SUPPLEMENTAL MATERIAL

Table S1. Comparison of participant characteristics between adolescents with and without $PM_{2.5}$ data.

	With PM2.5 (N=322)	Without PM2.5 (N=99)	P value*
Age (years)	16.95±2.25	17.88±2.24	0.77
Male (n, %)	180, 55.90%	47, 47.47%	0.14
Non-Hispanic white (n, %)	255, 79.19%	74, 74.75%	0.35
BMI percentile	65.35±29.09	65.35±26.12	0.99
PAC (count)	0.47±3.00	0.44±1.70	0.65
PVC (count)	0.36±3.09	0.34±2.27	0.87

Data are presented as mean±SD for continuous variables and n, percentage for binary variables.

*: T-test and chi-square tests were used to obtain p values.

Table S2. Rate Ratio (95% C) in association between 10μg/m^3 increase in $PM_{2.5}$ concentration and number of cardiac arrhythmias from models with different numbers of lag terms.

	PAC		PVC	
	Rate Ratio (95% CI)	p	Rate Ratio (95% CI)	p
Lag 0 model				
Lag 0	0.982 (0.951, 1.036)	0.39	1.010 (0.992, 1.029)	0.28
Lag 0-1 model				
Lag 0	0.992 (0.983, 1.001)	0.25	0.998 (0.983, 1.012)	0.77
Lag 1	0.996 (0.987, 1.006)	0.41	1.036 (1.020, 1.053)	<0.01
Cumulative	0.988 (0.971, 1.009)	0.23	1.034 (1.005, 1.064)	0.02
Lag 0-2 model				
Lag 0	0.994 (0.987, 1.002)	0.12	0.996 (0.980, 1.012)	0.61
Lag 1	0.997 (0.990, 1.004)	0.43	1.030 (1.017, 1.044)	<0.01
Lag 2	1.001 (0.993, 1.009)	0.91	1.017 (1.004, 1.030)	0.01
Cumulative	0.988 (0.970, 1.007)	0.22	1.043 (1.006, 1.083)	0.02
Lag 0-3 model				
Lag 0	0.995 (0.989, 1.002)	0.17	0.998 (0.983, 1.013)	0.76
Lag 1	0.998 (0.990, 1.003)	0.25	1.015 (1.004, 1.027)	<0.01
Lag 2	1.000 (0.995, 1.006)	0.88	1.022 (1.011, 1.033)	<0.01
Lag 3	1.003 (0.998, 1.009)	0.25	1.016 (1.002, 1.029)	0.02
Cumulative	0.989 (0.970, 1.009)	0.27	1.051 (1.002, 1.102)	0.04
Lag 0-4 model				
Lag 0	0.992 (0.983, 1.001)	0.09	0.999 (0.985, 1.012)	0.85
Lag 1	0.996 (0.990, 1.002)	0.23	1.006 (0.995, 1.012)	0.27
Lag 2	0.999 (0.995, 1.004)	0.71	1.013 (1.003, 1.023)	0.01
Lag 3	1.003 (0.998, 1.007)	0.28	1.019 (1.008, 1.029)	<0.01
Lag 4	1.005 (0.999, 1.011)	0.10	1.024 (1.011, 1.137)	<0.01
Cumulative	0.990 (0.969, 1.012)	0.37	1.061 (1.005, 1.121)	0.03
Lag 0-5 model				
Lag 0	0.996 (0.990, 1.002)	0.44	0.999 (0.987, 1.012)	0.91
Lag 1	0.997 (0.993, 1.002)	0.31	1.005 (0.995, 1.016)	0.30
Lag 2	0.999 (0.994, 1.002)	0.67	1.010 (1.001, 1.020)	0.03
Lag 3	1.000 (0.996, 1.003)	0.88	1.015 (1.005, 1.024)	<0.01
Lag 4	1.004 (1.000, 1.009)	0.07	1.018 (1.007, 1.028)	<0.01
Lag 5	1.009 (1.003, 1.016)	<0.01	1.020 (1.007, 1.032)	<0.01
Cumulative	0.992 (0.969, 1.016)	0.50	1.068 (1.004, 1.137)	0.04
Lag 0-6 model				
Lag 0	0.994 (0.990, 1.001)	0.09	1.003 (0.9901 1.015)	0.64
Lag 1	0.996 (0.993, 1.002)	0.20	0.998 (0.987, 1.009)	0.70
Lag 2	0.998 (0.995, 1.003)	0.18	0.998 (0.988, 1.008)	0.65
Lag 3	1.001 (0.998, 1.005)	0.53	1.002 (0.993, 1.012)	0.64
Lag 4	1.003 (0.999, 1.007)	0.10	1.012 (1.003, 1.020)	<0.01
Lag 5	1.004 (1.000, 1.009)	0.04	1.026 (1.018, 1.034)	<0.01

Lag 6	1.004 (0.999, 1.009)	0.08	1.046 (1.037, 1.054)	<0.01
Cumulative	0.992 (0.967, 1.017)	0.53	1.086 (1.018, 1.159)	0.01
Lag 0-7 model				
Lag 0	0.993 (0.987, 1.001)	0.08	0.996 (0.984, 1.009)	0.54
Lag 1	0.997 (0.995, 1.001)	0.17	0.999 (0.989, 1.009)	0.84
Lag 2	0.999 (0.995, 1.002)	0.37	1.003 (0.994, 1.011)	0.59
Lag 3	1.002 (0.998, 1.006)	0.29	1.007 (0.998, 1.015)	0.11
Lag 4	1.004 (1.000, 1.008)	0.06	1.011 (1.004, 1.019)	<0.01
Lag 5	1.004 (1.000, 1.008)	0.04	1.017 (1.009, 1.025)	<0.01
Lag 6	1.003 (0.999, 1.007)	0.16	1.023 (1.015, 1.031)	<0.01
Lag 7	1.000 (0.995, 1.005)	0.97	1.030 (1.020, 1.039)	<0.01
Cumulative	0.992 (0.965, 1.019)	0.54	1.087 (1.013, 1.167)	0.02
Lag 0-8 model				
Lag 0	0.994 (0.989, 1.001)	0.10	0.995 (0.982, 1.007)	0.40
Lag 1	0.997 (0.991, 1.002)	0.21	0.999 (0.989, 1.009)	0.89
Lag 2	0.998 (0.995, 1.002)	0.29	1.004 (0.996, 1.012)	0.38
Lag 3	1.002 (0.998, 1.005)	0.31	1.008 (1.000, 1.015)	0.04
Lag 4	1.004 (1.000, 1.008)	0.05	1.011 (1.004, 1.018)	<0.01
Lag 5	1.004 (1.001, 1.008)	0.02	1.014 (1.007, 1.021)	<0.01
Lag 6	1.004 (1.000, 1.007)	0.06	1.017 (1.009, 1.025)	<0.01
Lag 7	1.001 (0.998, 1.005)	0.53	1.019 (1.009, 1.029)	<0.01
Lag 8	0.998 (0.993, 1.002)	0.27	1.021 (1.008, 1.033)	<0.01
Cumulative	0.991 (0.963, 1.020)	0.53	1.090 (1.008, 1.179)	0.03
Lag 0-9 model				
Lag 0	0.988 (0.980, 1.001)	0.08	0.996 (0.984, 1.008)	0.48
Lag 1	0.996 (0.994, 1.002)	0.24	0.998 (0.988, 1.008)	0.75
Lag 2	0.998 (0.995, 1.001)	0.17	1.001 (0.993, 1.010)	0.79
Lag 3	1.001 (0.998, 1.004)	0.60	1.004 (0.997, 1.012)	0.29
Lag 4	1.003 (0.999, 1.007)	0.12	1.007 (1.000, 1.014)	0.04
Lag 5	1.004 (1.000, 1.008)	0.04	1.010 (1.004, 1.017)	<0.01
Lag 6	1.004 (1.000, 1.007)	0.04	1.014 (1.007, 1.020)	<0.01
Lag 7	1.003 (0.999, 1.006)	0.11	1.017 (1.010, 1.024)	<0.01
Lag 8	1.000 (0.999, 1.006)	0.83	1.020 (1.013, 1.028)	<0.01
Lag 9	0.999 (0.997, 1.002)	0.62	1.024 (1.015, 1.033)	<0.01
Cumulative	0.991 (0.963, 1.020)	0.55	1.095 (1.011, 1.186)	0.03
Lag 0-10 model				
Lag 0	0.989 (0.985, 1.002)	0.09	0.995 (0.983, 1.007)	0.41
Lag 1	0.996 (0.991, 1.003)	0.30	0.999 (0.989, 1.009)	0.80
Lag 2	0.998 (0.995, 1.004)	0.18	1.002 (0.994, 1.010)	0.58
Lag 3	1.001 (0.997, 1.004)	0.73	1.005 (0.999, 1.012)	0.12
Lag 4	1.003 (0.999, 1.007)	0.19	1.008 (1.002, 1.014)	<0.01
Lag 5	1.004 (0.999, 1.008)	0.07	1.011 (1.005, 1.016)	<0.01
Lag 6	1.004 (1.000, 1.008)	0.04	1.012 (1.007, 1.018)	<0.01
Lag 7	1.003 (0.999, 1.006)	0.06	1.014 (1.008, 1.020)	<0.01
Lag 8	1.001 (0.999, 1.004)	0.25	1.016 (1.009, 1.022)	<0.01
Lag 9	0.999 (0.996, 1.001)	0.36	1.016 (1.007, 1.025)	<0.01

Lag 10	0.998 (0.995, 1.002)	0.14	1.016 (1.005, 1.127)	<0.01
Cumulative	0.991 (0.962, 1.020)	0.53	1.097 (1.008, 1.194)	0.03
Lag 0-11 model				
Lag 0	0.990 (0.987, 1.002)	0.11	0.998 (0.985, 1.010)	0.70
Lag 1	0.994 (0.991, 1.003)	0.24	0.999 (0.989, 1.009)	0.86
Lag 2	1.000 (0.997, 1.004)	0.16	1.001 (0.993, 1.009)	0.95
Lag 3	1.000 (0.997, 1.004)	0.86	1.003 (0.996, 1.009)	0.45
Lag 4	1.002 (0.999, 1.006)	0.24	1.005 (0.999, 1.010)	0.13
Lag 5	1.003 (0.999, 1.007)	0.08	1.007 (1.001, 1.012)	0.02
Lag 6	1.004 (1.000, 1.007)	0.04	1.009 (1.003, 1.014)	<0.01
Lag 7	1.003 (1.000, 1.007)	0.04	1.011 (1.005, 1.016)	<0.01
Lag 8	1.002 (0.999, 1.005)	0.12	1.013 (1.007, 1.019)	<0.01
Lag 9	1.000 (0.998, 1.003)	0.85	1.016 (1.008, 1.023)	<0.01
Lag 10	0.998 (0.995, 1.001)	0.11	1.018 (1.009, 1.027)	<0.01
Lag 11	0.998 (0.994, 1.001)	0.29	1.021 (1.009, 1.032)	<0.01
Cumulative	0.989 (0.959, 1.021)	0.50	1.102 (1.007, 1.021)	0.03
Lag 0-12 model				
Lag 0	0.991 (0.988, 1.002)	0.23	0.998 (0.986, 1.010)	0.73
Lag 1	0.995 (0.992, 1.006)	0.48	0.999 (0.989, 1.009)	0.84
Lag 2	0.998 (0.995, 1.001)	0.15	1.000 (0.992, 1.009)	0.96
Lag 3	1.000 (0.997, 1.003)	0.99	1.002 (0.994, 1.010)	0.67
Lag 4	1.002 (0.998, 1.010)	0.30	1.003 (0.997, 1.010)	0.35
Lag 5	1.003 (0.999, 1.011)	0.09	1.005 (0.999, 1.011)	0.12
Lag 6	1.003 (1.000, 1.012)	0.04	1.007 (1.001, 1.012)	0.02
Lag 7	1.003 (1.000, 1.014)	0.03	1.009 (1.003, 1.014)	<0.01
Lag 8	1.003 (0.999, 1.016)	0.06	1.011 (1.005, 1.016)	<0.01
Lag 9	1.001 (0.999, 1.019)	0.30	1.013 (1.007, 1.019)	<0.01
Lag 10	0.999 (0.998, 1.022)	0.56	1.016 (1.009, 1.022)	<0.01
Lag 11	1.003 (1.001, 1.005)	0.01	1.018 (1.010, 1.026)	<0.01
Lag 12	0.997 (0.994, 1.001)	0.61	1.021 (1.011, 1.030)	<0.01
Cumulative	0.989 (0.957, 1.021)	0.49	1.105 (1.006, 1.021)	0.04

All models controlled for age, race, sex, BMI percentile, temperature, and relative humidity.

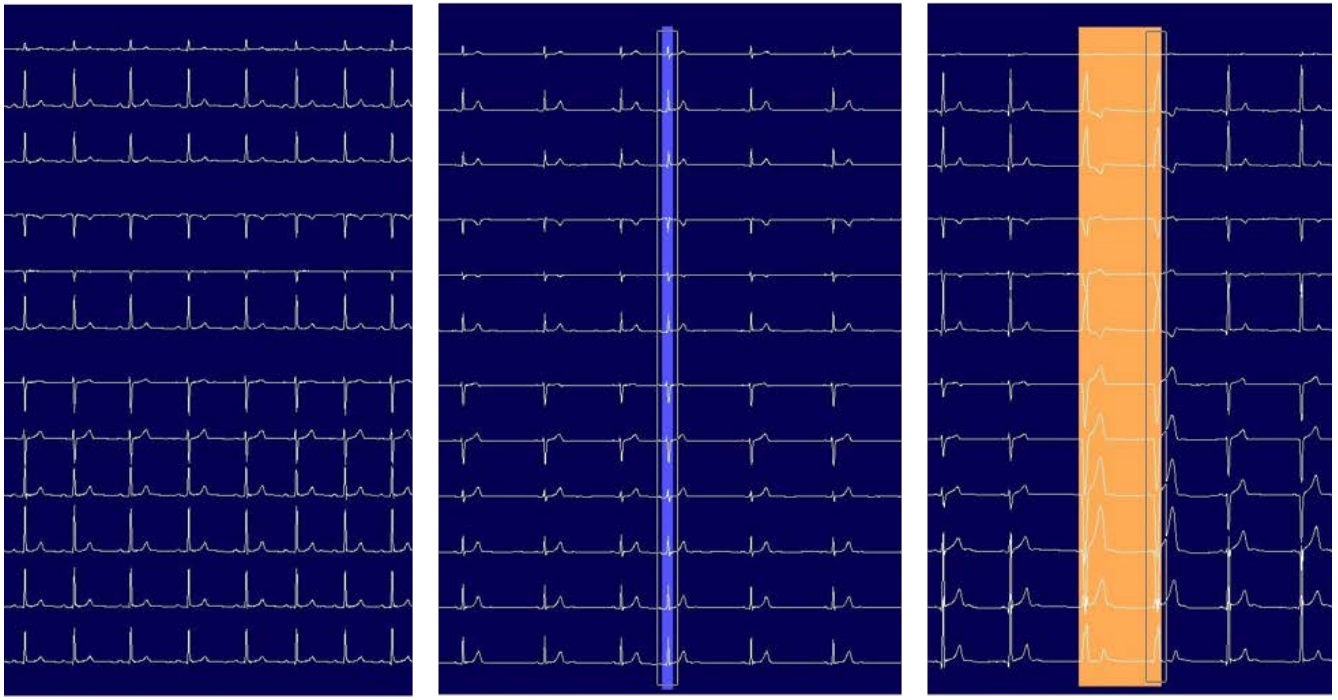
Table S3. Rate ratios (95% CI) and p-value in association between 10 μg/m^3 increment of $PM_{2.5}$ concentration and PVC counts after truncating $PM_{2.5}$ and temperature.

	Model 1*		Model 2†	
	RR (95% CI)	p-value	RR (95% CI)	p-value
Lag-0 (instantaneous)	1.002 (0.979, 1.025)	0.89	0.967 (0.920, 1.018)	0.20
Lag-1 (0.5-1.0 hours prior)	1.018 (1.002, 1.036)	0.03	1.022 (1.005, 1.039)	<0.01
Lag-2 (1.0-1.5 hours prior)	1.023 (1.006, 1.041)	<0.01	1.037 (1.021, 1.055)	<0.01
Lag-3 (1.5-2.0 hours prior)	1.017 (1.001, 1.040)	0.03	1.032 (1.014, 1.052)	<0.01
Cumulative (within 2.0 hours)	1.062 (1.001, 1.146)	0.05	1.060 (1.005, 1.141)	0.04

*: Model 1 adjusted for age, race, sex, BMI percentile, temperature, and relative humidity.

†: Model 2 adjusted for age, race, sex, BMI percentile, physical activity level, self-reported exposure to cigarette smoking, temperature, relatively humidity.

Figure S1. Comparison of EKG characteristics of normal heartbeat, PAC, and PVC



EKG: Electrocardiogram

PAC: Premature atrial contractions. Defined as a premature heart beat with ≥ 25% reduction in the R-R interval compare to the immediate prior R-R interval.

PVC: Premature ventricular contraction. Characterized by an absence of P wave and a premature QRS complex with an abnormally large width and amplitude on EKG.