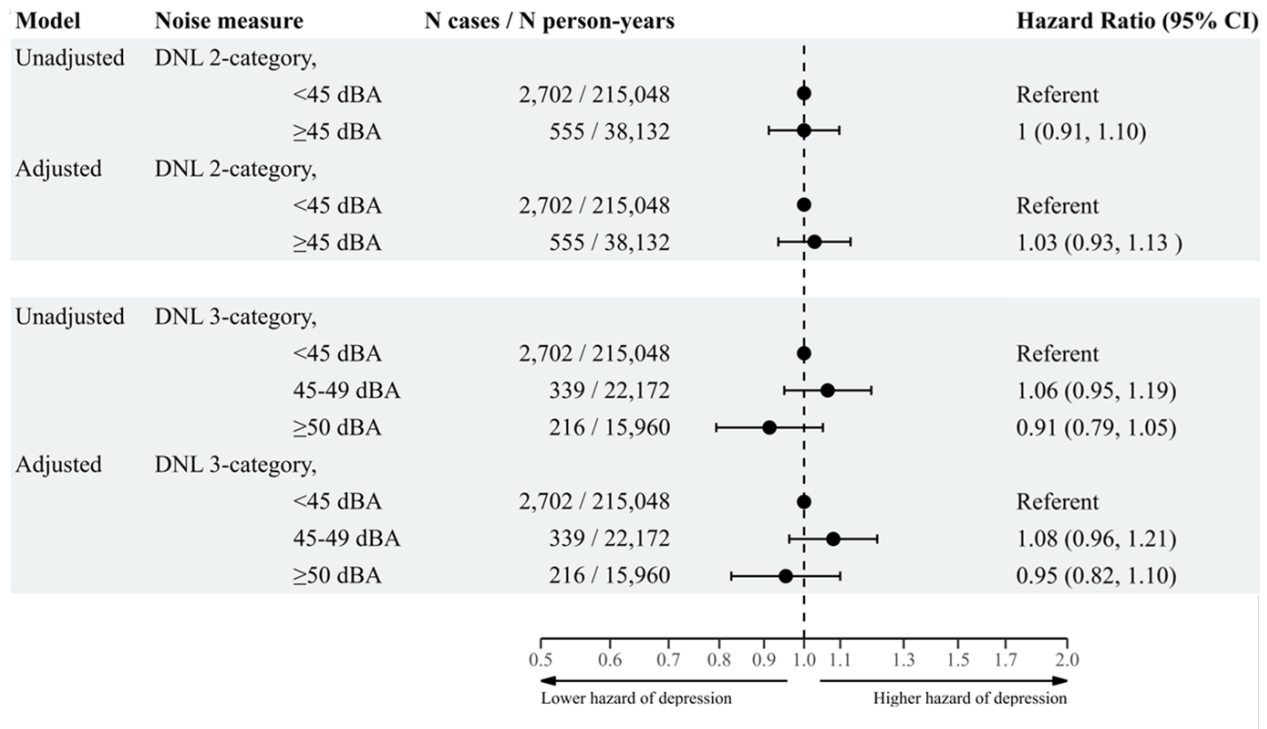


Figure 3. Preliminary results on the relationship between aircraft noise and incident depression with hazard ratios (95% confidence intervals) of associations across day-night average sound level (DNL) in the Nurses’ Health Study 2 (NHSII) cohort. Adjusted models include age, time period, race/ethnicity, individual- and neighborhood-level socioeconomic status, region, air pollution, and population density.

Task 5 – Develop Analysis Plan and Submit Manuscript Proposal on Sleep Outcomes and Aircraft Noise Exposure

Boston University, University of North Carolina, Harvard University

Objective

The aim of this task is to study the association between aircraft noise and sleep.

Research Approach

Research will be performed within the WHI, which contains multiple questions on sleep outcomes (Table 5) as well as a validated sleep scale. Noise exposure data were linked to the WHI cohorts’ geocoded addresses. A manuscript proposal was developed and submitted and statistical analysis designed for studying aircraft noise and sleep quality. Manuscript proposal was approved by the WHI Proposal and Presentation (P&P) committee. Variables will be selected a priori to be examined as confounders and/or effect modifiers. Appropriate datasets will be compiled to perform descriptive statistics and primary analysis.

Milestones

- Received cohort approval to study aircraft noise and sleep outcomes.
- Produced preliminary characterization of study population.

Major Accomplishments

- Coordinated with a sleep expert to develop analysis plan to study the association between aircraft noise and sleep in the WHI.



- Prepared and submitted a manuscript proposal to WHI’s P&P committee and received approval.
- Generated descriptive statistics of the study participants.

Table 5. Preliminary overview of sleep questions and responses in a Women’s Health Initiative (WHI) cohort of 116,707 participants.

Question	Response				
	No	<1/week	1-2/week	3-4/week	5+/week
Trouble falling asleep	58%	18%	13%	6%	4%
Waking at night	28%	17%	21%	18%	22%
Waking earlier than planned	41%	21%	19%	11%	7%
Trouble falling back asleep	48%	20%	17%	9%	6%
Napping during day	47%	22%	17%	8%	4%
Falling asleep during day	25%	22%	26%	16%	10%
Using medication for sleep	76%	9%	5%	3%	6%
Question	Response				
	Very restless	Restless	Average	Restful	Very restful
Rate the quality of your sleep	2%	14%	42%	29%	13%
Question	Response				
	<6 hours	6 hours	7 hours	8 hours	9+ hours
Average hours of sleep per night	8%	28%	37%	22%	4%

Note: Percentages may not sum to 100% due to missing data and rounding

Task 6 – Review and Rerun Analyses, and Revise Manuscript on Cardiovascular Disease and Aircraft Noise Exposure

Boston University, University of North Carolina

Objective

The aim of this task is to finalize the results and manuscript of a study of aircraft noise exposure and cardiovascular disease (CVD).

Research Approach

Analysis that was previously run but not published as part of a dissertation on aircraft noise and CVD in the WHI will be reviewed and rerun with the intent of addressing some differing results in two sub-components of the WHI (the clinical trial and observational study cohorts). Additional analyses will be performed to identify the source of sub-cohort differences via propensity matching the two populations on demographic and health data. The draft manuscript will be revised, reviewed by co-authors, and submitted to a peer-reviewed journal.

Milestones

- Reevaluated assumptions and criteria for analysis of aircraft noise and CVD.
- Reevaluated and reran statistical analysis code.

Major Accomplishments

- Determined updated assumptions and criteria for analyses.
- Rewrote, updated previous statistical code to run successfully on the WHI servers for review and comparison with previous results.



- Generated data to evaluate demographic and health differences between the sub-cohorts (Table 6).

Table 6. Characteristics of participants in two sub-components (clinical trial and observational study cohorts) of the study of noise and cardiovascular disease in the Women’s Health Initiative (WHI).

	Population	
	Observational Study	Clinical Trial
Total	24,710	17,682
Age (years; mean and sd)	63 (7.2)	63 (6.8)
Employed (%)	9,650 (39%)	7,316 (41%)
Smoking, current (%)	1,640 (6.6%)	1,513 (8.6%)
Smoking, past (%)	10,271 (42%)	7,036 (40%)
Smoking, never (%)	12,799 (52%)	9,133 (52%)
BMI (kg/m²; mean, sd)	27 (5.8)	29 (6.0)
Family history of CVD	16,252 (66%)	11,608 (66%)

Note: Body Mass Index (ratio of height to weight) as BMI; Standard deviation abbreviated as sd.

Task 7 – Receive Participant Addresses, Perform Data Processing for Linking with New Cohort and Develop Data Use Procedures

Boston University, University of North Carolina

Objective

The aim of this task is to prepare participant addresses for linking airport noise data to participants’ geocoded addresses.

Research Approach

The missing addresses for HCHS/SOL participants were requested and received from HCHS/SOL and geocoding processing was performed. Institutional Review Board (IRB) revision and approval was obtained. Our team collaborated in the development and execution of a data use agreement and procedures for use of aircraft noise exposure estimates.

Milestones

- Received IRB approval.
- Received and processing the missing geocoded addresses needed to link noise data.

Major Accomplishments

- Revised IRB protocol to include noise research and received approval.
- Met with HCHS/SOL committee regarding data use agreement for aircraft noise data use.
- Started processing addresses including data cleaning and data de-duplication to prepare for geocoding and data linking (Figure 4).

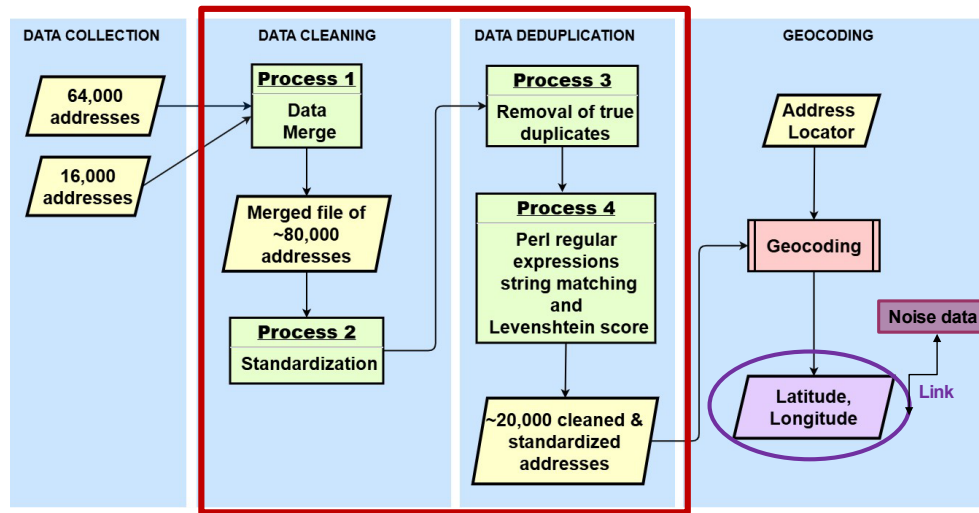


Figure 4. Data processing steps (highlighted) for the Hispanic Community Health Study/Study of Latinos (HCHS/SOL) participant addresses in preparation for linkage with the aircraft noise data.

Task 8 – Define Request for Noise Data for Additional Year and Airports

Boston University, University of North Carolina, Harvard University

Objective

The aim of this task is to define the aircraft noise data request and obtain data for an additional year and additional airports.

Research Approach

More recent data were requested to add to the 5-year incremental data received for 1995 to 2015. The year 2019 was chosen as the additional year to avoid anomalies related to 2020. The locations of participants were reviewed, particularly in new cohorts such as HCHS/SOL, to request 2015 and 2019 data for additional relevant airports not included in the 90 airports previously provided. For the 2019 DNL data, a quality and format review will be performed for the 90 airports before requesting additional metrics and airports. Then data for other metrics (e.g., nighttime noise) will be requested.

Milestone

Requested and obtained data for additional years and airports for additional metric.

Major Accomplishments

- Reviewed aircraft noise DNL format for 2019 aircraft noise data.
- Determined data needs and additional data request and order of delivery.

Task 9 – Prepare the Final Draft of the Report on Study Results Related to 2018 FAA Reauthorization Act, Section 189 for Policymakers

Boston University, Massachusetts Institute of Technology

Objective

The aim of this task is to develop a report of overall study results in response to 2018 FAA Reauthorization Act, Section 189 for policymakers.



Research Approach

Summarized FAA Reauthorization Act of 2018 (Pub. L. 115-254), Section 189, *STUDY ON POTENTIAL HEALTH AND ECONOMIC IMPACTS OF OVERFLIGHT NOISE*, and provided the background of the study, study methods and data, study findings, and conclusions.

Milestone

- Generated a final report on the overall study results in response to Section 189 for policymakers.

Major Accomplishment

- Submitted a final draft of the report summarizing the overall study results in relation to Section 189.

Publications

Peer-Reviewed Journal Publications

- Bozigar, M., Laden, F., Hart, J. E., Redline, S., Huang, T., Whitsel, E. A., Nelson, E. J., Grady, S. T., Levy, J. I., & Peters, J. L. (2024). Aircraft noise exposure and body mass index among female participants in two Nurses' Health Study prospective cohorts living around 90 airports in the United States. *Environment International*, 187, 108660. doi: 10.1016/j.envint.2024.108660. PMID: 38677085
- Bozigar, M., Huang, T., Redline, S., Hart, J. E., Grady, S. T., Nguyen, D. D., James, P., Nicholas, B., Levy, J. I., Laden, F., & Peters, J. L. (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*, 131(4), 47010. doi: 10.1289/EHP10959
- Grady, S. T., Hart, J. E., Laden, F., Roscoe, C., Nguyen, D. D., Nelson, E. J., Bozigar, M., VoPham, T., Manson, J. E., Weuve, J., Adar, S. D., Forman, J. P., Rexrode, K., Levy, J. I., & Peters, J. L. (2023). Associations between long-term aircraft noise exposure, cardiovascular disease, and mortality in US cohorts of female nurses. *Environmental Epidemiology*, 7(4), e259. doi: 10.1097/EE9.0000000000000259
- Kim, C. S., Grady, S. T., Hart, J. E., Laden, F., VoPham, T., Nguyen, D. D., Manson, J. E., James, P., Forman, J. P., Rexrode, K. M., Levy, J. I. & Peters, J. L. (2022). Long-term aircraft noise exposure and risk of hypertension in the Nurses' Health Studies. *Environmental Research*, 207, 112195.
- Nguyen, D. D., Levy, J. I., Kim, C., Lane, K. J., Simon, M. C., Hart, J. E., Whitsel, E. A., VoPham, T., Malwitz, A., & Peters, J. L. (2023). Characterizing temporal trends in populations exposed to aircraft noise around U.S. airports: 1995–2015. *Journal of Exposure Science and Environmental Epidemiology*. <https://doi.org/10.1038/s41370-023-00575-5>
- Nguyen, D. D., Whitsel, E. A., Wellenius, G. A., Levy, J. I., Leibler, J. H., Grady, S. T., Stewart, J. D., Fox, M. P., Collins, J. M., Eliot, M. N., Malwitz, A., Manson, J. E., & Peters, J. L. (2023). Long-term aircraft noise exposure and risk of hypertension in postmenopausal women. *Environmental Research*, 218, 115037. doi: 10.1016/j.envres.2022.115037
- Peters, J. L., Grady, S. T., Laden, F., Nelson, E., Bozigar, M., Hart, J. E., Manson, J. E., Huang, T., Redline, S., Kaufman, J. D., Forman, J. P., Rexrode, K. M., & Levy, J. I. (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*, 172(263), 114457. doi: 10.1016/j.ijheh.2024.114457. PMID: 39270405

Outreach Efforts

Presentations

- Presented an oral presentation on current progress during the ASCENT Fall Meeting (October 29–31, 2024) and ASCENT Spring Noise and Operations Meeting (April 14–15, 2025)
- Presented an oral presentation entitled "Characterizing temporal trends in populations exposed to aircraft noise around U.S. airports: 1995–2015" at the Aviation Noise and Emissions Symposium (March 11–12, 2025)
- Presented an oral presentation entitled "Residential exposure to aircraft noise and depression risk in a U.S. prospective cohort" at the Joint Annual Meeting of ISES and ISEE 2025 (August 17–20, 2025).

Awards

None.



Student Involvement

The dissertation of Daniel Nguyen (doctoral graduate, Boston University) included a characterization of the temporal trends in aviation noise surrounding U.S. airports. Daniel Nguyen graduated in the spring of 2022 and is currently working for the Centers for Disease Control and Prevention.

The dissertation of Stephanie Grady (doctoral candidate, Boston University) includes developing and performing statistical analyses on noise and hypertension risk, cardiovascular event risk, and biomarkers of neurodegeneration. Stephanie Grady graduated in the spring of 2024 and is currently working as a postdoctoral fellow at Boston University.

Plans for Next Period

(October 1, 2025, to September 30, 2026)

- Generate results, draft the manuscript, and publish on the relationship between aircraft noise exposure and mental health outcomes (e.g., depression and anxiety).
- Generate results and draft the manuscript on the relationship between aircraft noise exposure and sleep outcomes.
- Review analyses, finalize the manuscript, and publish on aircraft noise exposure and cardiovascular disease.
- Link aircraft noise data to geocoded addresses of participants in the additional cohort.
- Process and link aircraft noise data for additional years and locations.

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