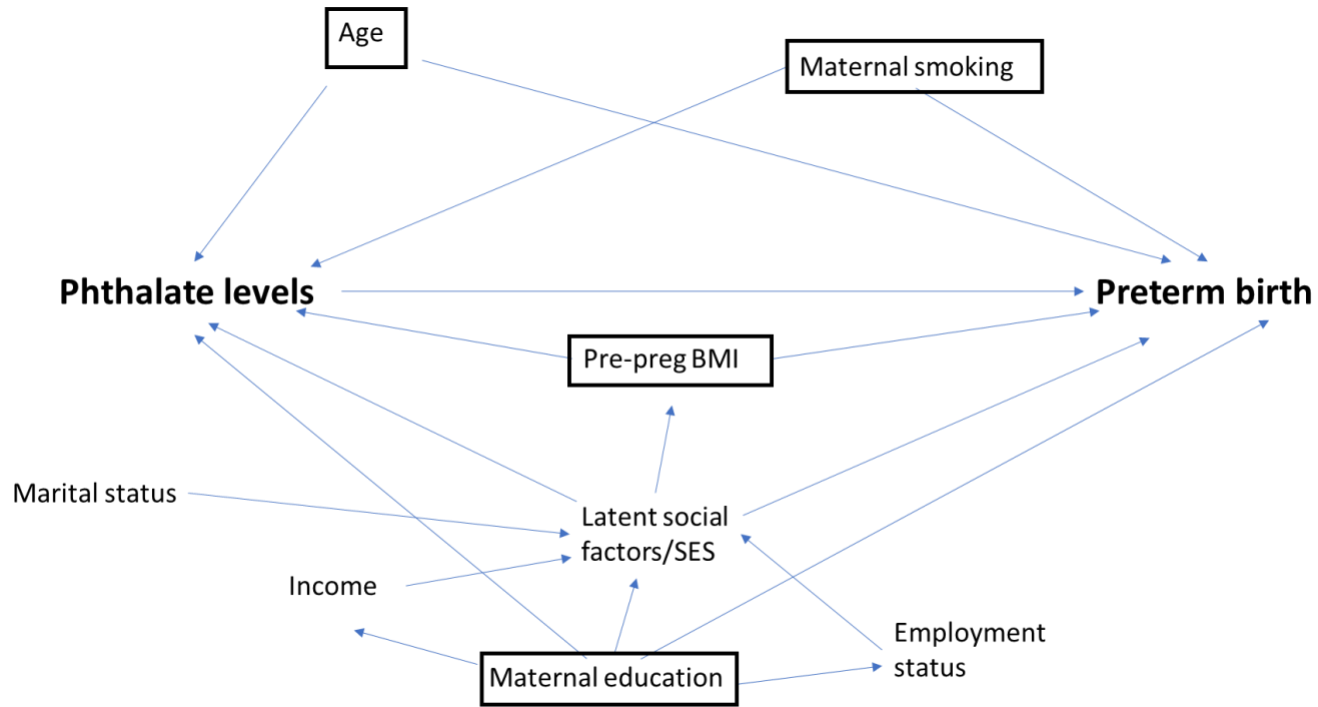


**Figure S1.** Directed acyclic graph of potential confounders in the analysis of prenatal urinary phthalate metabolites and preterm birth.



Note: Variables with boxes around them indicate variables on open backdoor paths that were further considered as confounders in our data.

**Table S1.** Pearson correlation coefficients between specific gravity-corrected pregnancy averages of urinary phthalate and phthalate alternative metabolites.

	MEP	MBP	MBzP	MiBP	$\Sigma$ DEHP	MCPP	MCOP	MCNP	MHBP	MHiBP	MECPTP	MEHHTP	MONP
MEP	1.00												
MBP	0.26	1.00											
MBzP	0.15	0.53	1.00										
MiBP	0.22	0.61	0.38	1.00									
$\Sigma$ DEHP	0.20	0.53	0.41	0.42	1.00								
MCPP	0.16	0.42	0.35	0.31	0.54	1.00							
MCOP	0.12	0.22	0.23	0.21	0.45	0.74	1.00						
MCNP	0.09	0.17	0.21	0.23	0.39	0.58	0.68	1.00					
MHBP	0.19	0.81	0.47	0.51	0.41	0.41	0.17	0.12	1.00				
MHiBP	0.23	0.56	0.34	0.89	0.37	0.34	0.20	0.22	0.63	1.00			
MECPTP	0.04	-0.02	0.01	0.02	0.06	0.11	0.18	0.24	-0.03	-0.02	1.00		
MEHHTP	0.04	0.02	0.02	0.04	0.12	0.15	0.15	0.20	0.02	0.02	0.92	1.00	
MONP	0.11	0.31	0.26	0.31	0.42	0.57	0.79	0.32	0.29	0.25	0.22	0.24	1.00

Abbreviations: monoethyl phthalate (MEP); mono-*n*-butyl phthalate (MBP); monobenzyl phthalate (MBzP); mono-isobutyl phthalate (MiBP); di(2-ethylhexyl) phthalate (DEHP); mono-3-carboxypropyl phthalate (MCPP); mono carboxyisooctyl phthalate (MCOP); mono carboxyisononyl phthalate (MCNP); mono-3-hydroxybutyl phthalate (MHBP); mono-2-hydroxyisobutyl phthalate (MHiBP); mono-2-ethyl-5-carboxypentyl terephthalate (MECPTP); mono-2-ethylhydroxyhexyl terephthalate (MEHHTP); 4-methyl-7-oxo-octyl phthalate (MONP).

**Table S2.** Geometric means of specific gravity-corrected pregnancy-average phthalate and phthalate alterative metabolite concentrations stratified by demographic characteristics in the PROTECT cohort (ng/mL or nmol/mL for  $\Sigma$ DEHP).

	MEP	MBP	MBzP	MiBP	$\Sigma$ DEHP	MCPP	MCOP	MCNP	MHBP	MHiBP	MECPTP	MEHHTP	MONP
<b>Age (years)</b>													
18-24 (ref.)	39.88	18.61	3.79	11.34	0.11	1.52	10.62	1.78	1.59	4.88	19.93	3.45	2.11
25-29	41.87	<b>13.12</b>	<b>2.38</b>	<b>9.14</b>	<b>0.09</b>	<b>1.27</b>	10.23	1.68	<b>1.17</b>	<b>4.04</b>	<b>28.43</b>	<b>4.57</b>	1.84
30-34	<b>59.65</b>	<b>13.35</b>	<b>2.23</b>	<b>9.09</b>	<b>0.10</b>	<b>1.31</b>	11.39	<b>1.98</b>	<b>1.30</b>	<b>3.90</b>	<b>33.46</b>	<b>5.60</b>	2.08
>35	45.63	<b>12.94</b>	<b>2.15</b>	<b>9.72</b>	<b>0.10</b>	1.38	11.29	1.81	<b>1.20</b>	4.27	<b>39.20</b>	<b>6.55</b>	2.10
<b>Education</b>													
<High school (ref.)	48.18	21.48	3.91	12.42	0.12	1.65	9.36	1.66	1.84	5.95	12.87	2.44	1.59
High school/equivalent	34.19	19.91	4.83	12.22	0.11	1.61	9.25	1.77	1.75	5.00	15.96	2.63	2.29
Some college	44.07	<b>16.08</b>	<b>2.89</b>	10.32	0.11	1.42	11.19	1.79	1.46	<b>4.48</b>	<b>24.99</b>	4.22	1.90
College degree	47.82	<b>12.42</b>	<b>2.17</b>	<b>8.90</b>	<b>0.09</b>	<b>1.26</b>	11.04	1.83	<b>1.14</b>	<b>3.92</b>	<b>35.27</b>	<b>5.82</b>	2.07
<b>Income</b>													
<20k (ref.)	40.41	16.50	3.25	10.55	0.10	1.35	9.49	1.67	1.50	4.65	20.01	3.56	1.88
20-40k	43.49	<b>13.30</b>	<b>2.32</b>	<b>9.16</b>	0.10	1.27	10.59	1.79	<b>1.21</b>	4.07	<b>30.53</b>	<b>4.78</b>	1.94
>40k	<b>51.73</b>	<b>12.73</b>	<b>2.20</b>	<b>9.17</b>	0.10	1.44	<b>12.72</b>	<b>2.02</b>	<b>1.16</b>	<b>3.96</b>	<b>44.36</b>	<b>7.22</b>	2.18
<b>Marital status</b>													
Single (ref.)	53.53	17.39	3.32	11.03	0.11	1.51	10.40	1.74	1.53	4.89	23.10	3.92	1.96
Married/cohabitating	<b>42.82</b>	<b>14.34</b>	<b>2.62</b>	<b>9.68</b>	0.10	1.34	10.79	1.80	<b>1.30</b>	4.21	28.45	4.75	2.01
<b>Pre-pregnancy BMI (kg/m<sup>2</sup>)</b>													
<18.5 (ref.)	37.55	14.38	2.99	9.30	0.10	1.28	9.33	1.65	1.42	4.22	21.31	4.09	2.17
18.5-24.9	41.67	13.48	2.44	9.50	0.10	1.29	10.62	1.75	1.22	4.12	28.33	4.56	1.81
25-29.9	49.46	15.40	2.97	9.52	0.10	1.45	10.91	1.85	1.38	4.33	27.80	4.46	2.07
>30	50.84	<b>18.47</b>	3.15	<b>12.43</b>	<b>0.11</b>	1.57	11.93	1.92	1.58	5.19	29.59	5.38	2.28
<b>Employment status</b>													
Employed (ref.)	45.30	13.19	2.33	9.13	0.10	1.30	11.09	1.82	1.20	3.99	32.46	5.40	1.99
Unemployed	43.76	<b>18.53</b>	<b>3.64</b>	<b>11.50</b>	<b>0.11</b>	<b>1.50</b>	10.01	1.74	<b>1.67</b>	<b>5.04</b>	<b>18.67</b>	<b>3.13</b>	2.06
<b>Smoking</b>													
Never (ref.)	43.19	14.54	2.67	9.78	0.10	1.36	10.70	1.79	1.32	4.25	27.18	4.50	1.99
Ever	52.20	<b>17.22</b>	<b>3.24</b>	10.53	<b>0.12</b>	1.45	10.67	1.77	1.53	4.87	27.26	4.95	2.05
Current	59.41	16.67	2.44	13.96	0.12	1.68	13.07	2.16	1.20	4.79	<b>82.74</b>	<b>12.91</b>	2.53
<b>Alcohol use in pregnancy</b>													
None (ref.)	44.19	14.74	2.71	9.87	0.10	1.35	10.63	1.78	1.32	4.31	27.51	4.56	2.01
Any	52.41	16.84	3.13	9.96	0.11	<b>1.72</b>	12.05	2.01	1.59	4.30	31.27	5.77	1.92
<b>Newborn sex</b>													
Female (ref.)	44.03	14.92	2.77	9.54	0.10	1.43	11.26	1.79	1.33	4.24	28.13	4.63	1.94
Male	45.61	14.82	2.69	10.28	0.10	1.33	10.27	1.79	1.34	4.37	27.67	4.68	2.07
<b>Preterm</b>													
No (ref.)	44.76	14.54	2.70	9.75	0.10	1.36	10.69	1.78	1.31	4.22	28.93	4.79	2.02
Yes	43.83	<b>18.66</b>	3.06	<b>12.00</b>	0.10	1.55	11.01	1.88	<b>1.63</b>	<b>5.34</b>	<b>18.88</b>	<b>3.33</b>	1.87

Differences from reference category p<0.05 are bolded. Abbreviations: monoethyl phthalate (MEP); mono-*n*-butyl phthalate (MBP); monobenzyl phthalate (MBzP); mono-isobutyl phthalate (MiBP); di(2-ethylhexyl) phthalate (DEHP); mono-3-carboxypropyl phthalate (MCPP); mono carboxyisooctyl phthalate (MCOP); mono carboxyisononyl phthalate (MCNP); mono-3-hydroxybutyl phthalate (MHBP); mono-2-hydroxyisobutyl phthalate (MHiBP); mono-2-ethyl-5-carboxypentyl terephthalate (MECPTP); mono-2-ethylhydroxyhexyl terephthalate (MEHHTP); 4-methyl-7-oxo-octyl phthalate (MONP)

**Table S3.** Adjusted<sup>a</sup> odds ratios (95% confidence intervals) for an interquartile range difference in urinary phthalate or phthalate alternative metabolite concentrations and preterm birth by study visit.

	Visit 1	Visit 2	Visit 3
n (preterm, term)	70, 793	78, 805	64, 605
MEP	0.99 (0.73, 1.35)	0.98 (0.73, 1.30)	1.06 (0.78, 1.45)
MBP	1.11 (0.82, 1.49)	<b>1.38 (1.05, 1.81)</b>	1.15 (0.84, 1.59)
MBzP	1.08 (0.82, 1.43)	1.10 (0.84, 1.43)	1.11 (0.82, 1.51)
MiBP	1.19 (0.90, 1.59)	<b>1.34 (1.02, 1.76)</b>	1.21 (0.89, 1.65)
∑DEHP	0.87 (0.65, 1.16)	1.02 (0.78, 1.33)	0.92 (0.68, 1.24)
M CPP	1.08 (0.84, 1.39)	1.07 (0.83, 1.37)	1.05 (0.82, 1.34)
MCOP	1.04 (0.81, 1.35)	1.04 (0.81, 1.34)	1.01 (0.77, 1.32)
MCNP	0.97 (0.77, 1.22)	1.12 (0.91, 1.38)	1.12 (0.89, 1.42)
n (preterm, term)	55, 585	58, 582	46, 437
MHBP	1.13 (0.82, 1.57)	<b>1.53 (1.11, 2.10)</b>	1.03 (0.73, 1.46)
MHiBP	1.16 (0.81, 1.67)	<b>1.84 (1.27, 2.67)</b>	1.39 (0.92, 2.09)
n (preterm, term)	30, 324	32, 337	25, 270
MECPTP	<b>0.52 (0.31, 0.87)</b>	0.74 (0.48, 1.14)	1.13 (0.78, 1.65)
MEHHTP	<b>0.58 (0.35, 0.95)</b>	0.73 (0.46, 1.16)	1.22 (0.81, 1.84)
MONP	0.82 (0.55, 1.20)	0.87 (0.61, 1.23)	0.97 (0.67, 1.41)

<sup>a</sup>Adjusted for maternal age (continuous), education (4 level ordinal variable), gestational age at urine sample collection, and specific gravity. Associations with p value <0.05 are bolded. Median (range) gestational age in weeks at sample collection by visit was as follows: visit 1=17.6 (16.6, 19.3); visit 2=23.4 (22.0, 25.1); visit 3=27.6 (25.9, 30.3). Abbreviations: monoethyl phthalate (MEP); mono-*n*-butyl phthalate (MBP); monobenzyl phthalate (MBzP); mono-isobutyl phthalate (MiBP); di(2-ethylhexyl) phthalate (DEHP); mono-3-carboxypropyl phthalate (M CPP); mono carboxyisooctyl phthalate (MCOP); mono carboxyisononyl phthalate (MCNP); mono-3-hydroxybutyl phthalate (MHBP); mono-2-hydroxyisobutyl phthalate (MHiBP); mono-2-ethyl-5-carboxypentyl terephthalate (MECPTP); mono-2-ethylhydroxyhexyl terephthalate (MEHHTP); 4-methyl-7-oxo-octyl phthalate (MONP).

**Table S4.** Crude<sup>a</sup> associations (95% confidence intervals) between an interquartile range difference in urinary phthalate or phthalate alternative metabolite concentrations and gestational age at birth (days).

	Visit 1	Visit 2	Visit 3	Pregnancy average
Metabolite	B (95% CI)	B (95% CI)	B (95% CI)	B (95% CI)
n	882	895	681	1090
MEP	0.25 (-0.85, 1.35)	0.31 (-0.78, 1.39)	0.32 (-0.87, 1.50)	0.70 (-0.50, 1.90)
MBP	-0.88 (-1.91, 0.16)	<b>-1.60 (-2.59, -0.61)</b>	<b>-1.38 (-2.53, -0.23)</b>	<b>-2.02 (-3.11, -0.93)</b>
MBzP	<b>-1.01 (-2.00, -0.01)</b>	<b>-1.34 (-2.35, -0.34)</b>	-0.97 (-2.11, 0.18)	<b>-1.42 (-2.48, -0.37)</b>
MiBP	<b>-1.04 (-2.06, -0.01)</b>	<b>-1.05 (-2.09, -0.01)</b>	<b>-1.50 (-2.65, -0.35)</b>	<b>-1.53 (-2.60, -0.46)</b>
∑DEHP	0.37 (-0.62, 1.35)	-0.61 (-1.60, 0.36)	-0.09 (-1.17, 0.98)	-0.37 (-1.49, 0.75)
M CPP	-0.66 (-1.56, 0.25)	-0.65 (-1.59, 0.28)	-0.31 (-1.25, 0.62)	<b>-1.12 (-2.14, -0.10)</b>
MCOP	-0.09 (-0.99, 0.81)	-0.37 (-1.32, 0.58)	0.22 (-0.79, 1.22)	-0.45 (-1.52, 0.63)
MCNP	0.08 (-0.74, 0.89)	-0.43 (-1.25, 0.38)	-0.25 (-1.14, 0.65)	-0.48 (-1.53, 0.56)
n	653	651	490	827
MHBP	-1.20 (-2.42, 0.03)	<b>-1.97 (-3.20, -0.75)</b>	-1.21 (-2.49, 0.06)	<b>-2.23 (-3.48, -0.98)</b>
MHiBP	-1.09 (-2.45, 0.27)	<b>-1.90 (-3.31, -0.50)</b>	<b>-2.09 (-3.59, -0.60)</b>	<b>-1.86 (-3.22, -0.49)</b>
n	363	377	299	428
MECPTP	<b>2.10 (0.76, 3.44)</b>	0.60 (-0.74, 1.94)	1.14 (-0.22, 2.50)	<b>2.29 (0.70, 3.88)</b>
MEHHTP	<b>1.87 (0.41, 3.32)</b>	1.06 (-0.38, 2.51)	1.30 (-0.18, 2.78)	<b>2.28 (0.61, 3.95)</b>
MONP	0.01 (-1.31, 1.34)	0.14 (-1.04, 1.32)	0.01 (-1.30, 1.32)	-0.64 (-2.34, 1.07)

<sup>a</sup>Pregnancy averages are corrected for urinary specific gravity. Models for individual visits 1-3 include uncorrected phthalate or phthalate alternative metabolites and are adjusted for gestational age at urine sample collection and specific gravity. Associations with p value <0.05 are bolded. Median (range) gestational age in weeks at sample collection by visit was as follows: visit 1=17.6 (16.6, 19.3); visit 2=23.4 (22.0, 25.1); visit 3=27.6 (25.9, 30.3). Abbreviations: monoethyl phthalate (MEP); mono-*n*-butyl phthalate (MBP); monobenzyl phthalate (MBzP); mono-isobutyl phthalate (MiBP); di(2-ethylhexyl) phthalate (DEHP); mono-3-carboxypropyl phthalate (M CPP); mono carboxyisooctyl phthalate (MCOP); mono carboxyisononyl phthalate (MCNP); mono-3-hydroxybutyl phthalate (MHBP); mono-2-hydroxyisobutyl phthalate (MHiBP); mono-2-ethyl-5-carboxypentyl terephthalate (MECPTP); mono-2-ethylhydroxyhexyl terephthalate (MEHHTP); 4-methyl-7-oxo-octyl phthalate (MONP).

**Table S5.** Adjusted<sup>a</sup> associations (95% confidence intervals) between an interquartile range difference in urinary phthalate or phthalate alternative metabolite concentrations and gestational age at birth (days).

	Visit 1	Visit 2	Visit 3	Pregnancy average
Metabolite	B (95% CI)	B (95% CI)	B (95% CI)	B (95% CI)
n	824	841	637	1019
MEP	-0.04 (-1.18, 1.10)	0.15 (-0.96, 1.25)	0.51 (-0.70, 1.71)	0.54 (-0.69, 1.77)
MBP	-0.39 (-1.48, 0.69)	<b>-1.18 (-2.20, -0.15)</b>	-0.86 (-2.05, 0.32)	<b>-1.44 (-2.60, -0.27)</b>
MBzP	-0.60 (-1.66, 0.46)	-0.83 (-1.87, 0.21)	-0.50 (-1.67, 0.67)	-0.91 (-2.04, 0.23)
MiBP	-0.70 (-1.77, 0.36)	-0.71 (-1.76, 0.34)	-0.97 (-2.16, 0.21)	-1.04 (-2.15, 0.07)
∑DEHP	0.72 (-0.30, 1.75)	-0.47 (-1.48, 0.54)	0.38 (-0.71, 1.47)	0.05 (-1.13, 1.22)
MCPPP	-0.52 (-1.44, 0.41)	-0.52 (-1.48, 0.45)	-0.13 (-1.07, 0.81)	-0.84 (-1.89, 0.22)
MCOP	-0.12 (-1.04, 0.81)	-0.47 (-1.44, 0.50)	0.13 (-0.89, 1.14)	-0.51 (-1.61, 0.59)
MCNP	0.11 (-0.71, 0.94)	-0.27 (-1.10, 0.57)	-0.18 (-1.08, 0.72)	-0.32 (-1.38, 0.75)
n	603	599	453	763
MHBP	-0.88 (-2.19, 0.43)	<b>-1.69 (-2.96, -0.42)</b>	-0.89 (-2.20, 0.42)	<b>-1.85 (-3.20, -0.50)</b>
MHiBP	-0.68 (-2.10, 0.75)	<b>-1.54 (-2.97, -0.11)</b>	<b>-1.66 (-3.19, -0.12)</b>	-1.38 (-2.80, 0.04)
n	327	337	274	383
MECPTP	<b>1.75 (0.29, 3.21)</b>	0.55 (-0.90, 2.00)	1.09 (-0.37, 2.54)	<b>2.14 (0.32, 3.95)</b>
MEHHTP	1.27 (-0.34, 2.87)	0.99 (-0.58, 2.56)	1.28 (-0.31, 2.86)	<b>1.99 (0.07, 3.91)</b>
MONP	-0.04 (-1.39, 1.31)	-0.27 (-1.54, 1.00)	-0.11 (-1.46, 1.23)	-0.94 (-2.77, 0.89)

<sup>a</sup>Pregnancy averages are corrected for urinary specific gravity and models are additionally adjusted for maternal age (continuous), education (4 level ordinal variable), pre-pregnancy body mass index (continuous), and tobacco use (categorical). Models for individual visits 1-3 include uncorrected phthalate or phthalate alternative metabolites and are adjusted for gestational age at urine sample collection and specific gravity as well as maternal age (continuous), education (4 level ordinal variable), pre-pregnancy body mass index (continuous), and tobacco use (categorical). Associations with p value <0.05 are bolded. Median (range) gestational age in weeks at sample collection by visit was as follows: visit 1=17.6 (16.6, 19.3); visit 2=23.4 (22.0, 25.1); visit 3=27.6 (25.9, 30.3). Abbreviations: monoethyl phthalate (MEP); mono-*n*-butyl phthalate (MBP); monobenzyl phthalate (MBzP); mono-isobutyl phthalate (MiBP); di(2-ethylhexyl) phthalate (DEHP); mono-3-carboxypropyl phthalate (MCPPP); mono carboxyisooctyl phthalate (MCOP); mono carboxyisononyl phthalate (MCNP); mono-3-hydroxybutyl phthalate (MHBP); mono-2-hydroxyisobutyl phthalate (MHiBP); mono-2-ethyl-5-carboxypentyl terephthalate (MECPTP); mono-2-ethylhydroxyhexyl terephthalate (MEHHTP); 4-methyl-7-oxo-octyl phthalate (MONP).

**Table S6.** Adjusted<sup>a</sup> associations (95% confidence intervals) between an interquartile range difference in urinary phthalate or phthalate alternative metabolite concentrations and gestational age at birth (days).

Parent	Metabolite	Visit 1	Visit 2	Visit 3	Pregnancy average
		n=863	n=883	n=669	n=1071
DEP	MEP	0.31 (-0.83, 1.46)	0.60 (-0.52, 1.72)	0.65 (-0.56, 1.87)	0.96 (-0.28, 2.20)
DBP	MBP	-0.39 (-1.48, 0.69)	<b>-1.24 (-2.26, -0.21)</b>	-0.87 (-2.06, 0.31)	<b>-1.51 (-2.67, -0.36)</b>
BzBP	MBzP	-0.46 (-1.52, 0.61)	-0.74 (-1.79, 0.31)	-0.41 (-1.58, 0.77)	-0.73 (-1.86, 0.41)
DiBP	MiBP	-0.52 (-1.60, 0.55)	-0.61 (-1.66, 0.44)	-0.88 (-2.06, 0.31)	-0.93 (-2.04, 0.18)
DEHP	∑DEHP	1.03 (-0.05, 2.11)	-0.16 (-1.20, 0.88)	0.58 (-0.55, 1.71)	0.39 (-0.85, 1.63)
DNOP	MCPPP	-0.32 (-1.31, 0.68)	-0.18 (-1.18, 0.82)	0.27 (-0.74, 1.28)	-0.59 (-1.75, 0.58)
DiNP	MCOP	0.22 (-0.77, 1.21)	-0.04 (-1.06, 0.98)	0.69 (-0.40, 1.79)	-0.03 (-1.27, 1.21)
	MCNP	0.30 (-0.56, 1.17)	-0.13 (-0.97, 0.70)	-0.02 (-0.93, 0.90)	-0.08 (-1.20, 1.04)
	n	640	640	483	813
DBP	MHBP	-0.68 (-1.95, 0.60)	<b>-1.54 (-2.78, -0.31)</b>	-0.97 (-2.24, 0.31)	<b>-1.83 (-3.12, -0.53)</b>
DiBP	MHiBP	-0.19 (-1.62, 1.26)	-1.20 (-2.63, 0.23)	-1.29 (-2.81, 0.23)	-1.05 (-2.47, 0.38)
	n	354	369	295	419
DEHTP	MECPTP	<b>1.48 (0.09, 2.86)</b>	-0.10 (-1.47, 1.28)	0.45 (-0.95, 1.85)	1.22 (-0.49, 2.93)
	MEHHTP	1.13 (-0.40, 2.66)	0.31 (-1.20, 1.81)	0.54 (-0.99, 2.07)	<b>1.02 (-0.82, 2.87)</b>
DiNP	MONP	0.09 (-1.22, 1.40)	-0.21 (-1.42, 0.99)	-0.14 (-1.46, 1.17)	-0.98 (-2.72, 0.75)

<sup>a</sup>Pregnancy averages are corrected for urinary specific gravity and models are additionally adjusted for maternal age (continuous) and education (4 level ordinal variable), and year of birth (nominal). Models for individual visits 1-3 include uncorrected phthalate or phthalate alternative metabolites and are additionally adjusted for gestational age at urine sample collection and specific gravity. Associations with p value <0.05 are bolded. Median (range) gestational age in weeks at sample collection by visit was as follows: visit 1=17.6 (16.6, 19.3); visit 2=23.4 (22.0, 25.1); visit 3=27.6 (25.9, 30.3). Abbreviations: diethyl phthalate (DEP); dibutyl phthalate (DBP); benzylbutyl phthalate (BzBP); diisobutyl phthalate (DiBP); di(2-ethylhexyl) phthalate (DEHP); di-n-octyl phthalate (DNOP); diisononyl phthalate (DiNP); di-2-ethyl terephthalate (DEHTP); monoethyl phthalate (MEP); mono-n-butyl phthalate (MBP); monobenzyl phthalate (MBzP); mono-isobutyl phthalate (MiBP); mono-3-carboxypropyl phthalate (MCPPP); mono carboxyisooctyl phthalate (MCOP); mono carboxyisononyl phthalate (MCNP); mono-3-hydroxybutyl phthalate (MHBP); mono-2-hydroxyisobutyl phthalate (MHiBP); mono-2-ethyl-5-carboxypentyl terephthalate (MECPTP); mono-2-ethylhydroxyhexyl terephthalate (MEHHTP); 4-methyl-7-oxo-octyl phthalate (MONP).