Supplemental Material

In Utero and Childhood Polybrominated Diphenyl Ether Exposures and Body Mass at Age 7 Years: The CHAMACOS Study

Ayca Erkin-Cakmak, Kim G. Harley, Jonathan Chevrier, Asa Bradman, Katherine Kogut, Karen

Huen, and Brenda Eskenazi

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Figure S1. Directed acyclic graph Green node: Exposure variable; Dark blue node with I: Outcome variable; White node: Adjusted variable; Blue node: Ancestor of outcome; Pink node: Ancestor of both exposure and outcome variable (none shown); Green arrow: Causal pathway; Red arrow: Biasing pathway (none shown) Maternal_PBDE: Maternal PBDE levels during

pregnancy; Maternal_DM: Maternal Diabetes Mellitus; Poverty_Baseline: Poverty during pregnancy; Gestational _Age: Gestational age at birth; Child_PBDE_at_age7: Child PBDE levels at age 7.

Figure S2. Scatter plot of maternal and child Σ4PBDE concentrations and BMI z-score with regression lines at each time point (ages 2, 3.5, 5 and 7) separately for boys and girls with point estimates and 95% confidence intervals.

Table S1. Summary of anthropometric measurements (mean ± SD) at each time point.

	Age (years)	N (%)	Normal Weight (n, %)	Overweight (n, %)	Obese (n, %)	Height (cm)	Weight (kg)	BMI-z-score
Boys								
	2	94 (100)	69 (73.4)	10 (10.6)	15 (16.0)	86.8 ± 3.0	13.2 ± 1.9	0.5 ± 1.1
	3.5	88 (100)	41 (46.6)	23 (26.1)	24 (27.3)	99.6 ± 3.8	17.7 ± 3.6	1.2 ± 1.4
	5	91 (100)	43 (47.3)	18 (19.7)	30 (33.0)	110.2 ± 4.5	21.7 ± 5.1	1.2 ± 1.2
	7	97 (100)	48 (49.5)	19 (19.6)	30 (30.9)	123.2 ± 5.1	28.8 ± 7.8	1.1 ± 1.0
Girls								
	2	113 (100)	78 (69.0)	16 (14.2)	19 (16.8)	86.0 ± 3.1	13.0 ± 1.9	0.6 ± 1.2
	3.5	115 (100)	55 (47.8)	25 (21.7)	35 (30.4)	99.6 ± 3.8	17.7 ± 3.4	1.2 ± 1.1
	5	118 (100)	54 (45.8)	25 (21.2)	39 (33.0)	110.2 ± 4.3	22.1 ± 5.1	1.2 ± 1.0
	7	124 (100)	56 (45.2)	22 (17.7)	46 (37.1)	123.4 ± 5.5	29.5 ± 7.6	1.1 ± 1.0

Table S2. Detection frequency and lipid-adjusted concentration (ng/g lipids) of PBDE congeners in prenatal and childhood serum.

PBDE	Geometric Mean (95% CI)	Detection frequency (%)	Min.	10th %tile	25th %tile	50th %tile	75th %tile	90th %tile	Max
Maternal serum PBDE levels during pregnancy (n=229)									
BDE-47	15.32 (13.47, 17.42)	99.4	0.5	4.7	8.5	15.4	25.4	47.9	631.8
BDE-99	4.33 (3.80, 4.94)	99.4	0.3	1.5	2.3	4	6.9	12.1	260.9
BDE-100	2.77 (2.45, 3.12)	98.2	< LOD	0.9	1.6	2.5	4.3	7.7	87.7
BDE-153	2.40 (2.15, 2.69)	98.2	0.3	0.9	1.3	2.1	3.7	6.9	41.0
Σ4 PBDE	25.35 (22.42, 28.65)	100	2.3	8.4	14.1	24.3	41	73.2	1021.5
Child serum PBDE levels at age 7 (n=216)									
BDE-47	48.39 (43.21, 54.19)	94.2	1.9	17.4	28.4	46.4	78.3	136	768.2
BDE-99	11.32 (10.03, 12.79)	93.8	< LOD	3.8	6.6	10.7	20.4	36.9	218.2
BDE-100	10.83 (9.69, 12.10)	94.2	0.8	3.9	6.2	10.8	17.1	34.2	144.0
BDE-153	11.74 (10.57, 13.03)	94.2	0.9	4.8	6.6	11.1	19.3	32	263.1
Σ4 PBDE	83.03 (74.80, 92.17)	100	5.8	31.6	49.9	81.9	124.7	228.7	969.3

Abbreviations: Min., minimum; Max., maximum; LOD, level of detection; Σ4 PBDE, sum of BDE-47, BDE-99, BDE-100, BDE-153.

Table S3. Correlation matrix of individual and sum of 4 PBDE congeners in maternal and child serum.

PBDE	BDE-47	BDE-99	BDE-100	BDE-154	Σ4 PBDE
Maternal serum PBDE concentrations during pregnancy					
BDE-47	1				
BDE-99	0.92*	1			
BDE-100	0.94*	0.90*	1		
BDE-154	0.77*	0.72*	0.89*	1	
Σ4 PBDE	0.99*	0.95*	0.97*	0.84*	1
Child serum PBDE concentrations during pregnancy					
BDE-47	1				
BDE-99	0.97*	1			
BDE-100	0.95*	0.94*	1		
BDE-154	0.65*	0.67*	0.76*	1	
Σ4 PBDE	0.98*	0.97*	0.97*	0.77*	1
Maternal serum PBDE concentrations during pregnancy and child serum PBDE concentration at age 7					
BDE-47	0.27*	0.23*	0.25*	0.21	0.26*
BDE-99	0.25*	0.22	0.23*	0.18	0.24*
BDE-100	0.27*	0.25*	0.26*	0.24*	0.27*
BDE-153	0.28*	0.24*	0.26*	0.29*	0.28*
Σ4 PBDE	0.27*	0.23*	0.26*	0.23*	0.27*

Abbreviations: Σ4 PBDE, sum of BDE-47, BDE-99, BDE-100, BDE-153.

*$p < 0.05$ statistically significant.

Table S4. Unadjusted and adjusted associations between 10-fold increase in _maternal_ serum concentrations of PBDE (log_{10}) and child anthropometric measures at age 7.

PBDE	BMI z-score β (95% CI)	Waist Circumference z-score β (95% CI)	Overweight OR (95% CI)	Obese OR (95% CI)
Crude				
BDE-47	-0.001 (-031, 0.31)	1.85 (-1.13, 4.84)	0.97 (0.52, 1.79)	1.15 (0.60, 2.18)
BDE-99	0.08 (-0.23, 0.39)	2.32 (-0.62, 5.25)	1.04 (0.57, 1.90)	1.29 (0.69, 2.43)
BDE-100	0.02 (-0.31, 0.35)	1.44 (-1.73, 4.60)	0.98 (0.51, 1.89)	1.17 (0.59, 2.31)
BDE-153	-0.07 (-0.44, 0.29)	0.23 (-3.25, 3.71)	0.87 (0.43, 1.78)	1.06 (0.50, 2.25)
Σ4 PBDE	0.01 (-0.33, 0.33)	1.81 (-1.35, 4.99)	0.95 (0.49, 1.82)	1.16 (0.59, 2.30)
Adjusted				
BDE-47	-0.10 (-0.41, 0.21)	0.01 (-0.24, 0.26)	0.79 (0.38, 1.67)	1.03 (0.48, 2.23)
BDE-99	-0.01 (-0.31, 0.29)	0.04 (-0.19, 0.27)	0.87 (0.43, 1.76)	1.12 (0.54, 2.32)
BDE-100	-0.03 (-0.37, 0.30)	0.03 (-0.24, 0.30)	0.89 (0.40, 1.97)	1.19 (0.52, 2.73)
BDE-153	-0.002 (-0.38, 0.30)	0.03 (-0.28, 0.34)	1.05 (0.42, 2.63)	1.59 (0.61, 4.16)
Σ4 PBDE	-0.08 (-0.41, 0.25)	0.02 (-2.45, 0.28)	0.82 (0.38, 1.79)	1.09 (0.49, 2.46)

Abbreviations: BMI, body mass index; Σ4 PBDE, sum of BDE-47, BDE-99, BDE-100, BDE-153.

Overweight: Age- and sex-specific BMI ≥ the 85th percentile; Obese: Age- and sex-specific BMI ≥ the 95th percentile.

Adjusted model includes maternal age, education, pre-pregnancy BMI, years lived in US, gestational weight gain, poverty during pregnancy; and child gestational age, duration of breast feeding, and fast food and soda consumption at age 7.

Table S5. Adjusted associations from models with sex interaction between maternal serum concentrations of PBDE ($\log_{10}$) and child BMI and waist circumference z-score, and obesity status at age 7.

PBDE	BMI z-score β (95% CI)	Interaction *p*-value	Waist circumference z-score β (95% CI)	Interaction *p*-value	Overweight OR (95% CI)	Interaction *p*-value	Obese OR (95% CI)	Interaction *p*-value
BDE-47								
Boys	0.19 (-0.24, 0.61)		0.20 (-0.13, 0.53)		1.27 (0.46, 3.50)		2.82 (0.87, 9.03)	
Girls	-0.40 (-0.84, 0.04)	0.06	-0.26 (-0.60, 0.08)	0.05	0.46 (0.16, 1.38)	0.18	0.37 (0.11, 1.20)	0.02
BDE-99								
Boys	0.28 (-0.14, 0.70)		0.25 (-0.08, 0.87)		1.34 (0.49, 3.66)		3.18 (1.04, 9.77)	
Girls	-0.29 (-0.72, 0.12)	0.05	-0.19 (-0.52, 0.13)	0.06	0.56 (0.20, 1.54)	0.23	4.23 (0.14, 1.28)	0.01
BDE-100								
Boys	0.36 (-0.12, 0.84)		0.27 (-0.10, 0.65)		1.57 (0.49, 4.95)		4.32 (1.17, 15.9)	
Girls	-0.35 (-0.79, 0.09)	0.03	-0.21 (-0.56, 0.13)	0.06	0.53 (0.18, 1.57)	0.17	0.42 (0.13, 1.34)	<0.01
BDE-153								
Boys	0.54 (-0.02, 1.08)		0.32 (-0.11, 0.76)		2.29 (0.60, 8.74)		10.5 (2.19, 49.8)	
Girls	-0.39 (-0.88, 0.09)	0.01	-0.21 (-0.56, 0.13)	0.04	0.56 (0.17, 1.86)	0.11	0.41 (0.12, 1.53)	<0.01
Σ4 PBDE								
Boys	0.26 (-0.19, 0.72)		0.24 (-0.12, 0.59)		1.34 (0.45, 3.98)		3.45 (1.01, 11.8)	
Girls	-0.41 (-0.87, -0.05)	0.04	-0.26 (-0.62, 0.09)	0.05	0.48 (0.16, 1.47)	0.19	0.36 (0.10, 1.23)	0.01

Abbreviations: BMI, body mass index; OR, odds ratio; Σ4 PBDE, sum of BDE-47, BDE-99, BDE-100, BDE-153.

Overweight: Age- and sex-specific BMI ≥ the 85th percentile; Obese: Age- and sex-specific BMI ≥ the 95th percentile.

Controlling for maternal age, education, pre-pregnancy BMI, years lived in US, gestational weight gain, poverty during pregnancy; and child gestational age, duration of breast feeding, and fast food and soda consumption at age 7.

Table S6. Adjusted associations between maternal Σ4 PBDE and BDE-153 with BMI z-score at each time point separately.

Age (years)	BMI z-score β (95% CI) Boys	BMI z-score β (95% CI) Girls	Interaction *p*-value
Maternal serum Σ4 PBDE			
2	0.38 (-0.15, 0.91)	-0.56 (-1.11, -0.02)*	0.01
3.5	0.62 (0.07, 1.18)*	-0.66 (-1.19, -0.11)*	<0.01
5	0.34 (-0.16, 0.85)	-0.42 (-0.92, 0.09)	0.03
7	0.26 (-0.19, 0.71)	-0.41 (-0.87, 0.04)	0.04
Maternal serum PBDE-153			
2	0.39 (-0.25, 1.02)	-0.66 (-1.24, -0.09)*	0.01
3.5	0.99 (0.32, 1.66)*	-0.64 (-1.23, -0.06)*	<0.01
5	0.58 (-0.03, 1.19)**	-0.39 (-0.92, 0.14)	0.01
7	0.54 (-0.02, 1.08)**	-0.39 (-0.88, 0.09)	<0.01

Abbreviations: BMI, body mass index; Σ4 PBDE, sum of BDE-47, BDE-99, BDE-100, BDE-153.

Controlling for maternal age, education, pre-pregnancy BMI, years lived in US, gestational weight gain, poverty during pregnancy; and child gestational age, duration of breast feeding, and fast food and soda consumption at each time point (age 2, 3.5, 5 and 7 years) separately.
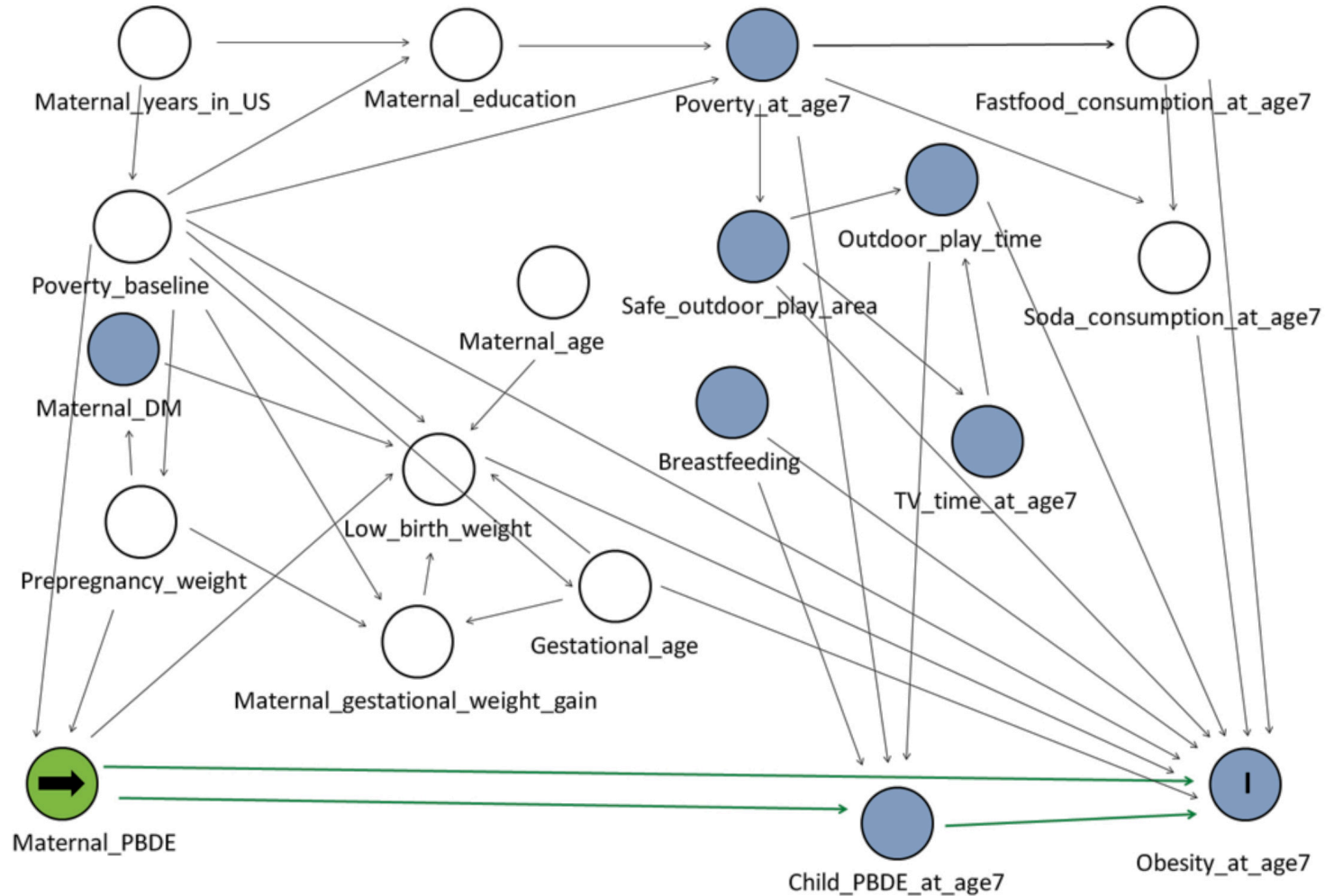
*p <0.05, **p <0.1.

Figure S1. Directed acyclic graph Green node: Exposure variable; Dark blue node with I: Outcome variable; White node: Adjusted variable; Blue node: Ancestor of outcome; Pink node: Ancestor of both exposure and outcome variable (none shown); Green arrow: Causal pathway; Red arrow: Biasing pathway (none shown) Maternal_PBDE: Maternal PBDE levels during pregnancy; Maternal_DM: Maternal Diabetes Mellitus; Poverty_Baseline: Poverty during pregnancy; Gestational _Age: Gestational age at birth; Child_PBDE_at_age7: Child PBDE levels at age 7.
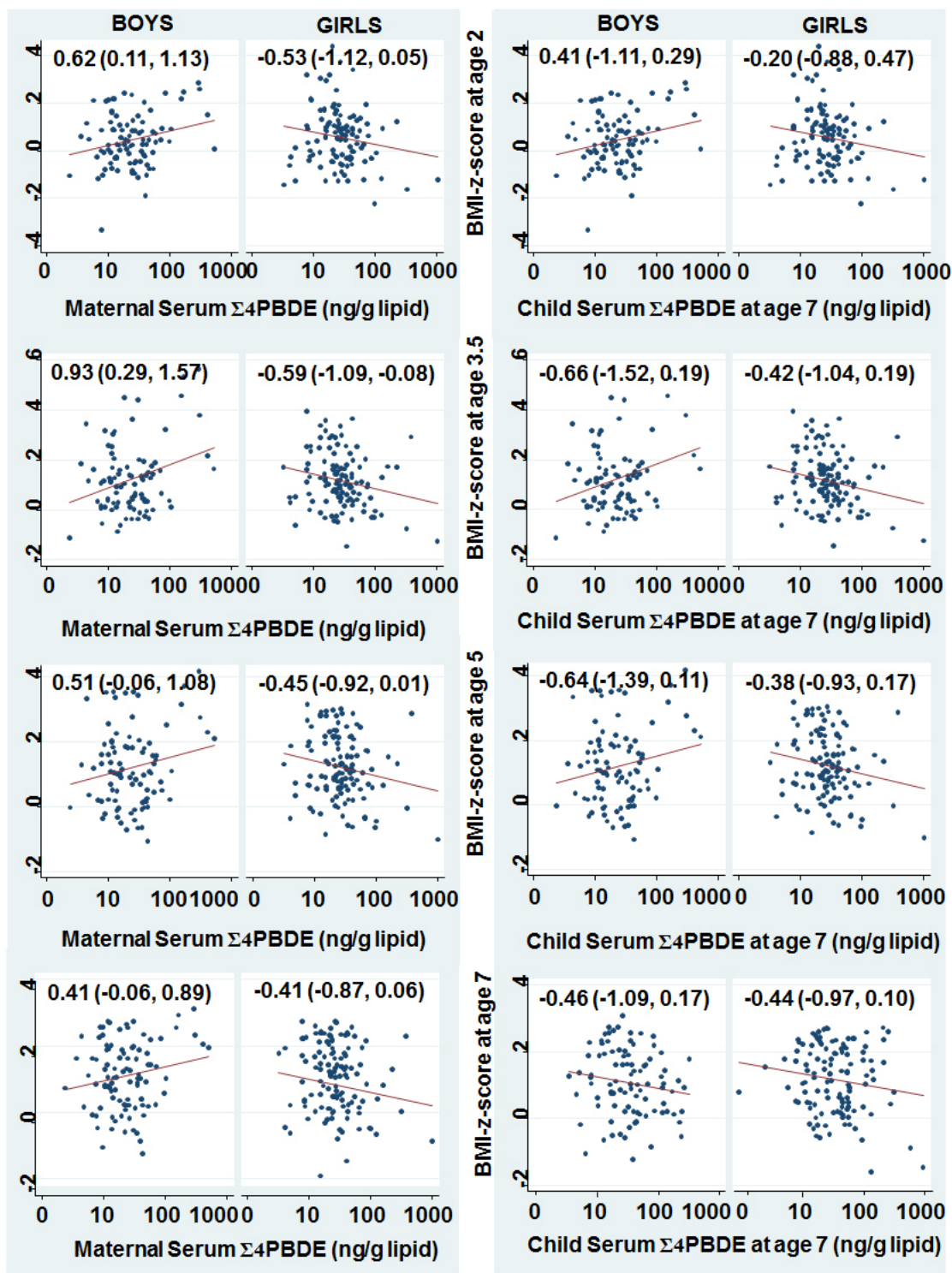
Figure S2. Scatter plot of maternal and child Σ4PBDE concentrations and BMI z-score with regression lines at each time point (ages 2, 3.5, 5 and 7) separately for boys and girls with point estimates and 95% confidence intervals.