

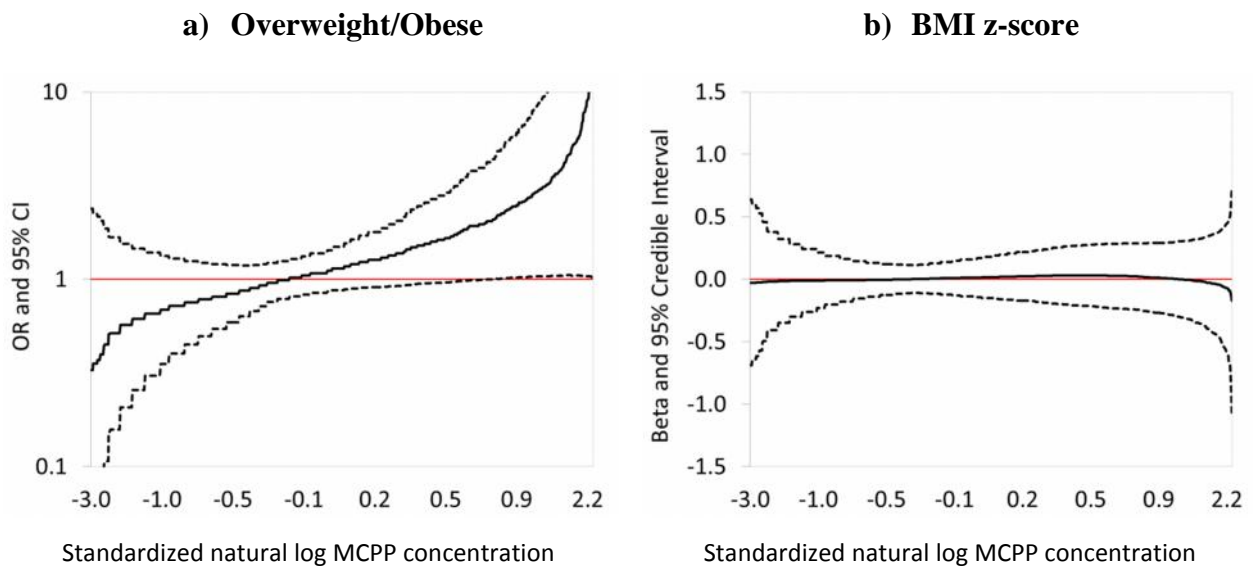
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## eAppendix: Specification of missing data models

We modeled natural log creatinine as a normally distributed random variable predicted by specific gravity; gestational age and calendar date at urine collection; maternal education, race/ethnicity, parity, BMI, and height; child's sex; and gestational weight gain. We modeled breast feeding status using a logistic model conditional on cohort, maternal education, race/ethnicity, parity, and maternal smoking during pregnancy. We modeled maternal pre-pregnancy weight, maternal last pregnancy weight, and maternal height as normally distributed random variables conditional on cohort, maternal education, race/ethnicity, parity, maternal smoking during pregnancy, maternal work status during pregnancy, child's sex, and maternal age at delivery. For each iteration of the MCMC algorithm, maternal pre-pregnancy BMI and gestational weight gain were calculated based on these imputed values.

eFigure 1. Posterior mean of odds ratios or beta coefficients and 95% credible intervals for the associations of natural log urinary MCP concentrations modeled using restricted quadratic spline terms with overweight/obese status (a) and BMI z-scores (b) among children aged 4 to 7 years (N=707; 1,416 follow-up visits). Associations estimated in multiple metabolite logistic or linear mixed effects regression models adjusted for cohort, maternal race/ethnicity, maternal age at delivery, maternal education, maternal work status during pregnancy, maternal pre-pregnancy BMI, maternal height, gestational weight gain, maternal smoking during pregnancy, natural log creatinine, calendar date of urine collection, parity, child's sex, breast feeding, and months of age at follow-up.



eTable 1. Distributions of phthalate metabolite concentrations ( $\mu\text{g/L}$ ) in maternal urine samples during pregnancy, by cohort and pooled (N=707)

Metabolite/ cohort	N	LOD	Percent detected	Geometric mean <sup>a</sup>	Minimum	25 <sup>th</sup> percentile	75 <sup>th</sup> percentile	Maximum
<b>MEP</b>								
MSSM	151	0.3	99	198.9	<LOD	81.0	495	7819
CCCEH	339	0.5	100	162.0	7.79	69.4	334	6046
HOME	217	0.5	100	119.3	3.30	36.0	335	26004
Pooled	707		100	154.1	<LOD	63.4	353	26004
<b>MnBP</b>								
MSSM	151	0.4	100	32.0	0.800	14.3	75.2	4043
CCCEH	339	0.6	100	38.0	1.20	20.3	81.3	1110
HOME	217	0.6	100	21.1	0.800	8.50	49.1	2240
Pooled	707		100	30.6	0.800	14.2	66.5	4043
<b>MiBP</b>								
MSSM	151	0.3	97	5.96	<LOD	2.90	15.3	76.6
CCCEH	339	0.3	100	9.22	<LOD	5.10	19.0	374
HOME	217	0.3	95	3.90	<LOD	1.50	11.4	84.1
Pooled	707		98	6.45	<LOD	3.20	15.9	374
<b>MCPP</b>								
MSSM	151	0.2	97	2.78	<LOD	1.50	5.50	129
CCCEH	339	0.2	97	2.06	<LOD	1.20	4.10	32.7
HOME	217	0.2	98	1.73	<LOD	0.900	3.60	23.6
Pooled	707		97	2.08	<LOD	1.10	4.30	129
<b>MBzP</b>								
MSSM	151	0.1	99	13.3	<LOD	4.75	29.8	481
CCCEH	339	0.2	100	13.5	<LOD	5.76	31.4	550
HOME	217	0.2	98	8.25	<LOD	3.74	22.5	653
Pooled	707		99	11.6	<LOD	4.75	28.7	653
<b>DEHP<sup>b</sup></b>								
MSSM	151	n/a	n/a	0.278	<LOD	0.129	0.507	19.9
CCCEH	339	n/a	n/a	0.298	<LOD	0.141	0.608	18.6
HOME	217	n/a	n/a	0.248	<LOD	0.0959	0.537	6.56
Pooled	707	n/a	n/a	0.277	<LOD	0.128	0.562	19.9
<b>MECPP</b>								
MSSM	151	0.3	99	35.2	<LOD	15.0	70.1	2055
CCCEH	339	0.6	100	39.5	3.00	19.5	77.9	1840
HOME	217	0.6	100	30.7	1.70	12.6	63.6	641
Pooled	707		100	35.7	<LOD	16.1	74.4	2055
<b>MEHHP</b>								
MSSM	151	0.3	99	20.6	<LOD	8.70	39.4	2051
CCCEH	339	0.7	100	22.5	1.10	10.6	48.4	1750
HOME	217	0.7	100	20.4	<LOD	8.00	47.0	784
Pooled	707		100	21.4	<LOD	9.20	45.1	2051

Metabolite/ cohort	N	LOD	Percent detected	Geometric mean <sup>a</sup>	Minimum	25 <sup>th</sup> percentile	75 <sup>th</sup> percentile	Maximum
<b>MEHP</b>								
MSSM	151	0.9	90	5.81	<LOD	3.00	11.8	478
CCCEH	339	1.2	83	5.04	<LOD	2.20	12.8	613
HOME	217	1.2	77	4.23	<LOD	1.50	10.8	233
Pooled	707		83	4.92	<LOD	2.00	11.9	613
<b>MEOHP</b>								
MSSM	151	0.5	99	18.3	<LOD	8.30	37.8	1335
CCCEH	339	0.7	100	18.7	<LOD	8.90	37.6	1320
HOME	217	0.7	99	16.8	<LOD	6.40	36.9	448
Pooled	707		99	18.0	<LOD	8.00	37.5	1335

Columbia Center for Children's Environmental Health (CCCEH), Health Outcomes and Measures of the Environment Study (HOME), limit of detection (LOD), Mount Sinai School of Medicine Center for Children's Environmental Health (MSSM)

<sup>a</sup> To compute the geometric mean, phthalate metabolite concentrations <LOD were replaced by LOD/ 2.

<sup>b</sup> Units are micromoles per liter.

eTable 2. Age- and sex- standardized body mass index z-score distributions (mean  $\pm$  standard deviation) at follow-up by selected characteristics (N=707; 1,416 follow up visits)

Group/ category	<i>n</i>	Body mass index z-score
Overall	1,416	0.47 $\pm$ 1.20
Cohort		
MSSM	308	0.55 $\pm$ 1.13
CCCEH	632	0.64 $\pm$ 1.32
HOME	476	0.19 $\pm$ 1.00
Age (years)		
4	420	0.32 $\pm$ 1.26
5	361	0.36 $\pm$ 1.19
6	258	0.69 $\pm$ 1.18
7	377	0.59 $\pm$ 1.11
Child's sex		
Girls	756	0.44 $\pm$ 1.20
Boys	660	0.50 $\pm$ 1.20
Race/ethnicity		
Non-Hispanic white	358	0.17 $\pm$ 0.93
Non-Hispanic black	463	0.46 $\pm$ 1.21
Hispanic	570	0.69 $\pm$ 1.29
Other	25	-0.09 $\pm$ 1.23

Columbia Center for Children's Environmental Health (CCCEH), Health Outcomes and Measures of the Environment Study (HOME), Mount Sinai School of Medicine Center for Children's Environmental Health (MSSM), standard deviation (SD)

eTable 3. Adjusted OR (95% CI) for associations between prenatal urinary phthalate metabolite concentrations and overweight/obese status by cohort, child's sex, and race/ethnicity

Metabolite /cohort	Overall	Girls	Boys	Non-Hispanic white	Non-Hispanic black	Hispanic
<b>MEP</b>						
MSSM	0.89 (0.40, 1.98)	0.79 (0.32, 1.94)	1.39 (0.46, 4.15)	0.97 (0.21, 4.36)	0.82 (0.32, 2.12)	0.86 (0.25, 2.88)
CCCEH	0.59 (0.27, 1.26)	0.58 (0.21, 1.56)	0.61 (0.21, 1.73)		0.73 (0.22, 2.36)	0.50 (0.18, 1.30)
HOME	0.56 (0.25, 1.24)	0.51 (0.19, 1.31)	0.66 (0.20, 2.10)	0.64 (0.20, 2.05)	0.50 (0.16, 1.50)	
<b>MnBP</b>						
MSSM	0.69 (0.27, 1.80)	0.96 (0.32, 2.85)	0.46 (0.13, 1.60)	0.63 (0.12, 3.17)	0.67 (0.22, 2.05)	0.52 (0.12, 2.25)
CCCEH	1.18 (0.42, 3.35)	1.61 (0.46, 5.64)	0.92 (0.22, 3.77)		1.23 (0.30, 5.05)	1.16 (0.30, 4.39)
HOME	1.49 (0.48, 4.60)	1.60 (0.45, 5.78)	1.55 (0.28, 8.11)	1.27 (0.24, 6.42)	1.59 (0.38, 6.61)	
<b>MiBP</b>						
MSSM	0.87 (0.34, 2.22)	0.99 (0.36, 2.78)	0.68 (0.18, 2.49)	0.77 (0.16, 3.72)	0.55 (0.18, 1.72)	0.85 (0.22, 3.34)
CCCEH	0.66 (0.24, 1.79)	0.79 (0.24, 2.56)	0.37 (0.08, 1.57)		0.54 (0.13, 2.14)	0.60 (0.17, 2.08)
HOME	1.03 (0.36, 3.04)	1.00 (0.29, 3.57)	0.94 (0.21, 4.35)	1.16 (0.29, 4.94)	0.54 (0.11, 2.55)	
<b>MCPP</b>						
MSSM	2.15 (0.88, 5.31)	2.94 (1.09, 8.04)	1.82 (0.53, 6.23)	1.47 (0.32, 6.68)	1.89 (0.64, 5.55)	3.84 (1.00, 14.76)
CCCEH	2.64 (1.14, 6.41)	3.50 (1.30, 9.96)	1.93 (0.56, 6.90)		1.79 (0.53, 6.27)	3.74 (1.28, 11.58)
HOME	1.34 (0.41, 4.45)	1.95 (0.50, 7.70)	0.79 (0.16, 4.05)	0.95 (0.19, 4.77)	1.86 (0.41, 8.63)	
<b>MBzP</b>						
MSSM	0.79 (0.31, 1.99)	0.80 (0.29, 2.20)	0.85 (0.22, 3.15)	0.75 (0.15, 3.81)	0.69 (0.23, 2.05)	0.96 (0.23, 3.92)
CCCEH	0.46 (0.20, 1.03)	0.59 (0.21, 1.62)	0.42 (0.13, 1.31)		0.39 (0.11, 1.30)	0.49 (0.17, 1.37)
HOME	0.78 (0.25, 2.42)	0.66 (0.19, 2.31)	1.13 (0.22, 5.67)	0.80 (0.17, 3.63)	1.02 (0.22, 4.62)	
<b>DEHP</b>						
MSSM	0.71 (0.33, 1.51)	0.59 (0.24, 1.46)	0.81 (0.30, 2.17)	1.32 (0.34, 5.10)	0.76 (0.28, 2.07)	0.44 (0.14, 1.36)
CCCEH	0.90 (0.42, 1.92)	0.67 (0.26, 1.67)	1.47 (0.46, 4.67)		1.11 (0.37, 3.29)	0.71 (0.26, 1.92)
HOME	1.13 (0.44, 2.85)	0.76 (0.25, 2.28)	2.06 (0.55, 7.53)	1.53 (0.48, 4.91)	0.96 (0.24, 3.83)	

Columbia Center for Children's Environmental Health (CCCEH), Health Outcomes and Measures of the Environment Study (HOME), Mount Sinai School of Medicine Center for Children's Environmental Health (MSSM)

Posterior mean of odds ratios (95% credible intervals) per standard deviation increase in natural log phthalate metabolite concentrations estimated in multiple metabolite logistic mixed effects regression models, adjusted for maternal race/ethnicity, maternal age at delivery, maternal education, maternal work status during pregnancy, maternal pre-pregnancy body mass index, maternal height, gestational weight gain, maternal smoking during pregnancy, natural log creatinine, calendar date of urine collection, parity, child's sex, breast feeding, and months of age at follow-up.



eTable 4. Adjusted (95% CI) for associations between prenatal urinary phthalate metabolite concentrations and body mass index z-scores by cohort, child's sex, and race/ethnicity

Metabolite /cohort	Overall	Girls	Boys	Non-Hispanic white	Non-Hispanic black	Hispanic
<b>MEP</b>						
MSSM	0.14 (-0.09, 0.37)	0.03 (-0.28, 0.34)	0.29 (-0.03, 0.61)	0.06 (-0.44, 0.56)	0.08 (-0.26, 0.43)	0.15 (-0.19, 0.49)
CCCEH	-0.10 (-0.27, 0.07) <sup>a</sup>	-0.14 (-0.37, 0.09)	-0.02 (-0.25, 0.21)		0.03 (-0.26, 0.31)	-0.16 (-0.36, 0.05)
HOME	-0.06 (-0.22, 0.09) <sup>a</sup>	-0.20 (-0.41, 0.00)	0.11 (-0.12, 0.34) <sup>b</sup>	0.01 (-0.21, 0.23)	-0.11 (-0.36, 0.14)	
<b>MnBP</b>						
MSSM	-0.23 (-0.54, 0.09)	-0.04 (-0.52, 0.45)	-0.27 (-0.64, 0.10)	-0.16 (-0.73, 0.41)	-0.27 (-0.74, 0.21)	-0.29 (-0.77, 0.19)
CCCEH	0.04 (-0.21, 0.28) <sup>a</sup>	0.27 (-0.07, 0.61)	-0.17 (-0.51, 0.17)		-0.17 (-0.61, 0.27)	0.15 (-0.15, 0.44)
HOME	0.18 (-0.07, 0.44) <sup>a</sup>	0.18 (-0.16, 0.52)	0.19 (-0.16, 0.55)	0.08 (-0.24, 0.40)	0.21 (-0.22, 0.64)	
<b>MiBP</b>						
MSSM	-0.02 (-0.30, 0.27)	0.04 (-0.33, 0.40)	-0.14 (-0.54, 0.25)	-0.39 (-0.95, 0.17)	-0.16 (-0.69, 0.38)	0.03 (-0.37, 0.42)
CCCEH	0.05 (-0.19, 0.29)	-0.08 (-0.40, 0.23)	0.07 (-0.27, 0.41)		0.21 (-0.22, 0.63)	-0.01 (-0.29, 0.28)
HOME	-0.02 (-0.24, 0.21)	-0.11 (-0.41, 0.20)	0.03 (-0.27, 0.34)	0.05 (-0.22, 0.32)	-0.19 (-0.67, 0.28)	
<b>MCPP</b>						
MSSM	0.17 (-0.12, 0.46)	0.19 (-0.17, 0.55)	0.15 (-0.25, 0.55)	-0.05 (-0.54, 0.44)	0.19 (-0.30, 0.67)	0.40 (-0.03, 0.83)
CCCEH	-0.05 (-0.23, 0.13) <sup>a</sup>	0.06 (-0.17, 0.29)	-0.17 (-0.45, 0.12)		-0.09 (-0.42, 0.23)	-0.03 (-0.25, 0.18)
HOME	-0.05 (-0.31, 0.21)	-0.03 (-0.41, 0.34)	-0.07 (-0.41, 0.28)	-0.10 (-0.42, 0.22)	0.21 (-0.27, 0.70)	
<b>MBzP</b>						
MSSM	-0.03 (-0.34, 0.27)	-0.02 (-0.39, 0.35)	-0.12 (-0.59, 0.35)	-0.03 (-0.63, 0.57)	0.07 (-0.42, 0.56)	-0.01 (-0.45, 0.42)
CCCEH	-0.09 (-0.27, 0.09)	-0.08 (-0.33, 0.17)	-0.03 (-0.28, 0.23)		-0.12 (-0.44, 0.2)	-0.07 (-0.30, 0.15)
HOME	-0.13 (-0.38, 0.11)	-0.12 (-0.44, 0.19)	-0.15 (-0.51, 0.21)	-0.18 (-0.47, 0.12)	-0.03 (-0.50, 0.43)	
<b>DEHP</b>						
MSSM	-0.13 (-0.32, 0.07)	-0.16 (-0.46, 0.14)	-0.06 (-0.32, 0.20)	0.28 (-0.12, 0.68)	-0.20 (-0.60, 0.20)	-0.28 (-0.56, 0.00)
CCCEH	-0.05 (-0.21, 0.12)	-0.19 (-0.40, 0.03)	0.12 (-0.15, 0.38)		-0.06 (-0.34, 0.21)	-0.05 (-0.26, 0.17)
HOME	0.05 (-0.14, 0.24)	0.03 (-0.23, 0.28)	0.10 (-0.18, 0.37)	0.07 (-0.15, 0.30)	-0.02 (-0.44, 0.40)	

Columbia Center for Children's Environmental Health (CCCEH), Health Outcomes and Measures of the Environment Study (HOME), Mount Sinai School of Medicine Center for Children's Environmental Health (MSSM)

Posterior mean of beta coefficients (95% credible intervals) per standard deviation increase in natural log phthalate metabolite concentrations estimated in multiple metabolite linear mixed effects regression models, adjusted for maternal race/ethnicity, maternal age at delivery, maternal education, maternal work status during pregnancy, maternal pre-pregnancy body mass index, maternal height, gestational weight gain, maternal smoking during pregnancy, natural log creatinine, calendar date of urine collection, parity, child's sex, breast feeding, and months of age at follow-up.

<sup>a</sup> Met criteria for heterogeneity compared to MSSM.

<sup>b</sup> Met criteria for heterogeneity compared to girls in the same cohort.

eTable 5. Sensitivity analyses for confounding among metabolites and loss to follow-up

Metabolite/outcome	Multiple metabolite models <sup>a</sup> (N = 707)	Single metabolite models <sup>b</sup> (N = 707)	Multiple metabolite models accounting for loss to follow-up <sup>c</sup> (N = 1143)
<b>MEP</b>			
Overweight/obese <sup>d</sup>	0.68 (0.42, 1.08)	0.66 (0.42, 1.03)	0.69 (0.43, 1.12)
BMI z-score <sup>e</sup>	-0.05 (-0.15, 0.05)	-0.06 (-0.15, 0.03)	-0.05 (-0.15, 0.05)
<b>MnBP</b>			
Overweight/obese <sup>d</sup>	1.00 (0.51, 1.98)	0.91 (0.56, 1.50)	0.96 (0.48, 1.90)
BMI z-score <sup>e</sup>	0.03 (-0.12, 0.18)	-0.03 (-0.14, 0.08)	0.01 (-0.14, 0.16)
<b>MiBP</b>			
Overweight/obese <sup>d</sup>	0.84 (0.44, 1.63)	0.78 (0.46, 1.31)	0.87 (0.45, 1.68)
BMI z-score <sup>e</sup>	0.01 (-0.14, 0.15)	-0.04 (-0.15, 0.08)	0.03 (-0.11, 0.18)
<b>MCPP</b>			
Overweight/obese <sup>d</sup>	2.12 (1.16, 3.96)	1.42 (0.88, 2.30)	2.25 (1.23, 4.18)
BMI z-score <sup>e</sup>	-0.02 (-0.15, 0.11)	-0.05 (-0.16, 0.05)	0.01 (-0.13, 0.14)
<b>MBzP</b>			
Overweight/obese <sup>d</sup>	0.63 (0.34, 1.15)	0.71 (0.44, 1.15)	0.62 (0.34, 1.13)
BMI z-score <sup>e</sup>	-0.07 (-0.20, 0.06)	-0.08 (-0.19, 0.02)	-0.07 (-0.20, 0.06)
<b>DEHP</b>			
Overweight/obese <sup>d</sup>	0.87 (0.53, 1.42)	0.89 (0.57, 1.38)	0.87 (0.53, 1.41)
BMI z-score <sup>e</sup>	-0.04 (-0.15, 0.06)	-0.07 (-0.16, 0.03)	-0.04 (-0.14, 0.07)

**Body mass index (BMI)**

Associations per standard deviation increase in natural log phthalate metabolite concentrations, adjusted for cohort, maternal race/ethnicity, maternal age at delivery, maternal education, maternal work status during pregnancy, maternal pre-pregnancy BMI, maternal height, gestational weight gain, maternal smoking during pregnancy, natural log creatinine, calendar date of urine collection, parity, child's sex, breast feeding, and months of age at follow-up.

<sup>a</sup> Associations among children with at least one follow-up visit estimated in a multiple metabolite linear mixed effects regression model (primary analysis).

<sup>b</sup> Associations among children with at least one follow-up visit estimated in a separate linear mixed effects regression model for each metabolite.

<sup>c</sup> Associations among all children with measured prenatal phthalate metabolite concentrations estimated in a multiple metabolite linear mixed effects regression model using a selection model for nonignorable missing outcome data.

<sup>d</sup> Posterior mean of odds ratios (95% credible intervals).

<sup>e</sup> Posterior mean of beta coefficients (95% credible intervals).