Supplemental Publication Material for:

Higher Aircraft Noise Exposure is Linked to Worse Heart Structure and Function by Cardiovascular MRI

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Supplemental Equation 1:

$$L_{\text{den}} = 10 \cdot \log_{10}\left(\frac{1}{24}\left(12 \cdot 10^{\frac{L_{\text{day}}}{10}} + 4 \cdot 10^{\frac{L_{\text{evening}}+5}{10}} + 8 \cdot 10^{\frac{L_{\text{night}}+10}{10}}\right)\right)$$

L_{den} = A-weighted equivalent noise level over a 24-hour day, but with a penalty of +10 decibels (A) for nighttime noise (23:00 to 07:00) and +5 decibels (A) for evening noise (19:00 to 23:00)

L_{day} = A-weighted equivalent noise level between 07:00 to 19:00

$L_{evening}$ = A-weighted equivalent noise level between 19:00 to 23:00

L_{night} = A-weighted equivalent noise level between 23:00 to 07:00

Supplemental Table 1. Field IDs or return ID of the UK Biobank variables used in the study and their descriptions.

Variable name	Field ID/return ID in UK biobank	Description/definition	Answers/outcomes used in analysis
CMR data	2383	Biobank Brain and Cardiac Mutual Risk Indexing study	lvedvml lvesvml lvsvml lvef lvmg wt_aha_1mm wt_aha_2mm wt_aha_3mm wt_aha_4mm wt_aha_5mm wt_aha_6mm wt_aha_7mm wt_aha_8mm wt_aha_9mm wt_aha_10mm wt_aha_11mm wt_aha_12mm wt_aha_13mm wt_aha_14mm wt_aha_15mm wt_aha_16mm wt_globalmm ecc_aha_1 ecc_aha_2 ecc_aha_3 ecc_aha_4 ecc_aha_5 ecc_aha_6 ecc_aha_7 ecc_aha_8 ecc_aha_9 ecc_aha_10 ecc_aha_11 ecc_aha_12 ecc_aha_13 ecc_aha_14 ecc_aha_15 ecc_aha_16 ecc_global err_aha_1 err_aha_2 err_aha_3 err_aha_4 err_aha_5 err_aha_6 err_aha_7 err_aha_8 err_aha_9 err_aha_10 err_aha_11 err_aha_12 err_aha_13 err_aha_14 err_aha_15 err_aha_16 err_global
Abdominal MRI	22410 & 22408 & 22407	Total trunk fat volume Abdominal subcutaneous adipose tissue volume Visceral adipose tissue volume	All values were used
Sex	31	Answers in the questionnaire: 0 Female 1 Male	0 Female 1 Male
Age	34	Field 34 contains participants' year of birth. Age in 2006 is calculated by subtracting the value of Field 34 from the year 2006, while the age in 2011 is calculated by subtracting the value of Field 34 from the year 2011.	All values were used
Height	50	Standing height	All positive values were used
Time at current address	699	Answers within the range between 1 and 85. There are three special values: -10 Less than a year -1 Do not know -3 Prefer not to answer	All positive values were used
Ethnic background	21000	Answers in the questionnaire: 1 White 1001 British	1 White 2 Mixed 3 Asian or Asian British

		2001 White and Black Caribbean 3001 Indian 4001 Caribbean 2 Mixed 1002 Irish 2002 White and Black African 3002 Pakistani 4002 African 3 Asian or Asian British 1003 Any other white background 2003 White and Asian 3003 Bangladesh 4003 Any other Black background 4 Black or Black British 2004 Any other mixed background 3004 Any other Asian background 5 Chinese 6 Other ethnic group -1 Do not know -3 Prefer not to answer	4 Black or Black British 5 Chinese 6 Other ethnic group
Townsend deprivation index at recruitment	22189	Townsend deprivation index calculated immediately prior to participant joining UK Biobank. Based on the preceding national census output areas. Each participant is assigned a score corresponding to the output area in which their postcode is located. The values here are rounded to 2 decimal places, replacing an earlier unrounded version.	All values were used
BMI	21001		All values were used
Smoking status	20116	-3 Prefer not to answer 0 Never 1 Previous 2 Current	0 Never 1 Previous 2 Current
Alcohol consumption	1558	1 Daily or almost daily 2 Three or four times a week 3 Once or twice a week 4 One to three times a month	1 Daily or almost daily 2 Three or four times a week 3 Once or twice a week 4 One to three times a month

		5 Special occasions only 6 Never -3 Prefer not to answer	5 Special occasions only 6 Never
Total number of vigorous or moderate physical activities (in days)	884 (Number of days/week of moderate physical activity) and 904 (Number of days/week of vigorous physical activity 10+ minutes)	Numbers between 0 and 7. In addition, there are two special values: -1 Do not know -3 Prefer not to answer	We used the largest number of days between 884 and 904. Only positive values were used.
Average annual household income before tax	738	1 Less than 18,000 2 18,000 to 30,999 3 31,000 to 51,999 4 52,000 to 100,000 5 Greater than 100,000 -1 Do not know -3 Prefer not to answer	1 Less than 18,000 2 18,000 to 30,999 3 31,000 to 51,999 4 52,000 to 100,000 5 Greater than 100,000
$PM_{2.5}$ concentration	24006	$PM_{2.5}$ (particulate matter with diameter less than or equal to 2.5 micrometers); Land Use Regression (LUR) estimate for annual average 2010.	All values were used
Diabetes diagnosed by a doctor	2443	ACE touchscreen question 'Has a doctor ever told you that you have diabetes?' Answers include 1 Yes 0 No -1 Do not know -3 Prefer not to answer	We used 1 Yes
Hypertension (based on self-reported doctor-diagnosed cases at baseline, self-reported use of medication to treat hypertension at baseline, or recorded blood pressure readings showing systolic blood pressure ≥140 or diastolic blood pressure ≥90 at baseline)	6150 & 6153 & 6177 & 4079 & 4080	6150 Vascular/heart problems diagnosed by doctor 6153 Medication for cholesterol, blood pressure, diabetes, or take exogenous hormones 6177 Medication for cholesterol, blood pressure or diabetes 4079 Diastolic blood pressure, automated reading 4080 Systolic blood pressure, automated reading	Hypertension was identified for individuals who met any of the following criteria: 1. they reported "High blood pressure" (answer 4) on question 6150; 2. or indicated "Blood pressure medication" (answer 2) on questions 6153 or 6157; 3. or had values of 4079 greater than or equal to 90, or 4080 greater than or equal to 140.

Total cholesterol	23400	Total cholesterol (continuous) was measured at baseline using a non-fasting blood sample.	All values were used
Hearing difficulties	2247	1 Yes 0 No 99 I am completely deaf -1 Do not know -3 Prefer not to answer	We excluded any participants who reported either yes (answer 1), I am completely deaf (answer 99) or negative values (-1 Do not know, or -3 Prefer not to answer).
CVD death	40000 & 40001	40001 Underlying (primary) cause of death: ICD10 40000 Date of death	We included any deaths due to primary causes assigned an ICD code within ICD Chapter I.
CVD inpatient	41202 & 41262	41202 Diagnoses - main ICD10 Date of first in-patient diagnosis - main ICD10	We included any individuals with inpatient records due to conditions assigned an ICD code within ICD Chapter I.
Diabetes inpatient			
Hypertension inpatient			
High cholesterol inpatient			
Ischemic Heart Disease inpatient			
Cerebrovascular Disease inpatient			
Arrythmias inpatient			
Heart Failure inpatient			
Cardiomyopathy inpatient			

Noise variables (aircraft, road, and rail) and NO_2 air concentrations used are not currently available from the UK Biobank. They were derived and linked to the UK Biobank dataset, as described in the methods section.

Supplemental Table 2. Correlations between aircraft noise and other environmental exposures.

Other environmental exposures	Aircraft noise in 2011			
	L_{night} ≥45dB		L_{den} ≥50dB	
	Correlation coefficient	***p*-value**	**Correlation coefficient**	***p*-value**
Road noise in 2013, dB	0.02	0.281	0.00	0.776
Rail noise in 2011, dB	0.03	0.043	0.08	**<0.001**
NO_2 air concentration, µg/m^3	0.03	0.054	-0.01	0.640
$PM_{2.5}$ air concentration, µg/m^3	0.11	**<0.001**	0.13	**<0.001**

As aircraft noise and road/rail noise were binary, we calculated the phi correlation coefficient. Since both air pollution variables were continuous, but aircraft noise was binary, we calculated the point-biserial correlation coefficient.

dB = decibels; L_{den} = 24-hour day-evening-night aircraft noise indicator; L_{night} = nighttime aircraft noise indicator; NO_2 =nitrogen dioxide; $PM_{2.5}$ = particulate matter with a diameter ≤2.5 µm.

Supplemental Table 3. Characteristics of participants who had CMR and MACE outcome data but no aircraft noise exposure.

	MACE **n = 1,272 (6.0%)**	**No MACE** **n = 20,088 (94.0%)**	***p*-value**
Demographics			
Age at baseline, years	58.00 (53.00, 62.00)	53.00 (47.00, 58.00)	**<0.001**
Male sex, %	962 (74.2%)	9,301 (46.4%)	**<0.001**
Ethnicity White, %	1,234 (97.4%)	19,607 (97.9%)	**0.028**
Mixed, %	<5	70 (0.3%)	
Asian or Asian British, %	19 (1.5%)	155 (0.8%)	
Black or Black British, %	<5	78 (0.4%)	
Chinese, %	<5	55 (0.3%)	
Other, %	7 (0.6%)	70 (0.3%)	
Townsend deprivation index in 2011 **(lower values indicate less deprivation)**	-2.56 (-3.86, -0.37)	-2.72 (-3.94, -0.80)	**<0.001**
Household income <£18,000, %	214 (18.2%)	2,300 (12.5%)	**<0.001**
£18000-30999, %	309 (26.3%)	4,221 (23.0%)	
£31000-51999, %	363 (30.9%)	5,707 (31.1%)	
£52000-100000, %	237 (20.2%)	5,050 (27.5%)	
>£100000, %	52 (4.4%)	1,096 (6.0%)	
Lifestyle			
Smoking Status Current, %	110 (8.7%)	1,180 (5.9%)	**<0.001**
Former, %	548 (43.1%)	6,511 (32.5%)	
Never, %	612 (48.2%)	12,350 (61.6%)	
Alcohol Consumption Daily, %	278 (21.9%)	4,298 (21.4%)	0.511
3-4 times/week, %	358 (28.1%)	5,689 (28.3%)	
1-2 times/week, %	315 (24.8%)	5,309 (26.4%)	
1-3 times/month, %	135 (10.6%)	2,192 (10.9%)	

Occasional, %	117 (9.2%)	1,627 (8.1%)	
Never, %	69 (5.4%)	961 (4.8%)	
Physical Activity, days/week	3.00 (2.00, 5.00)	3.00 (2.00, 5.00)	0.854
Environmental exposures			
NO_2 air concentrations in 2009, $\mu g/m^3$	26.71 (23.05, 30.81)	26.82 (23.08, 30.80)	0.951
$PM_{2.5}$ air concentrations in 2010, $\mu g/m^3$	9.86 (9.19, 10.57)	9.86 (9.15, 10.52)	0.453
BMI, kg/m^2	27.46 (25.08, 30.02)	25.98 (23.63, 28.80)	**<0.001**
Hypertension, %	926 (72.8%)	8,705 (43.3%)	**<0.001**
Diabetes, %	90 (7.1%)	451 (2.2%)	**<0.001**
High cholesterol, %	391 (30.7%)	7,222 (36.0%)	**<0.001**
CVD, %	809 (63.6%)	280 (1.4%)	**<0.001**
CMR heart structure and function metrics			
$LVEDV_i$, $ml/m^{1.7}$	61.55 (54.54, 70.42)	58.75 (52.35, 65.93)	**<0.001**
$LVESV_i$,$ml/m^{1.7}$	25.53 (21.19, 30.74)	23.37 (19.86, 27.67)	**<0.001**
$LVmass_i$, $g/m^{1.7}$	37.99 (33.19, 42.70)	33.64 (29.35, 38.79)	**<0.001**
LV MV, ml	91.52 (77.38, 105.72)	78.23 (64.95, 95.42)	**<0.001**
LV $\overline{WT}$, mm	6.00 (5.50, 6.52)	5.53 (5.02, 6.11)	**<0.001**
LV MWT, mm	7.55 (6.87, 8.35)	6.95 (6.26, 7.71)	**<0.001**
IVST, mm	5.93 (5.44, 6.51)	5.48 (4.95, 6.09)	**<0.001**
LV lateral WT, mm	6.06 (5.57, 6.63)	5.62 (5.12, 6.19)	**<0.001**
SLWR, unitless	0.98 (0.93, 1.02)	0.97 (0.93, 1.02)	0.108
LV RWM, g/ml	0.60 (0.55, 0.67)	0.57 (0.52, 0.63)	**<0.001**
LV MCF, unitless	1.00 (0.88, 1.13)	1.09 (0.97, 1.23)	**<0.001**
LV EF, %	58.51 (53.97, 62.49)	59.90 (56.02, 63.73)	**<0.001**
Absolute LV circumferential strain index, $m^{1.7}/g$ **Global**	0.56 (0.46, 0.68)	0.67 (0.54, 0.80)	**<0.001**
Basal	0.57 (0.48, 0.70)	0.68 (0.56, 0.81)	**<0.001**
Mid	0.56 (0.46, 0.68)	0.65 (0.54, 0.78)	**<0.001**
Apical	0.68 (0.57, 0.83)	0.80 (0.65, 0.96)	**<0.001**
Absolute LV radial strain index, $m^{1.7}/g$ **Global**	1.13 (0.92, 1.40)	1.33 (1.07, 1.62)	**<0.001**

Basal	1.12 (0.89, 1.40)	1.36 (1.07, 1.67)	**<0.001**
Mid	1.24 (1.01, 1.53)	1.43 (1.16, 1.76)	**<0.001**
Apical	1.32 (1.07, 1.59)	1.50 (1.22, 1.81)	**<0.001**
Absolute LV longitudinal strain index, $m^{1.7}/g$ **Global**	0.48 (0.39, 0.57)	0.55 (0.45, 0.65)	**<0.001**
Basal	0.51 (0.42, 0.60)	0.58 (0.48, 0.69)	**<0.001**
Mid	N/A		
Apical			

LVEDV, LVESV, and LVmass were indexed to height$^{1.7}$. Strain metrics were indexed to $LVmass_i$.

All variables are presented as percentages if categorial or median (interquartile range) if continuous. Comparisons were made using the Chi-Squared test with Yates continuity correction for categorical variables and the Mann-Whitney U-test for continuous variables. Significant *p*-values are presented in bold.

% = percentage; BMI = body mass index; CMR = cardiovascular magnetic resonance; EF = ejection fraction; IVST = interventricular septal wall thickness; LV = left ventricle; $LVmass_i$ = LV mass indexed to height$^{1.7}$; $LVEDV_i$ = LV end diastolic volume indexed to height$^{1.7}$; $LVESV_i$ = LV end-systolic volume indexed to height$^{1.7}$; MCF = myocardial contraction fraction; MV= myocardial volume; MWT = maximal wall thickness; N/A = not available; RWM = relative wall mass; SLWR = septal-to-lateral WT ratio; WT = wall thickness; $\overline{WT}$ = mean wall thickness. Other abbreviations as **in Supplemental Table 2**.

Supplemental Table 4. Absolute differences in CMR metrics between those exposed and unexposed to higher aircraft noise levels.

CMR heart structure and function metrics		LV volumes			LV structure							LV systolic function	
		$LVEDV_i$	**$LVESV_i$**	**LV MV**	**$LVmass_i$**	**LV $\overline{WT}$**	**LV MWT**	**IVST**	**LV lateral WT**	**SLWR**	**LV RWM**	**LV EF**	**LV MCF**
Aircraft noise L_{night} ≥45dB	**Absolute value (95% CI)**	2.72 (2.33, 3.11)	1.69 (0.56, 2.82)	5.88 (3.84, 7.92)	2.42 (1.55, 3.29)	0.20 (0.12, 0.29)	0.23 (0.15, 0.31)	0.19 (0.11, 0.28)	0.24 (0.13, 0.36)	-0.01 (-0.01, -0.00)	0.01 (0.00, 0.02)	-0.76 (-2.53, 1.01)	-0.03 (-0.07, 0.02)
	***p*-value**	**<0.001**	**0.003**	**<0.001**	**<0.001**	**<0.001**	**<0.001**	**<0.001**	**<0.001**	**0.008**	**0.013**	0.399	0.216
	n	3,149	3,149	3,153	3,149	3,151	3,151	3,151	3,151	3,151	3,153	3,153	3,153
Aircraft noise L_{den} ≥50dB	**Absolute value (95% CI)**	0.87 (0.56, 1.19)	0.43 (-0.13, 0.98)	2.49 (1.04, 3.94)	1.16 (0.53, 1.79)	0.12 (0.03, 0.21)	0.14 (-0.02, 0.31)	0.13 (0.05, 0.21)	0.12 (0.01, 0.22)	0.00 (-0.00, 0.01)	0.01 (-0.00, 0.02)	-0.32 (-1.19, 0.56)	-0.02 (-0.03, -0.01)
	***p*-value**	**<0.001**	0.133	**0.001**	**<0.001**	**0.008**	0.084	**0.001**	**0.027**	0.347	0.125	0.477	**<0.001**
	n	3,149	3,149	3,153	3,149	3,151	3,151	3,151	3,151	3,151	3,153	3,153	3,153

CMR absolute strain index metrics		LV circumferential				LV radial				LV longitudinal	
		Global	**Basal**	**Mid**	**Apical**	**Global**	**Basal**	**Mid**	**Apical**	**Global**	**Basal**
Aircraft noise L_{night} ≥45dB	**Absolute value (95% CI)**	-0.05 (-0.07, -0.02)	-0.05 (-0.08, -0.01)	-0.05 (-0.07, -0.02)	-0.05 (-0.09, -0.02)	-0.08 (-0.14, -0.03)	-0.09 (-0.14, -0.04)	-0.09 (-0.16, -0.01)	-0.07 (-0.15, -0.00)	-0.03 (-0.05, -0.02)	-0.03 (-0.05, -0.01)
	***p*-value**	**0.001**	**0.005**	**0.001**	**0.003**	**0.004**	**<0.001**	**0.025**	**0.046**	**<0.001**	**0.002**
	n	3,145	3,145	3,145	3,145	3,145	3,145	3,145	3,145	3,029	3,029
Aircraft noise L_{den} ≥50dB	**Absolute value (95% CI)**	-0.03 (-0.04, -0.01)	-0.03 (-0.04, -0.01)	-0.03 (-0.04, -0.02)	-0.03 (-0.05, -0.01)	-0.07 (-0.09, -0.04)	-0.06 (-0.09, -0.04)	-0.06 (-0.09, -0.04)	-0.07 (-0.09, -0.04)	-0.01 (-0.03, 0.00)	-0.02 (-0.03, -0.00)
	***p*-value**	**<0.001**	**<0.001**	**<0.001**	**0.012**	**<0.001**	**<0.001**	**<0.001**	**<0.001**	0.060	**0.028**
	n	3,145	3,145	3,145	3,145	3,145	3,145	3,145	3,145	3,029	3,029

LVEDV, LVESV, and LVmass were indexed to height$^{1.7}$. Strain metrics were indexed to $LVmass_i$.

All reported analyses consisted of generalized linear models with a gamma distribution and log link. The absolute differences in heart structure and function CMR metrics between those exposed and unexposed to higher aircraft noise levels are presented. Each model was adjusted for demographic (age, sex, and ethnicity), cohort-related (assessment center, non-mover status, and length at the current address), socio-economic (Townsend deprivation index and household income before tax), lifestyle (smoking status, alcohol consumption, and physical activity), and environmental (road noise, rail noise, and air concentrations of NO_2 and $PM_{2.5}$) confounders. Strain models were also adjusted for the use of antihypertensives. Significant *p*-values are in bold.

CI = confidence interval; exp β = exponentiated regression coefficient. Other abbreviations as in **Supplemental Tables 2** and **3**.

Supplemental Table 5. Percentage differences in CMR metrics between those exposed and unexposed to higher aircraft noise levels using regression models weighted with propensity scores.

CMR metrics		L_{night} ≥45dB vs. L_{night} <45dB		L_{den} ≥50dB vs. L_{den} <50dB	
		% difference (95% CI)	*p*-value	% difference (95% CI)	*p*-value
$LVEDV_i$		2.36% (1.05, 3.68)	**<0.001**	1.76% (-1.17, 4.77)	0.242
$LVESV_i$		3.74% (-2.82, 10.74)	0.271	2.11% (0.02, 4.24)	**0.048**
LV MV		4.83% (3.39, 6.29)	**<0.001**	4.28% (2.40, 6.19)	**<0.001**
$LVmass_i$		6.01% (1.63, 10.57)	**0.007**	4.28% (1.10, 7.57)	**0.008**
LV $\overline{WT}$		3.98% (1.94, 6.06)	**<0.001**	2.78% (1.82, 3.75)	**<0.001**
LV MWT		2.38% (0.28, 4.53)	**0.026**	3.45% (1.89, 5.03)	**<0.001**
IVST		3.60% (1.41, 5.83)	**0.001**	3.06% (1.39, 4.75)	**<0.001**
LV lateral WT		5.42% (3.51, 7.37)	**<0.001**	2.73% (2.44, 3.02)	**<0.001**
SLWR		-1.82% (-2.22, -1.42)	**<0.001**	0.39% (-1.10, 1.91)	0.607
LV RWM		2.34% (0.72, 4.00)	**0.005**	1.46% (-0.12, 3.06)	0.070
LV EF		-0.19% (-2.46, 2.13)	0.872	0.08% (-1.44, 1.62)	0.919
LV MCF		-2.11% (-4.75, 0.60)	0.126	-1.08% (-2.50, 0.36)	0.142
LV circumferential strain index	**Global**	-8.67% (-13.71, -3.34)	**0.002**	-2.69% (-5.18, -0.14)	**0.039**
	Basal	-11.44% (-18.06, -4.29)	**0.002**	-4.23% (-8.44, 0.17)	**0.060**
	Mid	-8.84% (-12.26, -5.28)	**<0.001**	-2.31% (-6.00, 1.53)	0.235
	Apical	-5.78% (-11.55, 0.37)	0.065	-1.86% (-4.49, 0.84)	0.175
LV radial strain index	**Global**	-7.11% (-13.40, -0.36)	**0.039**	-3.93% (-4.80, -3.05)	**<0.001**
	Basal	-10.10% (-13.45, -6.63)	**<0.001**	-4.87% (-6.49, -3.22)	**<0.001**
	Mid	-5.78% (-13.84, 3.03)	0.192	-2.82% (-5.10, -0.49)	**0.018**
	Apical	-3.13% (-10.30, 4.63)	0.419	-3.69% (-5.13, -2.23)	**<0.001**
LV longitudinal strain index	**Global**	-6.26% (-13.38, 1.44)	0.109	-3.10% (-6.75, 0.70)	0.108
	Basal	-6.13% (-13.37, 1.72)	0.123	-3.25%(-5.90, -0.52)	**0.020**

LVEDV, LVESV, and LVmass were indexed to height$^{1.7}$. Strain metrics were indexed to $LVmass_i$.
All reported analyses consisted of generalized linear models with a gamma distribution and log link, weighted by propensity scores. The % differences between those exposed and unexposed to higher aircraft noise levels are presented. Each model was adjusted for demographic (age, sex, and ethnicity), cohort-related (assessment center, non-mover status, and length at the current address), socio-economic (Townsend deprivation index and household income before tax), lifestyle (smoking status, alcohol consumption, and physical activity), and environmental (road noise, rail noise, and air concentrations of NO_2 and $PM_{2.5}$) confounders. Strain models were also adjusted for the use of antihypertensives. Significant *p*-values are in bold.
Abbreviations as in **Supplemental Tables 2**, **3**, and **4**.

Supplemental Table 6. Mediation analyses for total trunk fat volume.

CMR metrics	L_{night} ≥45dB						L_{den} ≥50dB					
	ACME		Total effects		PoM		ACME		Total effects		PoM	
	β (95% CI)	*p*-value	β (95% CI)	*p*-value	Proportion (95% CI)	*p*-value	β (95% CI)	*p*-value	β (95% CI)	*p*-value	Proportion (95% CI)	*p*-value
$LVEDV_i$	0.68 (0.47, 0.89)	**<0.001**	2.73 (1.91, 3.55)	**<0.001**	25% (22, 27)	**<0.001**	0.28 (0.04, 0.52)	**0.021**	0.90 (0.52, 1.28)	**<0.001**	31% (-7, 69)	0.113
$LVESV_i$	0.43 (0.26, 0.6)	**<0.001**	1.49 (0.28, 2.69)	**0.016**	29% (7, 51)	**0.010**	0.15 (0.02, 0.29)	**0.026**	0.44 (-0.06, 0.95)	0.087	35% (-36, 105)	0.333
LV MV	1.46 (0.96, 1.96)	**<0.001**	4.36 (1.2, 7.51)	**0.007**	33% (5, 62)	**0.020**	0.81 (-0.26, 1.89)	0.138	2.03 (-0.23, 4.29)	0.078	40% (-8, 88)	0.104
$LVmass_i$	0.62 (0.43, 0.81)	**<0.001**	1.97 (0.66, 3.27)	**0.003**	32% (5, 58)	**0.020**	0.35 (-0.09, 0.8)	0.119	0.98 (0.00, 1.97)	0.051	36% (-14, 86)	0.157
LV $\overline{WT}$	0.05 (0.02, 0.08)	**0.001**	0.16 (0.05, 0.26)	**0.004**	32% (-7, 71)	0.104	0.03 (-0.01, 0.08)	0.173	0.09 (-0.02, 0.20)	0.104	37% (-17, 91)	0.184
LV MWT	0.07 (0.03, 0.11)	**0.002**	0.15 (-0.01, 0.31)	0.068	45% (-16, 106)	0.145	0.05 (-0.03, 0.12)	0.199	0.11 (-0.08, 0.31)	0.264	45% (-6, 95)	0.081
IVST	0.05 (0.02, 0.08)	**0.001**	0.14 (0.04, 0.24)	**0.004**	34% (-7, 75)	0.105	0.03 (-0.02, 0.08)	0.205	0.1 (0.00, 0.20)	0.056	32% (-13, 77)	0.169
LV lateral WT	0.05 (0.02, 0.08)	**0.001**	0.19 (0.06, 0.33)	**0.006**	26% (-7, 59)	0.117	0.03 (-0.01, 0.08)	0.146	0.09 (-0.05, 0.22)	0.198	39% (-25, 103)	0.236
LV EF	-0.18 (-0.27, -0.09)	**<0.001**	-0.33 (-1.7, 1.03)	0.633	54% (-176, 284)	0.645	N/A	N/A	N/A	N/A	N/A	N/A
LV MCF	-0.01 (-0.02, 0.00)	**0.010**	-0.02 (-0.06, 0.02)	0.241	49% (-70, 168)	0.420	-0.01 (-0.02, 0.00)	0.203	-0.02 (-0.03, 0.00)	**0.007**	44% (-19, 107)	0.173
Global absolute LV circumferential strain index	-0.01 (-0.02, -0.01)	**<0.001**	-0.05 (-0.08, -0.03)	**<0.001**	24% (7, 41)	**0.006**	-0.01 (-0.01, 0.00)	0.120	-0.02 (-0.03, -0.02)	**<0.001**	27% (-11, 64)	0.161
Global absolute LV radial strain index	-0.02 (-0.03, -0.02)	**<0.001**	-0.09 (-0.13, -0.05)	**<0.001**	26% (13, 39)	**<0.001**	-0.01 (-0.02, 0.00)	0.080	-0.05 (-0.07, -0.04)	**<0.001**	18% (1, 35)	**0.038**
Global absolute LV longitudinal strain index	-0.01 (-0.01, 0.00)	**<0.001**	-0.04 (-0.05, -0.02)	**<0.001**	22% (5, 39)	**0.013**	0.00 (-0.01, 0.00)	0.104	-0.01 (-0.03, 0)	**0.010**	31% (8, 53)	**0.007**

We aimed to explore to what extent total trunk fat volume (estimated from abdominal MRIs) explains the relationships between higher aircraft noise exposure and worse heart structure and function CMR metrics using the Imai, Tingley, and Yamamoto framework of causal inference. We calculated the ACME of total trunk fat volume and total effects, and then the PoM via total trunk fat volume as their ratio expressed as a percentage. Models were adjusted for demographic (age, sex, and ethnicity), cohort-related (assessment center, non-mover status, and length at the current address), socio-economic (Townsend deprivation index and household income before tax), lifestyle (smoking status, alcohol consumption, and physical activity), and environmental (road noise, rail noise, and air concentrations of NO_2 and $PM_{2.5}$) confounders. If the model did not converge, N/A was added to the table. Significant *p*-values are in bold.

*ACME = average causal mediation effect; PoM = proportion of mediation. Other abbreviations as in **Supplemental Tables 2**, **3**, and **4**.*

Supplemental Table 7. Mediation analyses for abdominal subcutaneous adipose tissue volume.

CMR metrics	L_{night} ≥45dB						L_{den} ≥50dB					
	ACME		Total effects		PoM		ACME		Total effects		PoM	
	β (95% CI)	*p*-value	β (95% CI)	*p*-value	Proportion (95% CI)	*p*-value	β (95% CI)	*p*-value	β (95% CI)	*p*-value	Proportion (95% CI)	*p*-value
$LVEDV_i$	0.68 (0.52, 0.85)	**<0.001**	2.65 (2.02, 3.28)	**<0.001**	26% (14, 37)	**<0.001**	0.29 (0.00, 0.58)	**0.049**	0.83 (0.55, 1.12)	**<0.001**	35% (-12, 82)	0.141
$LVESV_i$	0.40 (0.27, 0.53)	**<0.001**	1.43 (0.37, 2.49)	**0.008**	28% (1, 56)	**0.045**	0.15 (-0.02, 0.32)	0.083	0.40 (-0.08, 0.87)	0.102	38% (-49, 126)	0.392
LV MV	1.47 (0.71, 2.23)	**<0.001**	4.23 (1.35, 7.11)	**0.004**	35% (-5, 74)	0.085	0.81 (-0.3, 1.92)	0.153	1.92 (-0.28, 4.13)	0.088	42% (-13, 98)	0.137
$LVmass_i$	0.60 (0.26, 0.94)	**0.001**	1.91 (0.71, 3.12)	**0.002**	31% (-4, 67)	0.084	0.34 (-0.12, 0.80)	0.144	0.93 (-0.04, 1.9)	0.061	37% (-20, 93)	0.201
LV $\overline{WT}$	0.05 (0.01, 0.09)	**0.014**	0.15 (0.05, 0.26)	**0.004**	31% (-14, 76)	0.173	0.03 (-0.02, 0.08)	0.192	0.09 (-0.02, 0.2)	0.111	36% (-23, 94)	0.231
LV MWT	0.06 (0.01, 0.11)	**0.014**	0.15 (-0.01, 0.3)	0.068	43% (-27, 113)	0.233	0.04 (-0.03, 0.11)	0.215	0.10 (-0.08, 0.29)	0.282	43% (-13, 100)	0.134
IVST	0.05 (0.01, 0.09)	**0.013**	0.14 (0.05, 0.24)	**0.004**	34% (-15, 83)	0.175	0.03 (-0.02, 0.08)	0.207	0.10 (0, 0.2)	0.057	32% (-17, 80)	0.203
LV lateral WT	0.05 (0.01, 0.09)	**0.016**	0.19 (0.06, 0.33)	**0.005**	25% (-12, 62)	0.188	0.03 (-0.01, 0.08)	0.176	0.08 (-0.05, 0.22)	0.209	38% (-33, 108)	0.293
LV EF	-0.13 (-0.25, 0.00)	**0.046**	-0.32 (-1.65, 1.02)	0.643	40% (-148, 228)	0.678	N/A	N/A	N/A	N/A	N/A	N/A
LV MCF	-0.01 (-0.02, 0.00)	**0.030**	-0.02 (-0.06, 0.01)	0.238	40% (-63, 143)	0.444	-0.01 (-0.02, 0.00)	0.247	-0.02 (-0.03, 0.00)	**0.008**	39% (-24, 102)	0.227
Global absolute LV circumferential strain index	-0.01 (-0.02, -0.01)	**<0.001**	-0.05 (-0.08, -0.03)	**<0.001**	21% (3, 40)	**0.025**	-0.01 (-0.01, 0.00)	0.149	-0.02 (-0.03, -0.02)	**<0.001**	25% (-12, 62)	0.194
Global absolute LV radial strain index	-0.02 (-0.03, -0.01)	**<0.001**	-0.09 (-0.13, -0.06)	**<0.001**	22% (7, 38)	**0.006**	-0.01 (-0.02, 0.00)	0.119	-0.05 (-0.07, -0.04)	**<0.001**	16% (-1, 34)	0.071
Global absolute LV longitudinal strain index	-0.01 (-0.01, 0.00)	**0.002**	-0.04 (-0.05, -0.03)	**<0.001**	19% (0, 38)	**0.045**	0.00 (-0.01, 0.00)	0.096	-0.01 (-0.02, 0.00)	**0.016**	30% (12, 49)	0.002

We aimed to explore to what extent abdominal subcutaneous adipose tissue volume (estimated from abdominal MRIs) explains the relationships between higher aircraft noise exposure and worse heart structure and function CMR metrics using the Imai, Tingley, and Yamamoto framework of causal inference. We calculated the ACME of abdominal subcutaneous adipose tissue volume and total effects, and then the PoM via abdominal subcutaneous adipose tissue as their ratio expressed as a percentage. Models were adjusted for demographic (age, sex, and ethnicity), cohort-related (assessment center, non-mover status, and length at the current address), socio-economic (Townsend deprivation index and household income before tax), lifestyle (smoking status, alcohol consumption, and physical activity), and environmental (road noise, rail noise, and air concentrations of NO_2 and $PM_{2.5}$) confounders. If the model did not converge, N/A was added to the table. Significant *p*-values are in bold.

*Abbreviations as in **Supplemental Tables 2**, **3**, **4**, and **6**.*

Supplemental Table 8. Mediation analyses for visceral adipose tissue volume.

CMR metrics	L_{night} ≥45dB						L_{den} ≥50dB					
	ACME		Total effects		PoM		ACME		Total effects		PoM	
	β (95% CI)	*p*-value	β (95% CI)	*p*-value	Proportion (95% CI)	*p*-value	β (95% CI)	*p*-value	β (95% CI)	*p*-value	Proportion (95% CI)	*p*-value
$LVEDV_i$	0.21 (-0.14, 0.56)	0.236	2.74 (1.75, 3.73)	**<0.001**	8% (-2, 18)	0.130	0.10 (0, 0.2)	**0.049**	0.96 (0.52, 1.39)	**<0.001**	11% (-1, 22)	0.062
$LVESV_i$	0.19 (0.07, 0.31)	**0.003**	1.52 (0.20, 2.83)	**0.023**	12% (8, 17)	**<0.001**	0.07 (0.03, 0.11)	**0.001**	0.49 (-0.07, 1.04)	0.087	14% (-6, 34)	0.178
LV MV	0.63 (0.14, 1.12)	**0.012**	4.24 (1.14, 7.34)	**0.007**	15% (4, 25)	**0.006**	0.46 (-0.19, 1.12)	0.163	2.07 (-0.37, 4.5)	0.096	22% (-1, 46)	0.066
$LVmass_i$	0.30 (0.14, 0.46)	**<0.001**	1.97 (0.64, 3.29)	**0.004**	15% (7, 24)	**0.001**	0.21 (-0.05, 0.48)	0.119	1.02 (-0.02, 2.07)	0.056	21% (-4, 45)	0.095
LV $\overline{WT}$	0.03 (0.01, 0.06)	**0.016**	0.15 (0.05, 0.25)	**0.003**	20% (-2, 43)	0.078	0.02 (-0.01, 0.06)	0.166	0.09 (-0.02, 0.21)	0.115	26% (-6, 58)	0.117
LV MWT	0.05 (0.01, 0.08)	**0.022**	0.15 (-0.01, 0.3)	0.070	31% (1, 62)	**0.046**	0.04 (-0.02, 0.09)	0.183	0.11 (-0.08, 0.31)	0.265	32% (4, 59)	**0.024**
IVST	0.03 (0, 0.06)	0.056	0.14 (0.05, 0.23)	**0.003**	20% (-5, 45)	0.122	0.02 (-0.01, 0.06)	0.230	0.10 (-0.01, 0.21)	0.070	21% (-6, 49)	0.125
LV lateral WT	0.03 (0.01, 0.05)	**0.002**	0.19 (0.06, 0.32)	**0.004**	17% (-1, 36)	0.064	0.02 (-0.01, 0.06)	0.127	0.09 (-0.05, 0.22)	0.218	28% (-11, 67)	0.157
LV EF	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
LV MCF	-0.01 (-0.02, 0.00)	**0.004**	-0.02 (-0.06, 0.02)	0.248	45% (-62, 152)	0.409	-0.01 (-0.01, 0.00)	0.133	-0.02 (-0.03, -0.01)	**0.003**	38% (-6, 81)	0.091
Global absolute LV circumferential strain index	-0.01 (-0.01, 0.00)	**<0.001**	-0.05 (-0.08, -0.03)	**<0.001**	17% (4, 30)	**0.001**	0.00 (-0.01, 0.00)	0.096	-0.02 (-0.03, -0.02)	**<0.001**	20% (-5, 44)	0.114
Global absolute LV radial strain index	-0.02 (-0.02, -0.01)	**<0.001**	-0.09 (-0.13, -0.05)	**<0.001**	19% (13, 25)	**<0.001**	-0.01 (-0.01, 0.00)	**0.044**	-0.06 (-0.07, -0.04)	**<0.001**	14% (3, 24)	**0.009**
Global absolute LV longitudinal strain index	-0.01 (-0.01, 0.00)	**<0.001**	-0.04 (-0.05, -0.02)	**<0.001**	14% (3, 25)	**0.013**	0.00 (-0.01, 0.00)	0.141	-0.02 (-0.03, 0.00)	**0.015**	19% (0, 38)	**0.046**

We aimed to explore to what extent visceral adipose tissue volume (estimated from abdominal MRIs) explains the relationships between higher aircraft noise exposure and worse heart structure and function CMR metrics using the Imai, Tingley, and Yamamoto framework of causal inference. We calculated the ACME of visceral adipose tissue volume and total effects, and then the PoM via visceral adipose tissue volume as their ratio expressed as a percentage. Models were adjusted for demographic (age, sex, and ethnicity), cohort-related (assessment center, non-mover status, and length at the current address), socio-economic (Townsend deprivation index and household income before tax), lifestyle (smoking status, alcohol consumption, and physical activity), and environmental (road noise, rail noise, and air concentrations of NO_2 and $PM_{2.5}$) confounders. If the model did not converge, N/A was added to the table. Significant *p*-values are in bold.

*Abbreviations as in **Supplemental Tables 2**, **3**, **4**, and **6**.*

Supplemental Table 9. Mediation analyses for hypertension.

CMR metrics	L_{night} ≥45dB						L_{den} ≥50dB					
	ACME		Total effects		PoM		ACME		Total effects		PoM	
	β (95% CI)	*p*-value	β (95% CI)	*p*-value	Proportion (95% CI)	*p*-value	β (95% CI)	*p*-value	β (95% CI)	*p*-value	Proportion (95% CI)	*p*-value
$LVEDV_i$	0.03 (-0.08, 0.13)	0.606	2.64 (2.04, 3.25)	**<0.001**	1% (-3, 5)	0.595	0.19 (-0.02, 0.40)	0.070	1.00 (0.88, 1.13)	**<0.001**	19% (-1, 39)	0.061
$LVESV_i$	0.00 (-0.02, 0.03)	0.758	1.69 (0.5, 2.88)	**0.005**	0% (-1, 2)	0.733	0.08 (0.04, 0.13)	**<0.001**	0.67 (0.25, 1.08)	**0.002**	13% (4, 21)	**0.003**
LV MV	0.12 (-0.33, 0.57)	0.609	5.27 (2.99, 7.55)	**<0.001**	2% (-6, 10)	0.593	0.64 (0.11, 1.16)	**0.017**	2.67 (0.92, 4.43)	**0.003**	24% (19, 29)	**<0.001**
$LVmass_i$	0.06 (-0.09, 0.21)	0.470	2.21 (1.29, 3.14)	**<0.001**	3% (-4, 9)	0.449	0.34 (0.08, 0.59)	**0.009**	1.20 (0.35, 2.04)	**0.005**	28% (26, 31)	**<0.001**
LV $\overline{WT}$	0.01 (-0.01, 0.02)	0.441	0.18 (0.11, 0.26)	**<0.001**	3% (-4, 10)	0.416	0.03 (0.00, 0.06)	**0.023**	0.11 (0.02, 0.21)	**0.015**	30% (23, 37)	**<0.001**
LV MWT	0.01 (-0.02, 0.03)	0.455	0.21 (0.12, 0.29)	**<0.001**	5% (-8, 17)	0.480	0.05 (0.01, 0.09)	**0.014**	0.14 (-0.03, 0.3)	0.100	36% (15, 57)	**0.001**
IVST	0.01 (-0.01, 0.02)	0.403	0.17 (0.1, 0.24)	**<0.001**	3% (-4, 9)	0.367	0.03 (0.00, 0.07)	**0.059**	0.12 (0.04, 0.21)	**0.004**	27% (15, 39)	**<0.001**
LV lateral WT	0.01 (-0.01, 0.02)	0.469	0.23 (0.13, 0.33)	**<0.001**	3% (-4, 9)	0.440	0.03 (0.01, 0.06)	**0.010**	0.11 (0.00, 0.22)	**0.045**	30% (22, 37)	**<0.001**
LV EF	0.01 (-0.02, 0.04)	0.583	-0.72 (-2.23, 0.79)	0.351	-1% (-4, 1)	0.314	-0.03 (-0.09, 0.03)	0.356	-0.28 (-0.99, 0.43)	0.439	10% (-12, 32)	0.366
LV MCF	0.00 (0.00, 0.00)	0.508	-0.03 (-0.07, 0)	0.090	3% (-4, 10)	0.454	-0.01 (-0.01, 0.00)	0.062	-0.02 (-0.03, -0.01)	**<0.001**	31% (11, 52)	**0.003**
Global absolute LV circumferential strain index	0.00 (0.00, 0.00)	0.083	-0.06 (-0.08, -0.03)	**<0.001**	4% (-1, 8)	0.091	0.00 (-0.01, 0.00)	0.077	-0.03 (-0.03, -0.02)	**<0.001**	18% (0, 35)	**0.048**
Global absolute LV radial strain index	0.00 (-0.01, 0.00)	0.127	-0.1 (-0.13, -0.07)	**<0.001**	2% (0, 5)	0.097	-0.01 (-0.01, 0.00)	0.123	-0.06 (-0.08, -0.05)	**<0.001**	9% (-1, 19)	0.092
Global absolute LV longitudinal strain index	0.00 (0.00, 0.00)	0.334	-0.04 (-0.05, -0.03)	**<0.001**	2% (-2, 6)	0.284	0.00 (-0.01, 0.00)	0.072	-0.02 (-0.03, 0.00)	**0.029**	20% (-10, 50)	0.182

We aimed to explore to what extent hypertension (defined as self-reported doctor diagnosis, systolic ≥140mmHg or diastolic ≥90mmHg at the baseline visit, or the use of anti-hypertensives) explains the relationships between higher aircraft noise exposure and worse heart structure and function CMR metrics using the Imai, Tingley, and Yamamoto framework of causal inference. We calculated the ACME via hypertension and total effects, and then the PoM via hypertension as their ratio expressed as a percentage. Models were adjusted for demographic (age, sex, and ethnicity), cohort-related (assessment center, non-mover status, and length at the current address), socio-economic (Townsend deprivation index and household income before tax), lifestyle (smoking status, alcohol consumption, and physical activity), and environmental (road noise, rail noise, and air concentrations of NO_2 and $PM_{2.5}$) confounders. Significant *p*-values are in bold.

*Abbreviations as in **Supplemental Tables 2, 3, 4,** and **6**.*

Supplemental Table 10. Mediation analyses for high cholesterol.

CMR metrics	L_{night} ≥45dB						L_{den} ≥50dB					
	ACME		Total effects		PoM		ACME		Total effects		PoM	
	β (95% CI)	*p*-value	β (95% CI)	*p*-value	Proportion (95% CI)	*p*-value	β (95% CI)	*p*-value	β (95% CI)	*p*-value	Proportion (95% CI)	*p*-value
$LVEDV_i$	0.10 (0.04, 0.16)	**0.001**	2.67 (2.13, 3.21)	**<0.001**	4% (1, 6)	**0.005**	0.00 (-0.05, 0.05)	0.897	1.00 (0.87, 1.12)	**<0.001**	0% (-5, 5)	0.898
$LVESV_i$	-0.34 (-0.8, 0.12)	0.152	1.66 (0.49, 2.84)	**0.005**	-20% (-56, 16)	0.267	0.00 (-0.04, 0.03)	0.898	0.66 (0.25, 1.06)	**0.002**	0% (-6, 5)	0.900
LV MV	-0.81 (-2.35, 0.73)	0.303	5.12 (2.55, 7.69)	**<0.001**	-16% (-50, 19)	0.369	0.00 (-0.09, 0.08)	0.919	2.68 (0.98, 4.39)	**0.002**	0% (-3, 3)	0.918
$LVmass_i$	-0.26 (-0.87, 0.36)	0.411	2.15 (1.15, 3.15)	**<0.001**	-12% (-42, 18)	0.434	0.00 (-0.02, 0.02)	0.916	1.18 (0.37, 1.99)	**0.004**	0% (-2, 1)	0.916
LV $\overline{WT}$	-0.04 (-0.11, 0.04)	0.314	0.18 (0.09, 0.26)	**<0.001**	-21% (-68, 25)	0.368	0.00 (-0.01, 0.01)	0.893	0.11 (0.03, 0.20)	**0.012**	0% (-5, 5)	0.891
LV MWT	-0.04 (-0.15, 0.06)	0.432	0.19 (0.11, 0.28)	**<0.001**	-22% (-76, 31)	0.414	0.00 (0.00, 0.00)	0.901	0.14 (-0.02, 0.29)	0.085	0% (-3, 3)	0.895
IVST	-0.04 (-0.11, 0.03)	0.273	0.16 (0.07, 0.25)	**<0.001**	-25% (-79, 29)	0.363	0.00 (-0.01, 0.01)	0.892	0.12 (0.05, 0.2)	**0.002**	0% (-6, 5)	0.891
LV lateral WT	-0.04 (-0.12, 0.04)	0.342	0.22 (0.11, 0.33)	**<0.001**	-17% (-57, 22)	0.389	0.00 (-0.01, 0.01)	0.894	0.11 (0.00, 0.22)	**0.043**	0% (-6, 6)	0.892
LV EF	0.46 (-0.02, 0.94)	0.060	-0.68 (-2.24, 0.88)	0.396	N/A	N/A	0.00 (-0.06, 0.07)	0.909	-0.25 (-0.95, 0.45)	0.482	-1% (-28, 25)	0.915
LV MCF	0.02 (-0.01, 0.04)	0.198	-0.03 (-0.07, 0.01)	0.183	-55% (-204, 94)	0.469	0.00 (0.00, 0.00)	0.912	-0.02 (-0.03, -0.01)	**<0.001**	-1% (-11, 10)	0.911
Global absolute LV circumferential strain index	0.01 (-0.01, 0.02)	0.339	-0.05 (-0.08, -0.03)	**<0.001**	-13% (-45, 19)	0.422	0.00 (0.00, 0.00)	0.834	-0.03 (-0.03, -0.02)	**<0.001**	0% (-1, 1)	0.835
Global absolute LV radial strain index	0.01 (-0.02, 0.03)	0.529	-0.10 (-0.13, -0.06)	**<0.001**	-8% (-35, 19)	0.565	0.00 (0.00, 0.00)	0.853	-0.06 (-0.08, -0.05)	**<0.001**	0% (-2, 2)	0.850
Global absolute LV longitudinal strain index	0.01 (-0.01, 0.02)	0.395	-0.04 (-0.05, -0.02)	**<0.001**	-16% (-53, 20)	0.383	0.00 (0.00, 0.00)	0.781	-0.01 (-0.03, 0.00)	**0.024**	-2% (-15, 11)	0.758

We aimed to explore to what extent high cholesterol (defined as a baseline total serum cholesterol level ≥6.2mmol/l) explains the relationships between higher aircraft noise exposure and worse heart structure and function CMR metrics using the Imai, Tingley, and Yamamoto framework of causal inference. We calculated the ACME of high cholesterol and total effects, and then the PoM via high cholesterol as their ratio expressed as a percentage. Models were adjusted for demographic (age, sex, and ethnicity), cohort-related (assessment center, non-mover status, and length at the current address), socio-economic (Townsend deprivation index and household income before tax), lifestyle (smoking status, alcohol consumption, and physical activity), and environmental (road noise, rail noise, and air concentrations of NO_2 and $PM_{2.5}$) confounders. If the model did not converge, N/A was added to the table. Significant *p*-values are in bold.

*Abbreviations as in **Supplemental Tables 2, 3, 4,** and **5**.*

Supplemental Table 11. Percentage differences in CMR metrics between those exposed and unexposed to higher aircraft noise levels.

CMR heart structure and function metrics			LV volumes			LV structure							LV systolic function	
			$LVEDV_i$	**$LVESV_i$**	**LV MV**	**$LVmass_i$**	**LV $\overline{WT}$**	**LV MWT**	**IVST**	**LV lateral WT**	**SLWR**	**LV RWM**	**LV EF**	**LV MCF**
Aircraft noise L_{night} ≥45dB	**Model 1**	**% difference (95% CI)**	4.47% (3.52, 5.43)	6.99% (1.97, 12.25)	7.14% (3.98, 10.39)	6.84% (3.84, 9.92)	3.49% (1.86, 5.15)	3.13% (1.83, 4.45)	3.28% (1.65, 4.93)	4.20% (2.07, 6.38)	-0.73% (-1.27, -0.18)	1.83% (0.31, 3.37)	-1.25% (-4.15, 1.74)	-2.57% (-6.33, 1.34)
		***p*-value**	**<0.001**	**0.006**	**<0.001**	**<0.001**	**<0.001**	**<0.001**	**<0.001**	**<0.001**	**0.009**	**0.018**	0.407	0.194
	Model 2	**% difference (95% CI)**	4.42% (3.52, 5.33)	6.97% (1.97, 12.22)	7.16% (4.02, 10.38)	6.87% (3.85, 9.98)	3.55% (1.93, 5.19)	3.18% (1.83, 4.56)	3.32% (1.71, 4.96)	4.27% (2.16, 6.43)	-0.77% (-1.33, -0.21)	1.91% (0.33, 3.51)	-1.29% (-4.20, 1.71)	-2.72% (-6.47, 1.19)
		***p*-value**	**<0.001**	**0.006**	**<0.001**	**<0.001**	**<0.001**	**<0.001**	**<0.001**	**<0.001**	**0.007**	**0.018**	0.397	0.170
	Model 3	**% difference (95% CI)**	4.56% (3.68, 5.45)	7.15% (2.22, 12.33)	7.22% (4.16, 10.37)	6.94% (4.04, 9.93)	3.54% (1.97, 5.14)	3.18% (1.92, 4.45)	3.33% (1.77, 4.91)	4.26% (2.18, 6.38)	-0.73% (-1.27, -0.19)	1.85% (0.38, 3.36)	-1.28% (-4.17, 1.69)	-2.64% (-6.36, 1.23)
		***p*-value**	**<0.001**	**0.004**	**<0.001**	**<0.001**	**<0.001**	**<0.001**	**<0.001**	**<0.001**	**0.008**	**0.014**	0.394	0.178
Aircraft noise L_{den} ≥50dB	**Model 1**	**% difference (95% CI)**	1.57% (1.25, 1.89)	2.24% (0.24, 4.28)	3.33% (1.21, 5.48)	3.49% (1.17, 5.87)	2.13% (0.42, 3.86)	2.03% (-0.42, 4.54)	2.31% (0.79, 3.85)	2.05% (0.04, 4.11)	0.30% (-0.34, 0.95)	1.69% (-0.61, 4.04)	-0.48% (-1.89, 0.96)	-1.93% (-2.70, -1.15)
		***p*-value**	**<0.001**	**0.028**	**0.002**	**0.003**	**0.014**	0.104	**0.003**	**0.046**	0.354	0.150	0.512	**<0.001**
	Model 2	**% difference (95% CI)**	1.53% (1.23, 1.82)	2.23% (0.20, 4.30)	3.35% (1.20, 5.54)	3.52% (1.20, 5.89)	2.17% (0.48, 3.89)	2.08% (-0.38, 4.61)	2.35% (0.83, 3.88)	2.12% (0.13, 4.14)	0.27% (-0.35, 0.89)	1.76% (-0.51, 4.08)	-0.50% (-1.96, 0.98)	-2.04% (-2.74, -1.33)
		***p*-value**	**<0.001**	**0.031**	**0.002**	**0.003**	**0.011**	0.099	**0.002**	**0.036**	0.390	0.130	0.506	**<0.001**
	Model 3	**% difference (95% CI)**	1.53% (1.28, 1.79)	2.19% (0.31, 4.11)	3.29% (1.13, 5.50)	3.44% (1.03, 5.91)	2.11% (0.36, 3.88)	2.02% (-0.46, 4.55)	2.29% (0.74, 3.87)	2.03% (-0.02, 4.14)	0.31% (-0.35, 0.96)	1.68% (-0.64, 4.06)	-0.46% (-1.86, 0.95)	-1.90% (-2.71, -1.08)
		***p*-value**	**<0.001**	**0.022**	**0.003**	**0.005**	**0.018**	0.111	**0.004**	0.053	0.360	0.158	0.520	**<0.001**

CMR absolute strain index metrics			LV circumferential				LV radial				LV longitudinal	
			Global	**Basal**	**Mid**	**Apical**	**Global**	**Basal**	**Mid**	**Apical**	**Global**	**Basal**
Aircraft noise L_{night} ≥45dB	**Model 1**	**% difference (95% CI)**	-7.76% (-11.75, -3.58)	-8.04% (-12.40, -3.47)	-7.71% (-11.39, -3.88)	-7.17% (-11.13, -3.03)	-6.96% (-10.21, -3.59)	-7.31% (-9.84, -4.71)	-6.87% (-10.91, -2.64)	-5.35% (-9.77, -0.71)	-6.29% (-8.74, -3.78)	-5.85% (-8.75, -2.86)
		***p*-value**	**<0.001**	**0.001**	**<0.001**	**0.001**	**<0.001**	**<0.001**	**0.002**	**0.024**	**<0.001**	**<0.001**
	Model 2	**% difference (95% CI)**	-7.83% (-11.85, -3.63)	-8.07% (-12.43, -3.48)	-7.76% (-11.48, -3.89)	-7.24% (-11.19, -3.12)	-7.00% (-10.35, -3.53)	-7.35% (-9.89, -4.74)	-6.91% (-10.98, -2.65)	-5.34% (-9.82, -0.64)	-6.31% (-8.84, -3.70)	-5.86% (-8.82, -2.81)
		***p*-value**	**<0.001**	**0.001**	**<0.001**	**0.001**	**<0.001**	**<0.001**	**0.002**	**0.027**	**<0.001**	**<0.001**
	Model 3	**% difference (95% CI)**	-7.83% (-11.83, -3.66)	-8.11% (-12.50, -3.50)	-7.78% (-11.46, -3.95)	-7.25% (-11.16, -3.17)	-7.02% (-10.28, -3.64)	-7.38% (-10.03, -4.66)	-6.92% (-10.95, -2.70)	-5.41% (-9.80, -0.81)	-6.37% (-8.73, -3.96)	-5.91% (-8.73, -3.01)
		***p*-value**	**<0.001**	**0.001**	**<0.001**	**<0.001**	**<0.001**	**<0.001**	**0.002**	**0.022**	**<0.001**	**<0.001**
Aircraft noise L_{den} ≥50dB	**Model 1**	**% difference (95% CI)**	-4.03% (-5.10, -2.95)	-3.71% (-5.17, -2.23)	-4.04% (-4.77, -3.30)	-3.89% (-6.25, -1.48)	-4.93% (-6.10, -3.74)	-4.68% (-5.70, -3.65)	-4.70% (-5.69, -3.69)	-4.21% (-5.53, -2.87)	-2.71% (-5.40, 0.07)	-2.84% (-5.10, -0.53)
		***p*-value**	**<0.001**	**<0.001**	**<0.001**	**0.002**	**<0.001**	**<0.001**	**<0.001**	**<0.001**	0.056	**0.016**
	Model 2	**% difference (95% CI)**	-4.10% (-5.11, -3.08)	-3.73% (-5.20, -2.25)	-4.08% (-4.80, -3.36)	-3.96% (-6.25, -1.61)	-4.97% (-6.09, -3.83)	-4.72% (-5.79, -3.65)	-4.74% (-5.71, -3.76)	-4.21% (-5.43, -2.97)	-2.72% (-5.39, 0.03)	-2.85% (-5.13, -0.52)
		***p*-value**	**<0.001**	**<0.001**	**<0.001**	**0.001**	**<0.001**	**<0.001**	**<0.001**	**<0.001**	0.052	**0.017**
	Model 3	**% difference (95% CI)**	-4.01% (-5.10, -2.89)	-3.69% (-5.12, -2.24)	-4.02% (-4.76, -3.27)	-3.86% (-6.27, -1.40)	-4.90% (-6.14, -3.65)	-4.64% (-5.75, -3.52)	-4.68% (-5.71, -3.64)	-4.19% (-5.58, -2.78)	-2.66% (-5.37, 0.12)	-2.81% (-5.11, -0.45)
		***p*-value**	**<0.001**	**<0.001**	**<0.001**	**0.002**	**<0.001**	**<0.001**	**<0.001**	**<0.001**	0.061	**0.020**

LVEDV, LVESV, and LVmass were indexed to height$^{1.7}$. Strain metrics were indexed to $LVmass_i$.

All reported analyses consisted of generalized linear models with a gamma distribution and log link. The % differences between those exposed and unexposed to higher aircraft noise levels were calculated as 100*(*exp β-1).* Each model was adjusted for demographic (age, sex, and ethnicity), cohort-related (assessment center, non-mover status, and length at the current address), socio-economic (Townsend deprivation index and household income before tax), lifestyle (smoking status, alcohol consumption, and physical activity), and environmental (road noise, rail noise, and air concentrations of NO_2 and $PM_{2.5}$) confounders. Strain models were also adjusted for the use of antihypertensives. Model 2 was additionally adjusted for the presence of diabetes (beyond model 1). Model 3 was additionally adjusted for the presence of cardiovascular disease (beyond model 1). Significant *p*-values are in bold.

Abbreviations as in **Supplemental Tables 2**, **3**, and **4**.

Supplemental Table 12. Characteristics of participants who lived near one of the four UK airports, had CMR, and did not move home during follow-up.

	Movers **n = 1,103 (30.3%)**	**Non-movers** **n = 2,532 (69.7%)**	***p*-value**
Demographics			
Age at baseline, years	51.00 (44.00, 57.00)	53.00 (47.00, 59.00)	**<0.001**
Male sex, %	512 (46.4%)	1,133 (44.7%)	0.352
Ethnicity White, %	1,047 (95.3%)	2,401 (95.1%)	0.602
Mixed, %	7 (0.6%)	18 (0.7%)	
Asian or Asian British, %	22 (2.0%)	43 (1.7%)	
Black or Black British, %	11 (1.0%)	40 (1.6%)	
Chinese, %	<5	11 (0.4%)	
Other, %	8 (0.7%)	11 (0.4%)	
Townsend deprivation index in 2011 **(lower values indicate less deprivation)**	-2.16 (-3.79, -0.69)	-2.67 (-3.98, -0.67)	**<0.001**
Household income <£18,000, %	106 (10.7%)	245 (10.6%)	0.131
£18000-30999, %	198 (19.9%)	491 (21.2%)	
£31000-51999, %	285 (28.7%)	684 (29.6%)	
£52000-100000, %	295 (29.7%)	702 (30.4%)	
>£100000, %	110 (11.1%)	190 (8.2%)	
Lifestyle			
Smoking Status Current, %	89 (8.1%)	181 (7.2%)	0.531
Former, %	343 (31.2%)	774 (30.6%)	
Never, %	668 (60.7%)	1,574 (62.2%)	
Alcohol Consumption Daily, %	261 (23.7%)	582 (23.0%)	0.945
3-4 times/week, %	299 (27.1%)	691 (27.3%)	
1-2 times/week, %	255 (23.1%)	618 (24.4%)	
1-3 times/month, %	128 (11.6%)	290 (11.5%)	

Occasional, %	102 (9.3%)	216 (8.5%)	
Never, %	57 (5.2%)	135 (5.3%)	
Physical Activity, days/week	3.00 (2.00, 5.00)	3.00 (2.00, 5.00)	**0.030**
Environmental exposures			
Aircraft noise in 2011, L_{den} ≥ 50dB, %	132 (12.0%)	172 (6.8%)	**<0.001**
L_{den} < 50dB, %	971 (88.0%)	2,360 (93.2%)	
L_{night} ≥ 45dB, %	45 (4.1%)	62 (2.4%)	**0.007**
L_{night} < 45dB, %	1,058 (95.9%)	2,470 (97.6%)	
Road noise in 2013, L_{den} ≥ 50dB, %	792 (71.8%)	1,825 (72.1%)	0.866
L_{den} < 50dB, %	311 (28.2%)	707 (27.9%)	
L_{night} ≥ 45dB, %	605 (54.9%)	1,315 (51.9%)	0.106
L_{night} < 45dB, %	498 (45.1%)	1,217 (48.1%)	
Rail noise in 2011, L_{den} ≥ 50dB, %	41 (3.7%)	78 (3.1%)	0.321
L_{den} < 50dB, %	1,062 (96.3%)	2,454 (96.9%)	
L_{night} ≥ 45dB, %	33 (3.0%)	60 (2.4%)	0.275
L_{den} < 50dB, %	1,070 (97.0%)	2,472 (97.6%)	
NO_2 air concentrations in 2009, μg/m^3	32.67 (27.98, 37.31)	32.12 (27.57, 36.09)	**<0.001**
$PM_{2.5}$ air concentrations in 2010, μg/m^3	9.92 (9.32, 10.58)	9.89 (9.33, 10.49)	0.373
BMI, kg/m^2	26.11 (23.46, 28.95)	25.80 (23.43, 28.68)	0.278
Hypertension, %	454 (41.2%)	1,123 (44.4%)	0.074
Diabetes, %	29 (2.6%)	77 (3.0%)	0.497
High cholesterol, %	359 (32.5%)	876 (34.6%)	0.230
CVD, %	34 (3.1%)	120 (4.7%)	**0.023**
CMR heart structure and function metrics			
$LVEDV_i$, ml/$m^{1.7}$	59.81 (52.56, 67.58)	59.00 (52.65, 66.81)	0.285
$LVESV_i$, ml/$m^{1.7}$	24.14 (20.42, 28.34)	23.58 (20.01, 27.88)	0.354
$LVmass_i$, g/$m^{1.7}$	33.62 (29.21, 38.97)	33.43 (29.14, 38.89)	0.506
LV MV, ml	78.73 (65.15, 95.86)	76.77 (64.32, 95.96)	0.211

LV $\overline{WT}$, mm	5.52 (5.01, 6.07)	5.47 (4.99, 6.09)	0.693
LV MWT, mm	6.88 (6.20, 7.63)	6.86 (6.21, 7.64)	0.702
IVST, mm	5.50 (4.95, 6.08)	5.43 (4.92, 6.07)	0.416
Lateral WT, mm	5.60 (5.13, 6.16)	5.56 (5.09, 6.18)	0.770
SLWR, unitless	0.57 (0.52, 0.62)	0.56 (0.52, 0.62)	0.719
LV RWM, g/ml	0.98 (0.93, 1.02)	0.97 (0.93, 1.02)	0.159
LV MCF, unitless	1.09 (0.97, 1.23)	1.10 (0.98, 1.23)	0.777
LV EF, %	59.54 (55.76, 63.35)	59.59 (56.01, 63.57)	0.467
Absolute LV circumferential strain index, $m^{1.7}/g$			
Global	0.65 (0.54, 0.80)	0.66 (0.54, 0.81)	0.354
Basal	0.68 (0.55, 0.80)	0.68 (0.55, 0.82)	0.335
Mid	0.64 (0.53, 0.78)	0.65 (0.53, 0.79)	0.157
Apical	0.79 (0.65, 0.95)	0.79 (0.64, 0.96)	0.772
Absolute LV radial strain index, $m^{1.7}/g$			
Global	1.29 (1.05, 1.60)	1.33 (1.06, 1.64)	0.174
Basal	1.33 (1.06, 1.68)	1.37 (1.06, 1.70)	0.249
Mid	1.41 (1.12, 1.73)	1.43 (1.14, 1.77)	0.117
Apical	1.47 (1.20, 1.78)	1.51 (1.21, 1.84)	0.175
Absolute LV longitudinal strain index, $m^{1.7}/g$			
Global	0.54 (0.45, 0.65)	0.55 (0.45, 0.66)	0.927
Basal	0.57 (0.48, 0.69)	0.58 (0.48, 0.69)	0.900
Mid	N/A		
Apical			

LVEDV, LVESV, and LVmass were indexed to height$^{1.7}$. Strain metrics were indexed to $LVmass_i$.

All variables are presented as percentages if categorial or median (interquartile range) if continuous. Comparisons were made using the Chi-Squared test with Yates continuity correction for categorical variables and Mann-Whitney U-test for continuous variables. Significant *p*-values are presented in bold.

*Abbreviations as in **Supplemental Tables 2** and **3**.*

Supplemental Table 13. Differences in CMR metrics between those exposed and unexposed to higher aircraft noise levels in those who did not move home during follow-up.

CMR metrics		L_{night} ≥45dB vs. L_{night} <45dB			L_{den} ≥50dB vs. L_{den} <50dB		
		% difference (95% CI)	*p*-value	n	% difference (95% CI)	*p*-value	n
$LVEDV_i$		5.44% (1.81, 9.19)	**0.003**	2,228	1.93% (1.19, 2.69)	**<0.001**	2,228
$LVESV_i$		7.89% (-2.17, 18.98)	0.128	2,228	2.41% (0.88, 3.96)	**0.002**	2,228
LV MV		9.13% (1.66, 17.15)	**0.016**	2,231	3.40% (2.09, 4.73)	**<0.001**	2,231
$LVmass_i$		8.52% (2.09, 15.36)	**0.009**	2,228	3.37% (1.35, 5.43)	**0.001**	2,228
LV $\overline{WT}$		4.22% (1.44, 7.08)	**0.003**	2,231	1.75% (0.61, 2.91)	**0.003**	2,231
LV MWT		4.44% (2.97, 5.93)	**<0.001**	2,231	1.60% (0.69, 2.52)	**0.001**	2,231
IVST		3.88% (1.30, 6.53)	**0.003**	2,231	1.55% (0.23, 2.89)	**0.022**	2,231
LV lateral WT		5.29% (2.08, 8.59)	**0.001**	2,231	2.22% (0.95, 3.51)	**0.001**	2,231
SLWR		-1.06%(-1.51, -0.61)	**<0.001**	2,231	-0.57% (-1.30, 0.16)	0.124	2,231
LV RWM		2.47% (0.13, 4.87)	**0.039**	2,231	1.34% (-0.16, 2.85)	0.080	2,231
LV EF		-0.93% (-4.76, 3.05)	0.640	2,231	-0.56% (-1.79, 0.69)	0.380	2,231
LV MCF		-2.24% (-7.98, 3.86)	0.464	2,231	-1.31% (-2.39, -0.22)	**0.019**	2,231
LV circumferential strain index	**Global**	-9.01% (-16.63, -0.69)	**0.034**	2,226	-5.05% (-6.82, -3.25)	**<0.001**	2,226
	Basal	-7.52% (-16.51, 2.43)	0.134	2,226	-3.47% (-7.50, 0.73)	0.104	2,226
	Mid	-9.18% (-16.47, -1.25)	**0.024**	2,226	-5.44% (-6.91, -3.95)	**<0.001**	2,226
	Apical	-8.37% (-13.74, -2.65)	**0.005**	2,226	-5.03% (-8.04, -1.92)	**0.002**	2,226
LV radial strain index	**Global**	-7.54% (-15.51, 1.18)	0.088	2,226	-5.85% (-7.37, -4.30)	**<0.001**	2,226
	Basal	-7.37% (-16.89, 3.25)	0.167	2,226	-5.51% (-10.11, -0.68)	**0.026**	2,226
	Mid	-7.08% (-15.99, 2.78)	0.154	2,226	-5.82% (-7.13, -4.49)	**<0.001**	2,226
	Apical	-5.08% (-10.49, 0.65)	0.081	2,226	-4.31% (-5.84, -2.76)	**<0.001**	2,226
LV longitudinal strain index	**Global**	-8.30% (-15.00, -1.07)	**0.025**	2,139	-3.14% (-5.67, -0.55)	**0.018**	2,139
	Basal	-8.01% (-14.62, -0.90)	**0.028**	2,139	-3.23% (-5.96, -0.42)	**0.025**	2,139

LVEDV, LVESV, and LVmass were indexed to height$^{1.7}$. Strain metrics were indexed to $LVmass_i$.

All reported analyses consisted of generalized linear models with a gamma distribution and log link. The % differences between those exposed and unexposed to higher aircraft noise levels were calculated as 100*(*exp β-1)*. The models were adjusted for demographic (age, sex, and ethnicity), cohort-related (assessment center and length at the current address), socio-economic (Townsend deprivation index and household income before tax), lifestyle (smoking status, alcohol consumption, and physical activity), and environmental (road noise, rail noise, and air concentrations of NO_2 and $PM_{2.5}$) confounders. Strain models were also adjusted for the use of antihypertensives. Significant *p*-values are presented in bold.

*Abbreviations as in **Supplemental Tables S1, 2, and 4**.*

Supplemental Figure 1. Graphic representation of the mediation analyses.

We explored the extent to which the relationship between higher aircraft noise exposure and worse CMR heart phenotype was explained by CV risk factors through mediation analyses, using the Imai, Tingley, and Yamamoto framework of causal inference. We regressed the noise exposure on the CMR outcomes to calculate the total effects. To calculate the effect of the independent variable on the mediator (the mediator model), we regressed the noise exposure on the CV risk factors. To calculate the effect of the mediator on the dependent variable (the outcome model), we regressed the CV risk factors on the CMR outcomes. All models were adjusted for demographic, cohort-related, socio-economic, lifestyle, and environmental confounders. This allowed us to derive the total effects, average causal mediation effects, average direct effects, and the proportion of mediation as described in the methods section.

BMI = body mass index; CMR = cardiovascular magnetic resonance; CV = cardiovascular.