Supplemental Digital Content

Hazardous Air Pollutants and Telomere Length in the Sister Study

Nicole M. Niehoff[1], Marilie D. Gammon[1], Alexander P. Keil[1], Hazel B. Nichols[1], Lawrence S. Engel[1], Jack A. Taylor[2,3], Alexandra J. White[3], Dale P. Sandler[3]

Author Affiliations: [1]Department of Epidemiology, University of North Carolina, 135 Dauer Drive, Chapel Hill, NC 27599; [2]Epigenetic and Stem Cell Biology Laboratory, National Institute of Environmental Health Sciences, Research Triangle Park, North Carolina 27709; [3]Epidemiology Branch, National Institute of Environmental Health Sciences, Research Triangle Park, North Carolina 27709

eTable 1. Stratified regression coefficients assessing effect measure modification by BMI for the associations[a] between hazardous air pollutants and telomere length, The Sister Study

BMI (kg/m²)	Air toxic	N	Stratified coefficient (95% CIs)	Interaction coefficient (95% CI)	p-interaction
	1,2-Dibromo-3-chloropropane				
<25	< median	141	1.00		
	≥ median	156	0.01 (-0.07, 0.09)		
≥25	< median	223	1.00		
	≥ median	207	0.04 (-0.03, 0.10)	0.03 (-0.07, 0.13)	0.6
	1,3-butadiene				
<25	< median	142	1.00		
	≥ median	155	0.05 (-0.04, 0.13)		
≥25	< median	222	1.00		
	≥ median	208	-0.04 (-0.11, 0.04)	-0.08 (-0.19, 0.02)	0.1
	1,4-dioxane				
<25	< median	164	1.00		
	≥ median	125	-0.03 (-0.11, 0.05)		
≥25	< median	260	1.00		
	≥ median	164	-0.03 (-0.09, 0.04)	0.01 (-0.10, 0.11)	0.9
	2,4-dinitrotoluene				
<25	< median	144	1.00		
	≥ median	153	0.01 (-0.07, 0.09)		
≥25	< median	220	1.00		
	≥ median	210	0.02 (-0.05, 0.08)	0.00 (-0.10, 0.11)	0.9
	2,4-toluene diisocyanate				
<25	< median	153	1.00		
	≥ median	144	0.01 (-0.07, 0.09)		
≥25	< median	211	1.00		
	≥ median	219	-0.05 (-0.11, 0.03)	-0.05 (-0.15, 0.06)	0.4
	2-chloroacetophenone				
<25	< median	141	1.00		
	≥ median	156	0.03 (-0.05, 0.11)		
≥25	< median	224	1.00		
	≥ median	204	0.03 (-0.03, 0.10)	0.00 (-0.10, 0.10)	1.0
	Acrylamide				

<25	< median	188	1.00		
	≥ median	88	0.00 (-0.08, 0.09)		
≥25	< median	279	1.00		
	≥ median	117	0.06 (-0.02, 0.13)	0.06 (-0.06, 0.17)	0.3
Acrylonitrile					
<25	< median	154	1.00		
	≥ median	143	0.04 (-0.04, 0.12)		
≥25	< median	208	1.00		
	≥ median	222	0.00 (-0.07, 0.06)	-0.04 (-0.14, 0.06)	0.4
Benzene					
<25	< median	148	1.00		
	≥ median	149	0.05 (-0.03, 0.14)		
≥25	< median	216	1.00		
	≥ median	214	0.00 (-0.07, 0.08)	-0.05 (-0.15, 0.06)	0.4
Benzidine					
<25	< median	178	1.00		
	≥ median	119	-0.09 (-0.17, -0.01)		
≥25	< median	267	1.00		
	≥ median	163	-0.01 (-0.08, 0.06)	0.08 (-0.03, 0.18)	0.1
Carbon tetrachloride					
<25	< median	142	1.00		
	≥ median	155	-0.04 (-0.12, 0.04)		
≥25	< median	223	1.00		
	≥ median	207	0.02 (-0.05, 0.09)	0.06 (-0.04, 0.17)	0.2
Chloroprene					
<25	< median	144	1.00		
	≥ median	153	-0.01 (-0.09, 0.07)		
≥25	< median	221	1.00		
	≥ median	209	0.01 (-0.06, 0.07)	0.02 (-0.08, 0.12)	0.7
Ethylbenzene					
<25	< median	144	1.00		
	≥ median	153	0.08 (0.00, 0.17)		
≥25	< median	220	1.00		
	≥ median	210	0.02 (-0.05 0.09)	-0.06 (-0.17, 0.04)	0.2
Ethylene dibromide					
<25	< median	153	1.00		

	≥ median	144	-0.07 (-0.15, 0.01)		
≥25	< median	211	1.00		
	≥ median	219	0.02 (-0.05, 0.09)	0.09 (-0.01, 0.19)	0.08
Ethylene dichloride					
<25	< median	146	1.00		
	≥ median	151	-0.06 (-0.14, 0.02)		
≥25	< median	217	1.00		
	≥ median	213	-0.01 (-0.08, 0.05)	0.05 (-0.06, 0.15)	0.4
Ethylene oxide					
<25	< median	141	1.00		
	≥ median	156	-0.04 (-0.12, 0.04)		
≥25	< median	223	1.00		
	≥ median	207	0.02 (-0.05, 0.08)	0.06 (-0.05, 0.16)	0.3
Ethylidene dichloride					
<25	< median	155	1.00		
	≥ median	142	0.07 (-0.01, 0.15)		
≥25	< median	207	1.00		
	≥ median	223	-0.02 (-0.09, 0.05)	-0.09 (-0.19, 0.01)	0.08
Hydrazine					
<25	< median	137	1.00		
	≥ median	160	-0.02 (-0.10, 0.06)		
≥25	< median	220	1.00		
	≥ median	210	0.01 (-0.06, 0.08)	0.03 (-0.07, 0.13)	0.6
Methylene chloride					
<25	< median	146	1.00		
	≥ median	151	0.04 (-0.04, 0.13)		
≥25	< median	217	1.00		
	≥ median	213	-0.01 (-0.08, 0.06)	-0.06 (-0.16, 0.04)	0.3
Nitrobenzene					
<25	< median	144	1.00		
	≥ median	153	0.01 (-0.07, 0.09)		
≥25	< median	221	1.00		
	≥ median	209	0.03 (-0.04, 0.09)	0.02 (-0.09, 0.12)	0.8
o-Toluidine					
<25	< median	147	1.00		
	≥ median	150	-0.04 (-0.12, 0.04)		

≥25	< median	218	1.00		
	≥ median	212	-0.03 (-0.10, 0.03)	0.01 (-0.10, 0.11)	0.9
Polycyclic organic matter					
<25	< median	141	1.00		
	≥ median	156	0.00 (-0.08, 0.08)		
≥25	< median	223	1.00		
	≥ median	207	0.01 (-0.06, 0.07)	0.00 (-0.10, 0.10)	1.0
Propylene dichloride					
<25	< median	143	1.00		
	≥ median	154	-0.03 (-0.11, 0.05)		
≥25	< median	221	1.00		
	≥ median	209	-0.02 (-0.08, 0.05)	0.01 (-0.09, 0.11)	0.8
Propylene oxide					
<25	< median	146	1.00		
	≥ median	151	-0.05 (-0.13, 0.03)		
≥25	< median	219	1.00		
	≥ median	211	0.02 (-0.05, 0.09)	0.07 (-0.03, 0.18)	0.2
Styrene					
<25	< median	141	1.00		
	≥ median	156	0.04 (-0.04, 0.13)		
≥25	< median	222	1.00		
	≥ median	208	-0.04 (-0.11, 0.03)	-0.08 (-0.19, 0.02)	0.1
Toluene					
<25	< median	142	1.00		
	≥ median	155	0.08 (-0.01, 0.17)		
≥25	< median	221	1.00		
	≥ median	209	0.01 (-0.06, 0.08)	-0.07 (-0.17, 0.03)	0.2
Vinyl chloride					
<25	< median	154	1.00		
	≥ median	143	0.05 (-0.02, 0.14)		
≥25	< median	208	1.00		
	≥ median	222	-0.01 (-0.08, 0.06)	-0.07 (-0.17, 0.03)	0.2
Vinylidene chloride					
<25	< median	148	1.00		
	≥ median	149	0.04 (-0.04, 0.12)		
≥25	< median	217	1.00		

	≥ median	213	-0.02 (-0.09, 0.05)	-0.06 (-0.16, 0.04)	0.3
	Xylenes				
<25	< median	143	1.00		
	≥ median	154	0.06 (-0.03, 0.14)		
≥25	< median	221	1.00		
	≥ median	209	0.04 (-0.03, 0.11)	-0.02 (-0.12, 0.08)	0.7

Abbreviations: BMI, body mass index; CIs, confidence intervals

[a] Models adjusted for age, race, residence type, education, and smoking status

eTable 2. Stratified regression coefficients assessing effect measure modification by physical activity for the associations between hazardous air pollutants and telomere length, The Sister Study

PA (hours per week)	Air toxic	N	Stratified coefficient (95% CIs)	Interaction coefficient (95% CI)	*p*-interaction
1,2-Dibromo-3-chloropropane					
≤ median	< median	174	1.00		
	≥ median	190	0.05 (-0.02, 0.12)		
> median	< median	190	1.00		
	≥ median	174	0.01 (-0.06, 0.08)	-0.03 (-0.13, 0.07)	0.5
1,3-butadiene					
≤ median	< median	180	1.00		
	≥ median	184	-0.04 (-0.12, 0.04)		
> median	< median	184	1.00		
	≥ median	180	0.04 (-0.04, 0.12)	0.08 (-0.02, 0.18)	0.1
1,4-dioxane					
≤ median	< median	228	1.00		
	≥ median	131	0.00 (-0.08, 0.07)		
> median	< median	197	1.00		
	≥ median	158	-0.07 (-0.14, 0.01)	-0.06 (-0.16, 0.04)	0.2
2,4-dinitrotoluene					
≤ median	< median	174	1.00		
	≥ median	190	0.00 (-0.07, 0.07)		
> median	< median	190	1.00		
	≥ median	174	0.04 (-0.03, 0.11)	0.04 (-0.06, 0.14)	0.5
2,4-toluene diisocyanate					
≤ median	< median	193	1.00		
	≥ median	171	-0.03 (-0.10, 0.05)		
> median	< median	171	1.00		
	≥ median	193	-0.01 (-0.09, 0.06)	0.02 (-0.08, 0.12)	0.8
2-chloroacetophenone					
≤ median	< median	171	1.00		
	≥ median	193	0.07 (0.00, 0.14)		
> median	< median	194	1.00		
	≥ median	168	0.01 (-0.06, 0.08)	-0.06 (-0.16, 0.04)	0.2
Acrylamide					

≤ median	< median	234	1.00		
	≥ median	97	0.01 (-0.07, 0.09)		
> median	< median	234	1.00		
	≥ median	108	0.06 (-0.02, 0.14)	0.05 (-0.06, 0.16)	0.4

Acrylonitrile

≤ median	< median	188	1.00		
	≥ median	176	0.01 (-0.06, 0.08)		
> median	< median	175	1.00		
	≥ median	189	0.02 (-0.05, 0.09)	0.01 (-0.09, 0.11)	0.8

Benzene

≤ median	< median	184	1.00		
	≥ median	180	-0.02 (-0.10, 0.05)		
> median	< median	181	1.00		
	≥ median	183	0.07 (-0.01, 0.15)	0.09 (0.00, 0.19)	0.06

Benzidine

≤ median	< median	219	1.00		
	≥ median	145	-0.01 (-0.08, 0.07)		
> median	< median	227	1.00		
	≥ median	137	-0.07 (-0.14, 0.00)	-0.07 (-0.17, 0.04)	0.2

Carbon tetrachloride

≤ median	< median	179	1.00		
	≥ median	185	-0.01 (-0.08, 0.07)		
> median	< median	186	1.00		
	≥ median	178	0.00 (-0.07, 0.07)	0.01 (-0.09, 0.11)	0.9

Chloroprene

≤ median	< median	169	1.00		
	≥ median	195	-0.01 (-0.08, 0.07)		
> median	< median	196	1.00		
	≥ median	168	0.02 (-0.06, 0.09)	0.02 (-0.08, 0.12)	0.7

Ethylbenzene

≤ median	< median	182	1.00		
	≥ median	182	0.00 (-0.07, 0.08)		
> median	< median	182	1.00		
	≥ median	182	0.10 (0.02, 0.17)	0.09 (-0.01, 0.19)	0.07

Ethylene dibromide

≤ median	< median	175	1.00

	≥ median	189	0.02 (-0.05, 0.09)		
> median	< median	190	1.00		
	≥ median	174	-0.05 (-0.12, 0.02)	-0.07 (-0.17, 0.04)	0.2
	Ethylene dichloride				
≤ median	< median	183	1.00		
	≥ median	181	-0.03 (-0.11, 0.04)		
> median	< median	181	1.00		
	≥ median	183	-0.03 (-0.10, 0.05)	0.01 (-0.09, 0.11)	0.9
	Ethylene oxide				
≤ median	< median	176	1.00		
	≥ median	188	0.00 (-0.07, 0.07)		
> median	< median	189	1.00		
	≥ median	175	-0.01 (-0.08, 0.07)	-0.01 (-0.11, 0.09)	0.9
	Ethylidene dichloride				
≤ median	< median	189	1.00		
	≥ median	175	0.05 (-0.02, 0.12)		
> median	< median	173	1.00		
	≥ median	191	-0.02 (-0.09, 0.05)	-0.07 (-0.17, 0.03)	0.1
	Hydrazine				
≤ median	< median	181	1.00		
	≥ median	183	-0.02 (-0.09, 0.05)		
> median	< median	177	1.00		
	≥ median	187	0.02 (-0.05, 0.09)	0.04 (-0.06, 0.14)	0.4
	Methylene chloride				
≤ median	< median	178	1.00		
	≥ median	186	0.00 (-0.08, 0.07)		
> median	< median	186	1.00		
	≥ median	178	0.03 (-0.05, 0.10)	0.03 (-0.07, 0.13)	0.6
	Nitrobenzene				
≤ median	< median	171	1.00		
	≥ median	193	0.01 (-0.06, 0.08)		
> median	< median	194	1.00		
	≥ median	170	0.04 (-0.03, 0.11)	0.03 (-0.07, 0.13)	0.5
	o-Toluidine				
≤ median	< median	177	1.00		
	≥ median	187	-0.04 (-0.11, 0.03)		

> median	< median	189	1.00		
	≥ median	175	-0.02 (-0.10, 0.05)	0.02 (-0.08, 0.12)	0.7

Polycyclic organic matter

≤ median	< median	189	1.00		
	≥ median	175	-0.03 (-0.10, 0.04)		
> median	< median	176	1.00		
	≥ median	188	0.04 (-0.04, 0.11)	0.07 (-0.03, 0.16)	0.2

Propylene dichloride

≤ median	< median	183	1.00		
	≥ median	181	-0.02 (-0.09, 0.05)		
> median	< median	182	1.00		
	≥ median	182	-0.02 (-0.09, 0.05)	0.00 (-0.10, 0.10)	1.0

Propylene oxide

≤ median	< median	178	1.00		
	≥ median	186	-0.03 (-0.10, 0.05)		
> median	< median	187	1.00		
	≥ median	177	0.01 (-0.06, 0.09)	0.04 (-0.06, 0.14)	0.4

Styrene

≤ median	< median	189	1.00		
	≥ median	175	-0.02 (-0.09, 0.06)		
> median	< median	174	1.00		
	≥ median	190	0.00 (-0.08, 0.08)	0.02 (-0.08, 0.12)	0.8

Toluene

≤ median	< median	179	1.00		
	≥ median	185	-0.01 (-0.09, 0.07)		
> median	< median	185	1.00		
	≥ median	179	0.09 (0.01, 0.17)	0.10 (0.00, 0.20)	0.04

Vinyl chloride

≤ median	< median	192	1.00		
	≥ median	172	0.03 (-0.04, 0.10)		
> median	< median	171	1.00		
	≥ median	193	0.00 (-0.07, 0.07)	-0.03 (-0.13, 0.07)	0.6

Vinylidene chloride

≤ median	< median	176	1.00		
	≥ median	188	0.00 (-0.07, 0.08)		
> median	< median	189	1.00		

	≥ median	175	0.01 (-0.06, 0.09)	0.01 (-0.09, 0.11)	0.9
	Xylenes				
≤ median	< median	180	1.00		
	≥ median	184	0.01 (-0.07, 0.09)		
> median	< median	184	1.00		
	≥ median	180	0.09 (0.02, 0.17)	0.09 (-0.01, 0.19)	0.09

Abbreviations: PA, physical activity; CIs, confidence intervals

Models adjusted for age, race, residence type, education, and smoking status

eFigure1. Plots of T/S ratio values against (a) 1,4-dioxane and (b) benzidine concentrations