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Supplementary Information For

The impact of childhood lead exposure on adult personality: Evidence from the US, Europe, and a large-scale natural experiment

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This section includes:

Supplementary text
Tables S1 to S34

Deviations from pre-registration

There were 4 deviations from the pre-registration, each of which were minor. First, we pre-registered that analyses involving the US sample would use N = 1,171,252 participants. During data cleaning, additional participants were included that satisfied inclusion criteria, bringing the sample size for multilevel analyses to N = 1,219,290. Including these extra participants did not affect results. Second, we pre-registered that we would visualize results using a bivariate chloropleth map. However, these visualizations were difficult for readers to understand, so we did not include them in the final manuscript. Third, we pre-registered that we would test an additional model for changes in personality before and after lead reduction where responses were clustered at the state level rather than the county level. However, counties within each state exhibited considerable variance in date of atmospheric lead phase-out, so it was not feasible to calculate a state-wide date of lead reduction. Fourth, we pre-registered that we would examine the correlation between lead exposure and personality while grouping participants into four age blocks (ages <20, 20-29, 30-39, 40-49, 50-59, and 60+). Few participants who were 50 or older fit inclusion criteria because lead measurement began in the 1960s and 1970s. We therefore combined the age 50-59 and 60+ age blocks.

Past exposure to data

Before pre-registering this study, the authors had used the GPIPP dataset for other research purposes, giving them exposure to the personality data used in this study. However, prior to pre-registration, no authors besides T.S. had accessed lead exposure data, which comes from US/EU governmental sources, and no authors, including T.S., had examined associations between personality variables and lead exposure in any past research.

Table S1. Descriptive statistics for US participants (N = 1,104,467)

Variable	M	SD	median	min	max
Extraversion	3.31	0.84	3.38	1.00	5.00
Agreeableness	3.77	0.67	3.89	1.00	5.00
Conscientiousness	3.56	0.71	3.56	1.00	5.00
Neuroticism	2.89	0.82	2.88	1.00	5.00
Openness to experience	3.67	0.65	3.70	1.00	5.00
Total yearly atmospheric lead exposure over first 18 years of life (ug/L^3)	3.26	5.86	0.82	0.00	85.28
Year of lead phase-out	1973.83	4.11	1975	1964	1995
Year of survey	2010.28	3.12	2011	2003	2015
Age when taking survey	24.37	8.57	21	13	55
Current college student?	0.36	0.48	0	0	1
Parents college graduates?	0.70	0.46	1	0	1
County median household income/10000	5.58	1.24	5.40	1.50	9.72

Table S2. Descriptive statistics for European participants (N = 423,921)

Variable	M	SD	median	min	max
Extraversion	3.41	0.80	3.50	1.00	5.00
Agreeableness	3.58	0.63	3.67	1.00	5.00
Conscientiousness	3.42	0.74	3.44	1.00	5.00
Neuroticism	2.94	0.84	2.88	1.00	5.00
Openness to experience	3.68	0.64	3.70	1.00	5.00
Average atmospheric lead from 1990-2015 (ng/m^3)	7.34	1.54	7.21	3.51	13.91
Year of survey	2009.47	2.86	2009	2003	2015
Age when taking survey	27.25	11.11	24	13	99
Current college student?	0.11	0.31	0.00	0	1
Parents college graduates?	0.48	0.50	0.00	0	1
GDP/1000 (US Dollars)	4.14	1.44	4.14	0.21	16.81
Closest lead measurement (degrees)	0.20	0.08	0.21	0.00	0.60

Table S3. Correlations between all study variables in the US (N = 1,104,467)

Variable	1.	2.	3.	4.	5.	6.	7.	8.	9.	10.	11.
1. Extraversion											
2. Agreeableness	.16										
3. Conscientiousness	.15	.31									
4. Neuroticism	-.29	-.36	-.31								
5. Openness	.16	.05	-.01	-.08							
6. Childhood atmospheric lead exposure	.01	.04	.14	-.05	.05						
7. Year of county-level lead decline	.00	.00	-.01	.00	.01	.08					
8. Year of survey	-.03	.05	.05	-.02	-.04	-.08	-.01				
9. Age	.00	.08	.23	-.07	.06	.75	.00	.11			
10. Current college student?	.02	.09	.06	-.02	-.06	-.15	.00	.02	-.13		
11. Parents college graduates?	.02	-.01	-.02	-.02	.07	-.08	.00	-.03	-.09	.06	
12. County-level income	.00	-.02	-.03	.01	.00	-.04	.07	.01	-.06	.00	.06

Table S4. Correlations between all study variables in Europe (N = 423,921).

Variable	1.	2.	3.	4.	5.	6.	7.	8.	9.	10.	11.
1. Extraversion											
2. Agreeableness	.19										
3. Conscientiousness	.21	.23									
4. Neuroticism	-.33	-.32	-.29								
5. Openness	.20	.06	.04	-.05							
6. Atmospheric lead from 1990-2015	-.01	-.06	-.01	.06	.07						
7. Year of survey	.01	.03	.05	-.06	-.05	-.06					
8. Age	.03	.11	.28	-.12	.10	-.03	.07				
9. Current college student?	-.03	.02	-.06	.01	-.02	-.05	.01	-.18			
10. Parents college graduates?	.03	.06	.01	-.07	.05	-.18	.04	-.01	.05		
11. GDP	.06	.04	.10	-.11	-.05	-.18	.14	.07	-.09	.04	
12. Closest lead measurement	.01	.00	.02	-.03	-.01	-.08	.07	.03	-.01	.06	.15

H1 Analyses: Associations between lead and personality in the US

Additional information about calculating atmospheric lead exposure:

For each participant, we estimated cumulative lead exposure per year over the first 18 years of life (e.g. childhood). For participants under age 18, lead exposure per year was estimated over the number of years they had been alive. We imputed missing lead data using linear averaged estimates for each year (e.g. if lead was measured at 4 micrograms/liter in county X in 1972 and 2 micrograms/liter in county X in 1974, we estimated there were 3 micrograms/liter of atmospheric lead in county X in 1973). For many counties, atmospheric lead data collection was discontinued as the county's lead level reached zero. In these cases, we imputed 0s for atmospheric lead for all years after discontinuation of data collection. In other cases, data collection was discontinued but the county's lead level had not reached zero. In these cases, we have imputed the average lead levels of all other counties that did not reach zero for all years after discontinuation of data collection.

Table S5. Results of Moran's I tests for spatial autocorrelation (clustering of residuals)

Trait	Method: Counties within 50 miles *p*	Method: Neighboring counties *p*
Extraversion	.37	.12
Agreeableness	.003	.03
Conscientiousness	.08	.32
Neuroticism	.002	.03
Openness	.07	.20

Note: Neighboring counties method uses queen contiguity to assign neighbors.

Table S6. Associations between childhood atmospheric lead and adult personality in the US (N = 1,104,467) and Europe (N = 423,921), with pre-registered controls.

	Dependent variable:									
	Extraversion		Agreeableness		Conscientiousness		Neuroticism		Openness to Experience	
	US	Europe	US	Europe	US	Europe	US	Europe	US	Europe
Atmospheric lead	**.022***	**.005***	**-.030***	**-.049***	**-.079***	**.014***	.002	**.025***	**.009***	**.079***
	(.018, .025)	(.001, .009)	(-.034, -.026)	(-.053, -.045)	(-.083, -.076)	(.010,.018)	(-.002, .005)	(.021, .029)	(.005, .013)	(.075, .083)
Age	-.002*	.002*	.012*	.010*	.034*	.024*	-.008*	-.010*	.007*	.010*
	(-.002, -.001)	(.002, .003)	(.011, .012)	(.010, .010)	(.034, .034)	(.024,.025)	(-.008, -.008)	(-.010, -.010)	(.006, .007)	(.009, .010)
Parent College	.049*	.057*	-.010*	.095*	-.002	.021*	-.061*	-.128*	.157*	.130*
	(.043, .054)	(.049, .065)	(-.015, -.005)	(.087, .103)	(-.006, .003)	(.014,.029)	(-.066, -.056)	(-.136, -.120)	(.152, .163)	(.122, .138)
Income	-.004*	.041*	-.012*	.013*	-.017*	.058*	.003*	-.068*	.003*	-.035*
	(-.006, -.002)	(.038, .044)	(-.014, -.010)	(.011, .016)	(-.019, -.015)	(.055,.060)	(.001, .005)	(-.071, -.065)	(.001, .005)	(-.037, -.032)
Constant	.034*	-.258*	-.208*	-.371*	-.730*	-.913*	.219*	.614*	-.296*	-.181*
	(.018, .050)	(-.274, -.242)	(-.224, -.192)	(-.386, -.356)	(-.745, -.714)	(-.928, -.898)	(.203, .235)	(.598, .629)	(-.312, -.280)	(-.196, -.165)

Note: Lead exposure and personality variables are standardized. Income is reported in units of $10,000. For US, income is median county income. For Europe, income is GDP per capita. 99% confidence intervals are reported in parentheses. * = p < .001. Bold indicates associations between personality and lead is significant at p < .001.

Table S7. Associations between lead and personality in the US before controlling for SES (N = 1,104,467)

	Dependent variable:				
	Extraversion	Agreeableness	Conscientiousness	Neuroticism	Openness
Atmospheric Lead	.021[*]	-.030[*]	-.079[*]	.002	.007[*]
	(.018, .025)	(-.034, -.026)	(-.083, -.075)	(-.001, .006)	(.004, .011)
Age	-.002[*]	.012[*]	.034[*]	-.008[*]	.006[*]
	(-.002, -.001)	(.011, .012)	(.034, .034)	(-.008, -.007)	(.006, .007)
Constant	.047[*]	-.283[*]	-.830[*]	.191[*]	-.152[*]
	(.036, .057)	(-.294, -.273)	(-.841, -.820)	(.180, .201)	(-.163, -.141)

Note: Lead and personality scores are standardized. Values in parentheses are 99% confidence intervals. * = *p*<.001.

Table S8. Associations between lead and personality in the US among participants with >.25ug/L^3 yearly lead exposure (N = 147,624)

	Extraversion	Agreeableness	Conscientiousness	Neuroticism	Openness
			Dependent variable:		
Atmospheric Lead	**.010**[*]	-.004	**-.016**[*]	-.007	**.016**[*]
	(.004, .016)	(-.010, .002)	(-.022, -.010)	(-.013, -.0004)	(.010, .022)
Age	.002[*]	.010[*]	.021[*]	-.011[*]	.004[*]
	(.001, .002)	(.009, .011)	(.020, .022)	(-.012, -.010)	(.003, .005)
Parent College	.027[*]	-.041[*]	-.063[*]	-.044[*]	.225[*]
	(.013, .041)	(-.055, -.028)	(-.077, -.050)	(-.058, -.029)	(.211, .239)
Median County Income	-.011[*]	-.028[*]	-.020[*]	.013[*]	.011[*]
	(-.017, -.005)	(-.034, -.023)	(-.026, -.015)	(.007, .019)	(.005, .017)
Constant	-.016	-.100[*]	-.317[*]	.288[*]	-.295[*]
	(-.055, .024)	(-.139, -.061)	(-.356, -.279)	(.248, .328)	(-.334, -.255)

Note: Lead and personality scores are standardized. Values in parentheses are 99% confidence intervals. * = $p<.001$.

Table S9. Associations between lead and personality in the US among participants with .25ug/L^3 or less yearly lead exposure (N = 956,831)

	Dependent variable:				
	Extraversion	Agreeableness	Conscientiousness	Neuroticism	Openness
Atmospheric Lead	**.045**[*]	**-.190**[*]	**-.300**[*]	**.074**[*]	**.031**[*]
	(.033, .058)	(-.203, -.177)	(-.312, -.287)	(.061, .086)	(.018, .044)
Age	-.003[*]	.017[*]	.045[*]	-.010[*]	.007[*]
	(-.004, -.003)	(.017, .018)	(.044, .045)	(-.010, -.009)	(.006, .008)
Parent College	.053[*]	-.005	.005	-.064[*]	.145[*]
	(.047, .059)	(-.011, .0004)	(-.0002, .011)	(-.070, -.058)	(.139, .151)
Median County Income	-.004[*]	-.010[*]	-.015[*]	.003[*]	.003[*]
	(-.006, -.002)	(-.012, -.008)	(-.017, -.013)	(.001, .006)	(.001, .005)
Constant	.073[*]	-.402[*]	-1.058[*]	.283[*]	-.279[*]
	(.051, .095)	(-.423, -.380)	(-1.080, -1.037)	(.261, .305)	(-.301, -.257)

Note: Lead and personality scores are standardized. Values in parentheses are 99% confidence intervals. * = *p*<.001.

Table S10. Associations between lead and personality among participants who are not currently college students (N = 712,312)

	Dependent variable:				
	Extraversion	Agreeableness	Conscientiousness	Neuroticism	Openness
Atmospheric Lead	**.025***	**-.022***	**-.077***	-.003	.001
	(.021, .029)	(-.026, -.018)	(-.081, -.072)	(-.007, .002)	(-.003, .005)
Age	-.003*	.012*	.036*	-.008*	.007*
	(-.003, -.002)	(.012, .013)	(.035, .036)	(-.008, -.007)	(.007, .008)
Parent College	.044*	-.009*	.003	-.057*	.172*
	(.037, .050)	(-.015, -.002)	(-.004, .009)	(-.064, -.051)	(.165, .178)
Median County Income	-.005*	-.009*	-.015*	.005*	.004*
	(-.008, -.003)	(-.012, -.007)	(-.018, -.013)	(.002, .007)	(.002, .007)
Constant	.057*	-.310*	-.852*	.223*	-.282*
	(.038, .077)	(-.329, -.291)	(-.871, -.833)	(.203, .242)	(-.301, -.263)

Note: Lead and personality scores are standardized. Values in parentheses are 99% confidence intervals. * = *p*<.001.

Table S11. Associations when discontinued data were imputed using an alternate method (N = 903,143)

	Dependent variable:				
	Extraversion	Agreeableness	Conscientiousness	Neuroticism	Openness
Atmospheric Lead	**.004***	**-.004***	**-.011***	-.00003	**.002***
	(.003, .004)	(-.005, -.003)	(-.012, -.011)	(-.001, .001)	(.001, .002)
Age	-.002*	.011*	.032*	-.008*	.007*
	(-.002, -.001)	(.010, .011)	(.032, .033)	(-.008, -.007)	(.006, .007)
Parent College	.047*	-.014*	-.007	-.061*	.164*
	(.041, .053)	(-.020, -.008)	(-.013, -.001)	(-.067, -.055)	(.158, .170)
Median County Income	-.008*	-.013*	-.019*	.003	.005*
	(-.010, -.006)	(-.015, -.011)	(-.021, -.017)	(.0003, .005)	(.002, .007)
Constant	.040*	-.161*	-.635*	.217*	-.304*
	(.023, .057)	(-.178, -.144)	(-.652, -.619)	(.200, .233)	(-.321, -.287)

Note: Lead and personality scores are standardized. Values in parentheses are 99% confidence intervals. * = $p<.001$.

Table S12. Associations across age deciles: Extraversion

	Dependent variable: Extraversion				
	Ages <20	Ages 20-29	Ages 30-39	Ages 40-49	Ages 50+
Atmospheric Lead	.042*	-.002	.002	.012*	.010
	(.025, .058)	(-.013, .009)	(-.006, .009)	(.006, .019)	(-.005, .026)
Age	-.005*	-.003*	.003*	.005*	-.005
	(-.008, -.003)	(-.004, -.002)	(.001, .006)	(.001, .008)	(-.032, .021)
Parent College	.060*	.059*	.021*	.027*	.007
	(.051, .069)	(.051, .068)	(.008, .035)	(.009, .045)	(-.054, .068)
Median County Income	-.007*	-.001	-.008*	-.004	.012
	(-.010, -.004)	(-.004, .002)	(-.013, -.003)	(-.012, .004)	(-.015, .040)
Constant	.116*	.020	-.107	-.200	.242
	(.070, .163)	(-.020, .060)	(-.196, -.018)	(-.356, -.043)	(-1.118, 1.603)
Observations	420,698	418,465	173,616	84,458	7,218

Note: Values in parentheses are 99% confidence intervals. Lead and personality scores are standardized. * = *p*<.001.

Table S13. Associations across age deciles: Agreeableness

	Dependent variable: Agreeableness				
	Ages <20	Ages 20-29	Ages 30-39	Ages 40-49	Ages 50+
Atmospheric Lead	-.003	**-.048***	**-.041***	-.001	-.003
	(-.020, .013)	(-.059, -.038)	(-.049, -.033)	(-.008, .005)	(-.018, .012)
Age	.079*	-.006*	.016*	.017*	.024
	(.076, .081)	(-.008, -.005)	(.013, .018)	(.014, .021)	(-.001, .050)
Parent College	.002	-.023*	-.040*	-.048*	-.100*
	(-.007, .011)	(-.032, -.014)	(-.053, -.027)	(-.065, -.030)	(-.159, -.041)
Median County Income	-.007*	-.016*	-.018*	-.026*	-.007
	(-.010, -.004)	(-.019, -.013)	(-.023, -.013)	(-.033, -.018)	(-.033, .019)
Constant	-1.400*	.284*	-.348*	-.423*	-.859
	(-1.447, -1.353)	(.244, .323)	(-.436, -.260)	(-.574, -.272)	(-2.177, .458)
Observations	420,698	418,465	173,616	84,458	7,218

Note: Values in parentheses are 99% confidence intervals. Lead and personality scores are standardized. * = $p<.001$.

Table S14. Associations across age deciles: Conscientiousness

	Dependent variable: Conscientiousness				
	Ages <20	Ages 20-29	Ages 30-39	Ages 40-49	Ages 50+
Atmospheric Lead	-.012	**-.035**[*]	**-.032**[*]	-.007	.005
	(-.028, .004)	(-.046, -.025)	(-.040, -.025)	(-.013, -.0004)	(-.010, .020)
Age	.100[*]	.021[*]	.019[*]	.016[*]	.020
	(.098, .103)	(.019, .022)	(.016, .021)	(.012, .019)	(-.005, .045)
Parent College	.040[*]	-.030[*]	-.071[*]	-.089[*]	-.111[*]
	(.032, .049)	(-.038, -.021)	(-.084, -.059)	(-.107, -.072)	(-.169, -.053)
Median County Income	-.020[*]	-.016[*]	-.018[*]	-.020[*]	-.006
	(-.023, -.016)	(-.019, -.013)	(-.023, -.013)	(-.027, -.012)	(-.032, .020)
Constant	-1.927[*]	-.287[*]	-.208[*]	-.104	-.442
	(-1.972, -1.882)	(-.325, -.248)	(-.294, -.123)	(-.254, .046)	(-1.740, .856)
Observations	420,698	418,465	173,616	84,458	7,218

Note: Values in parentheses are 99% confidence intervals. Lead and personality scores are standardized. * = p<.001.

Table S15. Associations across age deciles: Neuroticism

	Dependent variable: Neuroticism				
	Ages <20	Ages 20-29	Ages 30-39	Ages 40-49	Ages 50+
Atmospheric Lead	.010	**.047**[*]	**.023**[*]	**-.010**[*]	-.003
	(-.006, .026)	(.036, .058)	(.015, .030)	(-.017, -.004)	(-.019, .012)
Age	-.023[*]	-.002[*]	-.012[*]	-.014[*]	-.019
	(-.025, -.021)	(-.004, -.001)	(-.015, -.010)	(-.017, -.010)	(-.046, .008)
Parent College	-.061[*]	-.067[*]	-.051[*]	-.040[*]	.011
	(-.070, -.052)	(-.076, -.058)	(-.064, -.038)	(-.059, -.022)	(-.052, .073)
Median County Income	.005[*]	.002	.005	.015[*]	.010
	(.002, .008)	(-.001, .005)	(-.00005, .011)	(.007, .022)	(-.017, .038)
Constant	.473[*]	.096[*]	.367[*]	.392[*]	.637
	(.427, .519)	(.056, .136)	(.278, .456)	(.235, .548)	(-.755, 2.029)
Observations	420,698	418,465	173,616	84,458	7,218

Note Values in parentheses are 99% confidence intervals. Lead and personality scores are standardized. * = $p<.001$.

Table S16. Associations across age deciles: Openness to experience

	Dependent variable: Openness to Experience				
	Ages <20	Ages 20-29	Ages 30-39	Ages 40-49	Ages 50+
Atmospheric Lead	**.034***	**.042***	**.047***	**.023***	.003
	(.018, .050)	(.031, .052)	(.039, .055)	(.016, .029)	(-.013, .018)
Age	-.029*	.020*	-.010*	.005*	.002
	(-.031, -.026)	(.019, .022)	(-.012, -.007)	(.002, .009)	(-.025, .029)
Parent College	.107*	.146*	.237*	.255*	.236*
	(.099, .116)	(.137, .155)	(.224, .250)	(.236, .273)	(.174, .298)
Median County Income	-.001	.004	.017*	.010*	.013
	(-.004, .002)	(.001, .007)	(.011, .022)	(.002, .018)	(-.015, .040)
Constant	.349*	-.561*	.133*	-.407*	-.129
	(.302, .395)	(-.600, -.521)	(.044, .222)	(-.565, -.248)	(-1.509, 1.250)
Observations	420,698	418,465	173,616	84,458	7,218

Note: Values in parentheses are 99% confidence intervals. Lead and personality scores are standardized. * = $p<.001$.

Table S17. Additional US Extraversion controls requested in revision

	Dependent variable: Extraversion					
Lead exposure	**.022***	**.021***	**.012***	**.013***	-.001	.003
	(.018, .025)	(.016, .025)	(.007, .016)	(.008, .017)	(-.006, .004)	(-.002, .008)
Age	-.002*	-.001*	-.008*	-.008*	-.009*	-.009*
	(-.002, -.001)	(-.002, -.001)	(-.009, -.007)	(-.009, -.007)	(-.010, -.007)	(-.010, -.007)
Parent College	.049*	.042*	.041*	.039*	.040*	.040*
	(.043, .054)	(.036, .048)	(.034, .047)	(.033, .045)	(.034, .047)	(.034, .046)
County Income	-.004*					
	(-.006, -.002)					
ZIP Income		.015*	.016*	.012*	.012*	.015*
		(.013, .018)	(.013, .018)	(.009, .015)	(.009, .015)	(.013, .018)
Year Born			-.008*	-.008*	-.009*	-.008*
			(-.009, -.007)	(-.009, -.007)	(-.010, -.008)	(-.009, -.008)
ZIP % White non-Hispanic				.035*	.030*	.012
				(.023, .046)	(.019, .041)	(.0005, .024)
Age <20 Dummy					.023*	.021*
					(.013, .033)	(.011, .030)
Age 30-39 Dummy					.001	.0004
					(-.013, .016)	(-.014, .015)
Age 40-50 Dummy					.069*	.064*
					(.044, .095)	(.038, .090)
Age 50+ Dummy					.137*	.129*
					(.090, .185)	(.081, .176)
West						-.027*
						(-.034, -.019)
Southwest						.021*
						(.012, .029)
Midwest						.028*
						(.020, .036)
Southeast						.018*
						(.008, .027)
Constant	.034*	-.047*	15.691*	15.458*	17.553*	16.887*
	(.018, .050)	(-.063, -.032)	(13.859, 17.523)	(13.625, 17.292)	(15.692, 19.415)	(15.023, 18.751)
Observations	1,104,467	879,469	879,469	879,469	879,469	879,469

Note: Values in parentheses are 99% confidence intervals. Lead and personality scores are standardized. Income in units of Median household income/$10,000. Age groups are dummy-coded and interpretable as differences from the reference group (Age 20-30). Geographic regions are dummy coded and interpretable as differences from the reference group (Northeast US). * = $p<.001$.

Table S18. Additional US Agreeableness controls requested in revision

	Dependent variable: Agreeableness					
Lead exposure	**-.030***	**-.031***	**-.017***	**-.019***	**-.010***	**-.009***
	(-.034, -.026)	(-.035, -.027)	(-.021, -.012)	(-.023, -.015)	(-.015, -.006)	(-.014, -.004)
Age	.012*	.011*	.022*	.022*	.025*	.025*
	(.011, .012)	(.011, .012)	(.021, .023)	(.021, .023)	(.024, .027)	(.024, .027)
Parent College	-.010*	.0001	.003	.006	.003	.002
	(-.015, -.005)	(-.006, .006)	(-.003, .009)	(-.0002, .012)	(-.003, .009)	(-.004, .008)
County Income	-.012*					
	(-.014, -.010)					
ZIP Income		-.027*	-.027*	-.018*	-.019*	-.014*
		(-.029, -.024)	(-.030, -.025)	(-.021, -.016)	(-.022, -.016)	(-.017, -.011)
Year Born			.012*	.012*	.012*	.012*
			(.011, .013)	(.011, .013)	(.011, .013)	(.012, .013)
ZIP % White non-Hispanic				-.077*	-.071*	-.097*
				(-.088, -.066)	(-.082, -.060)	(-.108, -.085)
Age <20 Dummy					-.048*	-.050*
					(-.057, -.038)	(-.059, -.040)
Age 30-39 Dummy					-.142*	-.143*
					(-.156, -.128)	(-.157, -.128)
Age 40-50 Dummy					-.126*	-.129*
					(-.152, -.101)	(-.154, -.103)
Age 50+ Dummy					-.118*	-.121*
					(-.165, -.071)	(-.168, -.074)
West						-.006
						(-.013, .001)
Southwest						-.004
						(-.013, .004)
Midwest						.056*
						(.048, .064)
Southeast						.050*
						(.040, .060)
Constant	-.208*	-.195*	-25.012*	-24.494*	-24.870*	-25.190*
	(-.224, -.192)	(-.210, -.180)	(-26.837, -23.188)	(-26.319, -22.668)	(-26.723, -23.017)	(-27.045, -23.335)
Observations	1,104,467	879,469	879,469	879,469	879,469	879,469

Note: Values in parentheses are 99% confidence intervals. Lead and personality scores are standardized. Income in units of Median household income/$10,000. Age groups are dummy-coded and interpretable as differences from the reference group (Age 20-30). Geographic regions are dummy coded and interpretable as differences from the reference group (Northeast US). * = $p<.001$.

Table S19. Additional US Conscientiousness controls requested in revision

	Dependent variable: Conscientiousness					
Lead exposure	-.079*	-.078*	-.073*	-.072*	-.018*	-.016*
	(-.083, -.076)	(-.082, -.074)	(-.077, -.069)	(-.076, -.068)	(-.023, -.014)	(-.021, -.011)
Age	.034*	.034*	.038*	.038*	.041*	.041*
	(.034, .034)	(.034, .034)	(.037, .039)	(.037, .039)	(.040, .042)	(.040, .042)
Parent College	-.002	.005	.007	.006	-.003	-.003
	(-.007, .003)	(-.0004, .011)	(.001, .012)	(-.0002, .012)	(-.009, .003)	(-.009, .003)
County Income	-.017*					
	(-.019, -.015)					
ZIP Income		-.024*	-.024*	-.027*	-.028*	-.023*
		(-.026, -.021)	(-.027, -.022)	(-.029, -.024)	(-.031, -.025)	(-.026, -.020)
Year Born			.005*	.005*	.008*	.008*
			(.004, .006)	(.004, .006)	(.007, .009)	(.008, .009)
ZIP % White non-Hispanic				.021*	.044*	.012
				(.010, .031)	(.033, .055)	(.001, .024)
Age <20 Dummy					-.175*	-.177*
					(-.184, -.165)	(-.186, -.168)
Age 30-39 Dummy					-.173*	-.174*
					(-.187, -.159)	(-.188, -.160)
Age 40-50 Dummy					-.319*	-.323*
					(-.344, -.294)	(-.348, -.299)
Age 50+ Dummy					-.433*	-.440*
					(-.479, -.388)	(-.486, -.395)
West						-.033*
						(-.041, -.026)
Southwest						-.019*
						(-.028, -.011)
Midwest						.034*
						(.026, .042)
Southeast						.022*
						(.013, .032)
Constant	-.730*	-.760*	-10.409*	-10.547*	-17.209*	-17.652*
	(-.745, -.714)	(-.775, -.746)	(-12.187, -8.630)	(-12.327, -8.767)	(-19.009, -15.409)	(-19.454, -15.850)
Observations	1,104,467	879,469	879,469	879,469	879,469	879,469

Note: Values in parentheses are 99% confidence intervals. Lead and personality scores are standardized. Income in units of Median household income/$10,000. Age groups are dummy-coded and interpretable as differences from the reference group (Age 20-30). Geographic regions are dummy coded and interpretable as differences from the reference group (Northeast US). * = $p<.001$.

Table S20. Additional US Neuroticism controls requested in revision

	Dependent variable: Neuroticism					
Lead exposure	.002	.003	-.004	-.0002	**.008***	**.009***
	(-.002, .005)	(-.001, .007)	(-.008, .0004)	(-.004, .004)	(.003, .013)	(.004, .014)
Age	-.008*	-.008*	-.013*	-.013*	-.013*	-.013*
	(-.008, -.008)	(-.009, -.008)	(-.014, -.012)	(-.014, -.012)	(-.014, -.011)	(-.014, -.011)
Parent College	-.061*	-.065*	-.067*	-.072*	-.072*	-.069*
	(-.066, -.056)	(-.071, -.059)	(-.073, -.060)	(-.078, -.066)	(-.078, -.065)	(-.075, -.063)
County Income	.003*					
	(.001, .005)					
ZIP Income		.010*	.010*	-.005*	-.004*	-.006*
		(.008, .013)	(.008, .013)	(-.007, -.002)	(-.007, -.001)	(-.009, -.003)
Year Born			-.006*	-.006*	-.005*	-.005*
			(-.007, -.005)	(-.006, -.005)	(-.006, -.004)	(-.006, -.004)
ZIP % White non-Hispanic				.129*	.130*	.130*
				(.117, .140)	(.119, .141)	(.119, .142)
Age <20 Dummy					.009	.010
					(-.0001, .019)	(-.0001, .019)
Age 30-39 Dummy					.048*	.048*
					(.034, .062)	(.033, .062)
Age 40-50 Dummy					-.028	-.031
					(-.054, -.003)	(-.057, -.005)
Age 50+ Dummy					-.091*	-.097*
					(-.138, -.044)	(-.144, -.050)
West						-.040*
						(-.047, -.032)
Southwest						-.019*
						(-.028, -.011)
Midwest						-.053*
						(-.061, -.045)
Southeast						-.061*
						(-.071, -.051)
Constant	.219*	.210*	12.190*	11.321*	9.691*	9.596*
	(.203, .235)	(.195, .225)	(10.362, 14.018)	(9.492, 13.149)	(7.834, 11.548)	(7.737, 11.456)
Observations	1,104,467	879,469	879,469	879,469	879,469	879,469

Note: Values in parentheses are 99% confidence intervals. Lead and personality scores are standardized. Income in units of Median household income/$10,000. Age groups are dummy-coded and interpretable as differences from the reference group (Age 20-30). Geographic regions are dummy coded and interpretable as differences from the reference group (Northeast US). * = $p<.001$.

Table S21. Additional US Openness controls requested in revision

	Dependent variable: Openness to Experience					
Lead exposure	**.009***	**.008***	**-.009***	**-.014***	.001	-.001
	(.005, .013)	(.004, .012)	(-.013, -.005)	(-.018, -.010)	(-.004, .005)	(-.006, .003)
Age	.007*	.007*	-.006*	-.006*	-.008*	-.008*
	(.006, .007)	(.006, .007)	(-.007, -.005)	(-.007, -.006)	(-.010, -.007)	(-.010, -.007)
Parent College	.157*	.151*	.148*	.154*	.152*	.151*
	(.152, .163)	(.145, .157)	(.142, .154)	(.148, .160)	(.146, .158)	(.145, .157)
County Income	.003*					
	(.001, .005)					
ZIP Income		.011*	.012*	.032*	.031*	.029*
		(.009, .014)	(.010, .015)	(.029, .035)	(.028, .034)	(.026, .032)
Year Born			-.015*	-.016*	-.015*	-.015*
			(-.016, -.014)	(-.016, -.015)	(-.016, -.014)	(-.016, -.014)
ZIP % White non-Hispanic				-.167*	-.160*	-.145*
				(-.178, -.156)	(-.171, -.149)	(-.156, -.133)
Age <20 Dummy					-.070*	-.068*
					(-.079, -.060)	(-.077, -.058)
Age 30-39 Dummy					-.020*	-.020*
					(-.034, -.006)	(-.034, -.005)
Age 40-50 Dummy					-.048*	-.045*
					(-.073, -.022)	(-.070, -.019)
Age 50+ Dummy					.035	.042
					(-.012, .082)	(-.005, .089)
West						.022*
						(.015, .030)
Southwest						-.004
						(-.012, .004)
Midwest						-.014*
						(-.022, -.005)
Southeast						.024*
						(.014, .034)
Constant	-.296*	-.302*	29.817*	30.943*	29.350*	29.733*
	(-.312, -.280)	(-.317, -.286)	(27.998, 31.635)	(29.124, 32.761)	(27.503, 31.196)	(27.884, 31.582)
Observations	1,104,467	879,469	879,469	879,469	879,469	879,469

Note: Values in parentheses are 99% confidence intervals. Lead and personality scores are standardized. Income in units of Median household income/$10,000. Age groups are dummy-coded and interpretable as differences from the reference group (Age 20-30). Geographic regions are dummy coded and interpretable as differences from the reference group (Northeast US). * = $p<.001$.

Table S22: additional US age*lead exposure interactions requested in revision (N = 1,104,467)

	Extraversion	Agreeableness	Conscientiousness	Neuroticism	Openness
			Dependent variable:		
Lead exposure	-.007	**-.091***	**-.063***	**.061***	**.074***
	(-.017, .004)	(-.101, -.080)	(-.074, -.053)	(.051, .072)	(.064, .085)
Age <20*lead	.047*	.115*	.084*	-.058*	-.053*
	(.028, .067)	(.095, .134)	(.065, .103)	(-.078, -.039)	(-.072, -.033)
Age 30-40*lead	.015	.050*	.009	-.043*	-.047*
	(.003, .028)	(.038, .062)	(-.003, .021)	(-.056, -.031)	(-.059, -.035)
Age 40-50*lead	.023*	.090*	.045*	-.074*	-.050*
	(.011, .035)	(.078, .102)	(.033, .056)	(-.086, -.062)	(-.062, -.038)
Age 50+*lead	.017	.089*	.066*	-.065*	-.071*
	(-.001, .036)	(.070, .107)	(.048, .084)	(-.084, -.047)	(-.089, -.052)
Age	-.001*	.016*	.035*	-.009*	.004*
	(-.002, -.0004)	(.015, .017)	(.034, .036)	(-.010, -.008)	(.003, .005)
Parent College	.050*	-.013*	-.010*	-.061*	.154*
	(.044, .055)	(-.018, -.007)	(-.015, -.005)	(-.066, -.055)	(.149, .160)
County Income	-.005*	-.013*	-.017*	.004*	.004*
	(-.007, -.003)	(-.015, -.011)	(-.019, -.015)	(.002, .006)	(.002, .006)
Age <20 Dummy	.039*	.0003	-.133*	-.009	-.101*
	(.027, .051)	(-.012, .012)	(-.145, -.121)	(-.021, .003)	(-.113, -.089)
Age 30-39 Dummy	.010	-.125*	-.155*	.034*	-.032*
	(-.004, .023)	(-.138, -.112)	(-.168, -.142)	(.021, .047)	(-.045, -.019)
Age 40-50 Dummy	.051*	-.164*	-.336*	.011	-.086*
	(.025, .076)	(-.189, -.138)	(-.361, -.312)	(-.014, .037)	(-.112, -.061)
Age 50+ Dummy	.105*	-.162*	-.542*	-.051	.028
	(.036, .174)	(-.231, -.094)	(-.609, -.476)	(-.120, .017)	(-.041, .096)
Constant	.008	-.271*	-.633*	.240*	-.175*
	(-.021, .036)	(-.299, -.242)	(-.660, -.605)	(.212, .269)	(-.203, -.147)

Note: Values in parentheses are 99% confidence intervals. Lead and personality scores are standardized. . Age groups are dummy-coded and interpretable as differences from the reference group (Age 20-30). * = $p<.001$.

Table S23. Additional US geography*lead exposure interactions requested in revision (N = 1,104,467)

	Dependent variable:				
	Extraversion	Agreeableness	Conscientiousness	Neuroticism	Openness
Lead exposure	**.030***	**-.040***	**-.106***	.006	**.036***
	(.023, .037)	(-.047, -.033)	(-.113, -.099)	(-.0004, .013)	(.030, .043)
West*lead	-.004	.015*	.041*	-.006	-.034*
	(-.011, .003)	(.008, .022)	(.034, .047)	(-.013, .0005)	(-.041, -.027)
Southwest*lead	.005	-.019*	-.031*	.014*	-.048*
	(-.005, .015)	(-.029, -.009)	(-.041, -.022)	(.005, .024)	(-.058, -.038)
Midwest*lead	-.013*	-.007	-.016*	-.0001	-.011*
	(-.022, -.005)	(-.015, .002)	(-.024, -.008)	(-.008, .008)	(-.019, -.003)
Southeast*lead	-.00001	.011	.012	.006	-.039*
	(-.011, .011)	(.0001, .022)	(.001, .022)	(-.004, .017)	(-.050, -.029)
Age	-.002*	.012*	.035*	-.008*	.007*
	(-.003, -.002)	(.012, .012)	(.035, .036)	(-.009, -.008)	(.006, .007)
Parent College	.047*	-.013*	-.005	-.060*	.159*
	(.041, .052)	(-.018, -.007)	(-.010, .0002)	(-.065, -.054)	(.154, .165)
County Income	.002	-.006*	-.016*	-.0004	.001
	(-.0003, .004)	(-.008, -.004)	(-.018, -.014)	(-.003, .002)	(-.001, .003)
West Dummy	-.036*	.018*	-.011*	-.059*	.037*
	(-.042, -.029)	(.011, .024)	(-.018, -.005)	(-.066, -.053)	(.031, .044)
Southwest Dummy	.018*	.003	-.040*	-.037*	.006
	(.010, .026)	(-.005, .011)	(-.048, -.032)	(-.045, -.028)	(-.002, .014)
Midwest Dummy	.024*	.052*	.024*	-.049*	-.027*
	(.017, .032)	(.045, .059)	(.017, .031)	(-.057, -.042)	(-.034, -.019)
Southeast Dummy	.012*	.064*	.022*	-.074*	.031*
	(.003, .021)	(.055, .073)	(.013, .031)	(-.083, -.065)	(.022, .039)
Constant	.008	-.277*	-.770*	.295*	-.286*
	(-.011, .026)	(-.296, -.259)	(-.787, -.752)	(.277, .313)	(-.305, -.268)

Note: Values in parentheses are 99% confidence intervals. Geographic regions are dummy coded and interpretable as differences from the reference group (Northeast US). * = *p*<.001.

Table S24. Model with all controls and interactions requested in revision (N = 879,469)

	Dependent variable:				
	Extraversion	Agreeableness	Conscientiousness	Neuroticism	Openness
Lead exposure	**-.027***	**-.067***	**-.039***	**.058***	**.054***
	(-.040, -.013)	(-.081, -.054)	(-.052, -.026)	(.045, .072)	(.040, .067)
Age	-.008*	.026*	.041*	-.013*	-.009*
	(-.010, -.007)	(.024, .027)	(.040, .043)	(-.014, -.012)	(-.010, -.007)
Parent College	.040*	.002	-.003	-.069*	.152*
	(.033, .046)	(-.005, .008)	(-.009, .003)	(-.075, -.063)	(.146, .158)
ZIP Income	.015*	-.014*	-.023*	-.006*	.029*
	(.012, .018)	(-.017, -.012)	(-.026, -.020)	(-.009, -.003)	(.026, .032)
Year Born	-.009*	.012*	.008*	-.004*	-.015*
	(-.010, -.008)	(.011, .013)	(.007, .009)	(-.005, -.003)	(-.016, -.014)
ZIP % White non-Hispanic	.012	-.097*	.011	.130*	-.142*
	(.0004, .024)	(-.109, -.085)	(-.001, .022)	(.118, .142)	(-.154, -.130)
Age <20 Dummy	.044*	-.005	-.139*	-.015	-.088*
	(.031, .057)	(-.018, .009)	(-.152, -.126)	(-.029, -.002)	(-.101, -.075)
Age 30-39 Dummy	.009	-.132*	-.165*	.038*	-.018
	(-.006, .023)	(-.146, -.117)	(-.179, -.150)	(.023, .053)	(-.033, -.003)
Age 40-50 Dummy	.034	-.168*	-.344*	.006	-.062*
	(.004, .063)	(-.197, -.139)	(-.373, -.316)	(-.023, .036)	(-.091, -.033)
Age 50+ Dummy	.086	-.156*	-.521*	-.087	.019
	(.007, .165)	(-.235, -.078)	(-.598, -.445)	(-.166, -.008)	(-.059, .098)
West	-.028*	-.007	-.033*	-.039*	.023*
	(-.035, -.020)	(-.015, .0001)	(-.041, -.026)	(-.046, -.031)	(.016, .031)
Southwest	.020*	-.007	-.022*	-.016*	-.008
	(.011, .029)	(-.015, .002)	(-.031, -.014)	(-.025, -.007)	(-.016, .001)
Midwest	.029*	.057*	.034*	-.054*	-.014*
	(.021, .037)	(.048, .065)	(.026, .042)	(-.063, -.046)	(-.022, -.006)
Southeast	.018*	.052*	.023*	-.062*	.023*
	(.009, .028)	(.042, .062)	(.013, .032)	(-.072, -.052)	(.014, .033)
Age <20*lead	.053*	.106*	.082*	-.058*	-.053*
	(.031, .075)	(.085, .128)	(.061, .103)	(-.079, -.036)	(-.074, -.031)
Age 30-40*lead	.022*	.046*	.007	-.035*	-.045*
	(.008, .036)	(.032, .060)	(-.007, .021)	(-.049, -.021)	(-.059, -.031)
Age 40-50*lead	.045*	.073*	.032*	-.060*	-.027*
	(.031, .060)	(.058, .087)	(.018, .046)	(-.075, -.046)	(-.041, -.012)
Age 50+*lead	.043*	.065*	.046*	-.045*	-.029*
	(.021, .065)	(.043, .087)	(.025, .067)	(-.067, -.023)	(-.050, -.007)

West*lead	-.002	.001	.001	-.006	-.026*
	(-.010, .006)	(-.007, .009)	(-.007, .008)	(-.014, .002)	(-.034, -.018)
Southwest*lead	-.003	-.008	-.017*	.009	-.045*
	(-.013, .008)	(-.018, .003)	(-.027, -.007)	(-.002, .019)	(-.055, -.034)
Midwest*lead	-.017*	-.003	-.022*	-.004	-.014*
	(-.026, -.007)	(-.012, .007)	(-.031, -.013)	(-.014, .005)	(-.023, -.005)
Southeast*lead	.002	.024*	.010	-.005	-.033*
	(-.011, .014)	(.011, .036)	(-.002, .022)	(-.017, .008)	(-.046, -.021)
Constant	18.162*	-23.819*	-16.298*	8.071*	29.527*
	(16.258, 20.066)	(-25.714, -21.924)	(-18.139, -14.457)	(6.172, 9.970)	(27.638, 31.416)

Note: Values in parentheses are 99% confidence intervals. Lead and personality scores are standardized. Income in units of Median household income/$10,000. Age groups are dummy-coded and interpretable as differences from the reference group (Age 20-30). Geographic regions are dummy coded and interpretable as differences from the reference group (Northeast US). * = $p<.001$.

H2 Analyses:

Table S25. Shifts in personality traits after each county's lead phase-out (N = 1,219,290 participants nested within 269 counties)

	Dependent variable:				
	Extraversion	Agreeableness	Conscientiousness	Neuroticism	Openness
Shift in traits	**-.018**[*]	**.088**[*]	**.217**[*]	**-.049**[*]	**.042**[*]
	(-.032, -.004)	(.075, .101)	(.201, .233)	(-.062, -.036)	(.026, .057)
Age	-.001[*]	.011[*]	.026[*]	-.009[*]	.008[*]
	(-.001, -.001)	(.010, .011)	(.026, .026)	(-.010, -.009)	(.008, .008)
Constant	.038[*]	-.360[*]	-.872[*]	.307[*]	-.279[*]
	(.018, .057)	(-.380, -.340)	(-.892, -.851)	(.287, .327)	(-.300, -.257)

Note: These findings correspond to Figure 3. Shift in traits is interpretable as a standardized *d* score. * = *p*<.001.

Table S26. Personality shifts within each county when adding a 5-year lag to phase-out (N = 1,219,290 participants nested within 269 counties)

	Extraversion	Agreeableness	Conscientiousness	Neuroticism	Openness
			Dependent variable:		
Shift in traits	.006	**.127**[*]	**.091**[*]	**-.097**[*]	**.010**[*]
	(-.007, .020)	(.115, .140)	(.076, .105)	(-.110, -.085)	(-.004, .025)
Age	-.0005[*]	.012[*]	.023[*]	-.011[*]	.007[*]
	(-.001, -.0001)	(.012, .012)	(.022, .023)	(-.011, -.010)	(.007, .007)
Constant	.003	-.418[*]	-.672[*]	.376[*]	-.227[*]
	(-.015, .020)	(-.437, -.400)	(-.690, -.653)	(.357, .395)	(-.247, -.206)

Note: Shift in traits is interpretable as a standardized *d* score. * = p<.001.

Table S27. Personality shifts within each county when adding a 10-year lag to phase-out (N = 1,219,290 participants nested within 269 counties)

	Dependent variable:				
	Extraversion	Agreeableness	Conscientiousness	Neuroticism	Openness
Shift in traits	**.013**[*]	**.091**[*]	**-.039**[*]	**-.092**[*]	**-.048**[*]
	(.0003, .025)	(.079, .102)	(-.053, -.025)	(-.104, -.081)	(-.063, -.033)
Age	-.0002[*]	.011[*]	.019[*]	-.010[*]	.005[*]
	(-.001, .0001)	(.011, .011)	(.018, .019)	(-.011, -.010)	(.005, .006)
Constant	-.008	-.351[*]	-.482[*]	.354[*]	-.143[*]
	(-.022, .006)	(-.367, -.334)	(-.496, -.467)	(.338, .371)	(-.160, -.125)

Note: Shift in traits is interpretable as a standardized *d* score. * = *p*<.001.

Table S28. Personality shifts within each county, only examining people born +/- 10 years after phase-out (N = 402,273 participants nested within 269 counties)

	Extraversion	Agreeableness	Conscientiousness	Neuroticism	Openness
			Dependent variable:		
Shift in traits	-.004	**.064**[*]	**.101**[*]	**-.057**[*]	**-.044**[*]
	(-.020, .013)	(.047, .082)	(.086, .116)	(-.074, -.039)	(-.060, -.028)
Age	.001[*]	.014[*]	.024[*]	-.014[*]	-.003[*]
	(.0003, .002)	(.014, .015)	(.023, .024)	(-.015, -.014)	(-.003, -.002)
Constant	-.049[*]	-.506[*]	-.672[*]	.522[*]	.143[*]
	(-.085, -.013)	(-.544, -.468)	(-.708, -.635)	(.484, .561)	(.104, .183)

Note: Shift in traits is interpretable as a standardized *d* score. * = *p*<.001.

Table S29. Personality shifts within each county, only examining people born +/- 20 years after phase-out (N = 970,347 participants within 269 counties)

	Dependent variable:				
	Extraversion	Agreeableness	Conscientiousness	Neuroticism	Openness
Shift in traits	**-.029**[*]	**.076**[*]	**.220**[*]	**-.037**[*]	**.021**[*]
	(-.043, -.015)	(.063, .090)	(.201, .238)	(-.052, -.023)	(.006, .037)
Age	-.002[*]	.011[*]	.027[*]	-.009[*]	.006[*]
	(-.002, -.001)	(.010, .011)	(.027, .028)	(-.009, -.008)	(.006, .007)
Constant	.072[*]	-.345[*]	-.879[*]	.285[*]	-.198[*]
	(.050, .095)	(-.368, -.321)	(-.904, -.855)	(.262, .309)	(-.222, -.173)

Note: Shift in traits is interpretable as a standardized *d* score. * = *p*<.001.

Table S30. Personality shifts within each county, only examining participants not currently in college (N = 817,308 participants within 269 counties)

	Extraversion	Agreeableness	Conscientiousness	Neuroticism	Openness
			Dependent variable:		
Shift in traits	**-.027**[*]	**.066**[*]	**.192**[*]	**-.043**[*]	**.060**[*]
	(-.043, -.012)	(.051, .080)	(.175, .210)	(-.058, -.029)	(.043, .076)
Age	-.002[*]	.011[*]	.027[*]	-.010[*]	.008[*]
	(-.002, -.001)	(.011, .012)	(.026, .027)	(-.010, -.009)	(.008, .009)
Constant	.044[*]	-.437[*]	-.932[*]	.328[*]	-.256[*]
	(.023, .065)	(-.458, -.416)	(-.954, -.910)	(.306, .350)	(-.279, -.233)

Note: Shift in traits is interpretable as a standardized *d* score. * = $p<.001$.

Table S31. Personality shifts within each county when phase-out date is set at 1971 (N = 1,219,290 participants nested within 269 counties)

	Dependent variable:				
	Extraversion	Agreeableness	Conscientiousness	Neuroticism	Openness
Shift in traits	**-.040***	**.052***	**.283***	-.007	**.046***
	(-.054, -.025)	(.039, .065)	(.268, .297)	(-.021, .006)	(.031, .061)
Age	-.002*	.009*	.028*	-.008*	.008*
	(-.002, -.001)	(.009, .010)	(.027, .028)	(-.008, -.008)	(.008, .008)
Constant	.069*	-.304*	-.973*	.242*	-.284*
	(.049, .089)	(-.324, -.283)	(-.992, -.953)	(.221, .263)	(-.307, -.262)

Note: Shift in traits is interpretable as a standardized *d* score. * = *p*<.001.

H3 Analyses:

Additional information about calculating lead exposure

Unlike the U.S. atmospheric lead data, which was collected at the county level from 1960-2018, European lead data was modeled as a continuous distribution across latitude and longitude and collected from 1990-2015. We therefore estimated atmospheric lead exposure for European participants using a different method. First, we calculated each participant's lead exposure in each year using the weighted distance from the participant's childhood postal code to the nearest surrounding lead measurement sites (see pre-registration for further details). We included only participants who lived less than 1 degree latitude/longitude from the nearest estimated lead measurement. Atmospheric lead data in Europe was collected over fewer years, which restricts our ability to model change in lead exposure over time. However, this lead data demonstrated high test-retest reliability over a 10-year span (r = .74) and a 15-year span (r = .66). Therefore, we estimated each participant's lead exposure as an average of their exposure from 1990-2015. In effect, this indirect estimation method assumes that areas with higher atmospheric lead in the present also had higher levels of atmospheric lead in the unmeasured past.

Table S32. Associations between lead and personality in Europe, before controlling for SES (N = 423,921)

	Dependent variable:				
	Extraversion	Agreeableness	Conscientiousness	Neuroticism	Openness
Atmospheric Lead	**-.011**[*]	**-.061**[*]	-.003	**.054**[*]	**.077**[*]
	(-.015, -.007)	(-.065, -.057)	(-.006, .001)	(.050, .058)	(.073, .081)
Age	.003[*]	.010[*]	.025[*]	-.010[*]	.009[*]
	(.002, .003)	(.010, .010)	(.025, .025)	(-.011, -.010)	(.009, .010)
Constant	-.071[*]	-.272[*]	-.678[*]	.285[*]	-.252[*]
	(-.081, -.060)	(-.283, -.262)	(-.688, -.668)	(.275, .296)	(-.262, -.241)

Note: Lead and personality scores are standardized. Values in parentheses are 99% confidence intervals. * = p<.001.

Table S33. Associations between lead exposure and personality traits in Europe, only among those <.25 degrees lat/long from an atmospheric lead measurement (N = 291,878)

	Dependent variable:				
	Extraversion	Agreeableness	Conscientiousness	Neuroticism	Openness
Atmospheric Lead	.001	**-.038***	**.012***	**.022***	**.072***
	(-.004, .005)	(-.043, -.034)	(.008, .017)	(.017, .026)	(.068, .077)
Age	.002*	.010*	.025*	-.010*	.009*
	(.002, .003)	(.010, .011)	(.025, .026)	(-.011, -.010)	(.009, .010)
Parent College	.052*	.094*	.019*	-.126*	.129*
	(.042, .062)	(.085, .104)	(.010, .028)	(-.136, -.117)	(.119, .138)
Country GDP per capita	.046*	.008*	.058*	-.067*	-.037*
	(.043, .049)	(.004, .011)	(.055, .062)	(-.070, -.064)	(-.040, -.034)
Constant	-.276*	-.349*	-.937*	.619*	-.159*
	(-.294, -.258)	(-.367, -.331)	(-.955, -.920)	(.601, .637)	(-.177, -.141)

Note: Lead and personality scores are standardized. Values in parentheses are 99% confidence intervals. * = p<.001.

Table S34. Associations between lead and personality in European participants who are not college students (N = 378,668).

	Dependent variable:				
	Extraversion	Agreeableness	Conscientiousness	Neuroticism	Openness
Atmospheric Lead	**.008**[*]	**-.050**[*]	**.017**[*]	**.024**[*]	**.079**[*]
	(.003, .012)	(-.054, -.045)	(.013, .021)	(.020, .029)	(.075, .083)
Age	.002[*]	.010[*]	.024[*]	-.010[*]	.009[*]
	(.002, .002)	(.010, .011)	(.024, .025)	(-.011, -.010)	(.009, .010)
Parent College	.074[*]	.103[*]	.028[*]	-.140[*]	.126[*]
	(.065, .082)	(.095, .112)	(.020, .037)	(-.148, -.131)	(.118, .135)
Country GDP per capita	.040[*]	.013[*]	.056[*]	-.069[*]	-.028[*]
	(.037, .043)	(.010, .016)	(.054, .059)	(-.072, -.066)	(-.031, -.025)
Constant	-.249[*]	-.398[*]	-.911[*]	.637[*]	-.198[*]
	(-.265, -.232)	(-.415, -.382)	(-.927, -.895)	(.620, .653)	(-.214, -.181)

Note: Lead and personality scores are standardized. Values in parentheses are 99% confidence intervals. * = $p < .001$.