SUPPLEMENTAL MATERIALS

Associations between Repeated Measures of Urinary Phthalate Metabolites with Hormones and Timing of Natural Menopause

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Table S1 Percent change (95% confidence interval, 95% CI) in serum concentrations of **follicle-stimulating hormone (FSH)** in relation to a doubling increase in urinary phthalate metabolite concentrations and molar sums of phthalate metabolites, in total population and by menopausal status.

Phthalate metabolites	Total	Stratification by menopausal status		
		Premenopausal	Early and late perimenopausal	Postmenopausal
	Percent change (95% CI)	Percent change (95% CI)	Percent change (95% CI)	Percent change (95% CI)
HMW metabolites				
MBzP	0.50 (-1.95, 3.01)	-7.44 (-13.68, -0.75)	0.57 (-3.08, 4.37)	1.38 (-1.65, 4.50)
MCOP	1.27 (-1.28, 3.88)	-6.66 (-13.19, 0.36)	2.64 (-1.20, 6.64)	-0.86 (-3.72, 2.08)
MCNP	-1.02 (-3.34, 1.34)	-3.09 (-9.75, 4.07)	-0.68 (-4.15, 2.90)	-2.61 (-5.12, -0.03)*
MCPP	2.39 (-0.69, 5.56)	-3.45 (-11.77, 5.64)	3.54 (-1.03, 8.33)	-1.61 (-5.23, 2.14)
MECPP	-1.56 (-3.72, 0.64)	-0.04 (-6.66, 7.05)	-0.85 (-4.05, 2.44)	-1.70 (-4.30, 0.97)
MEHHP	-1.71 (-3.71, 0.33)	-0.77 (-6.67, 5.51)	-0.94 (-3.90, 2.10)	-1.24 (-3.73, 1.31)
MEHP	-1.57 (-3.52, 0.42)	-1.76 (-7.73, 4.60)	-1.64 (-4.50, 1.32)	-0.54 (-2.89, 1.88)
MEOHP	-1.26 (-3.30, 0.84)	-0.36 (-6.48, 6.15)	-1.01 (-4.04, 2.12)	-0.39 (-2.90, 2.19)
LMW metabolites				
MEP	0.70 (-1.11, 2.54)	1.34 (-3.80, 6.76)	0.44 (-2.27, 3.22)	1.41 (-0.70, 3.56)
MiBP	1.05 (-1.68, 3.85)	-2.51 (-9.66, 5.20)	2.71 (-1.50, 7.09)	-1.09 (-4.09, 2.00)
MnBP	1.50 (-1.33, 4.40)	-3.74 (-11.37, 4.55)	2.67 (-1.47, 6.99)	-0.28 (-3.71, 3.27)
Sum of metabolites				
∑DEHP	-1.66 (-3.77, 0.50)	-0.72 (-7.10, 6.09)	-1.06 (-4.18, 2.15)	-1.23 (-3.82, 1.44)
∑LMW	0.87 (-1.25, 3.03)	0.76 (-5.23, 7.13)	1.01 (-2.16, 4.29)	1.00 (-1.48, 3.55)
∑HMW	-1.71 (-4.05, 0.69)	-2.17 (-9.15, 5.34)	-1.23 (-4.68, 2.35)	-1.04 (-3.94, 1.95)
∑Anti-androgenic	-1.75 (-4.30, 0.87)	-2.53 (-10.07, 5.65)	-1.23 (-4.98, 2.66)	-0.91 (-4.11, 2.39)
∑Estrogenic	0.86 (-1.35, 3.12)	0.15 (-6.20, 6.94)	1.01 (-2.30, 4.44)	0.91 (-1.67, 3.57)

Models were adjusted for age (time-varying), race/ethnicity, study site, education, smoking status (time-varying), physical activity (time-varying), parity, BMI (time-varying), menopausal status (time-varying), and urinary creatinine (time-varying).
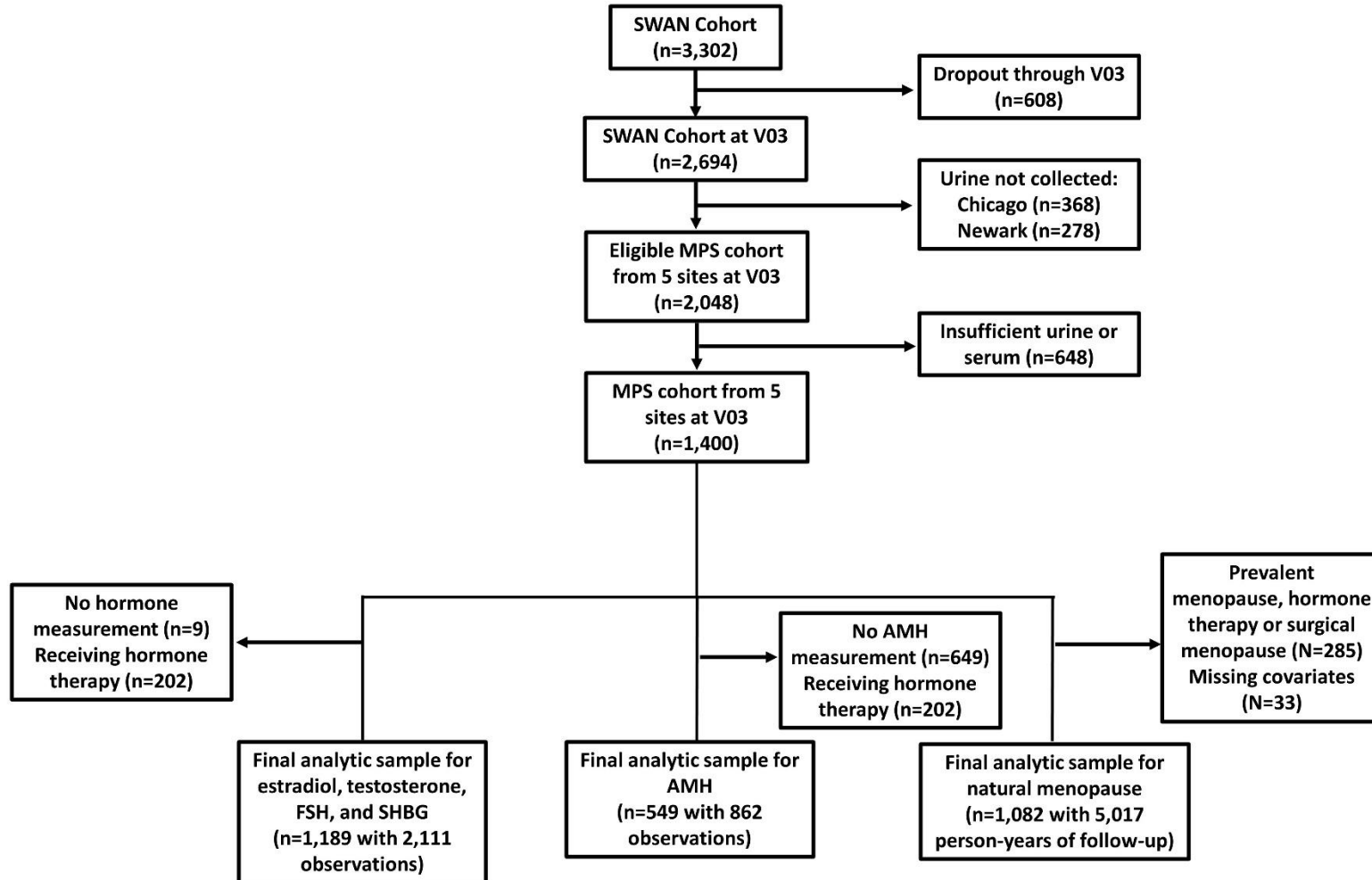FDR *$P<0.05$

Table S2 Percent change (95% confidence interval, 95% CI) in serum concentrations of **sex hormone-binding globulin (SHBG)** in relation to a doubling increase in urinary phthalate metabolite concentrations and molar sums of phthalate metabolites, in total population and by menopausal status.
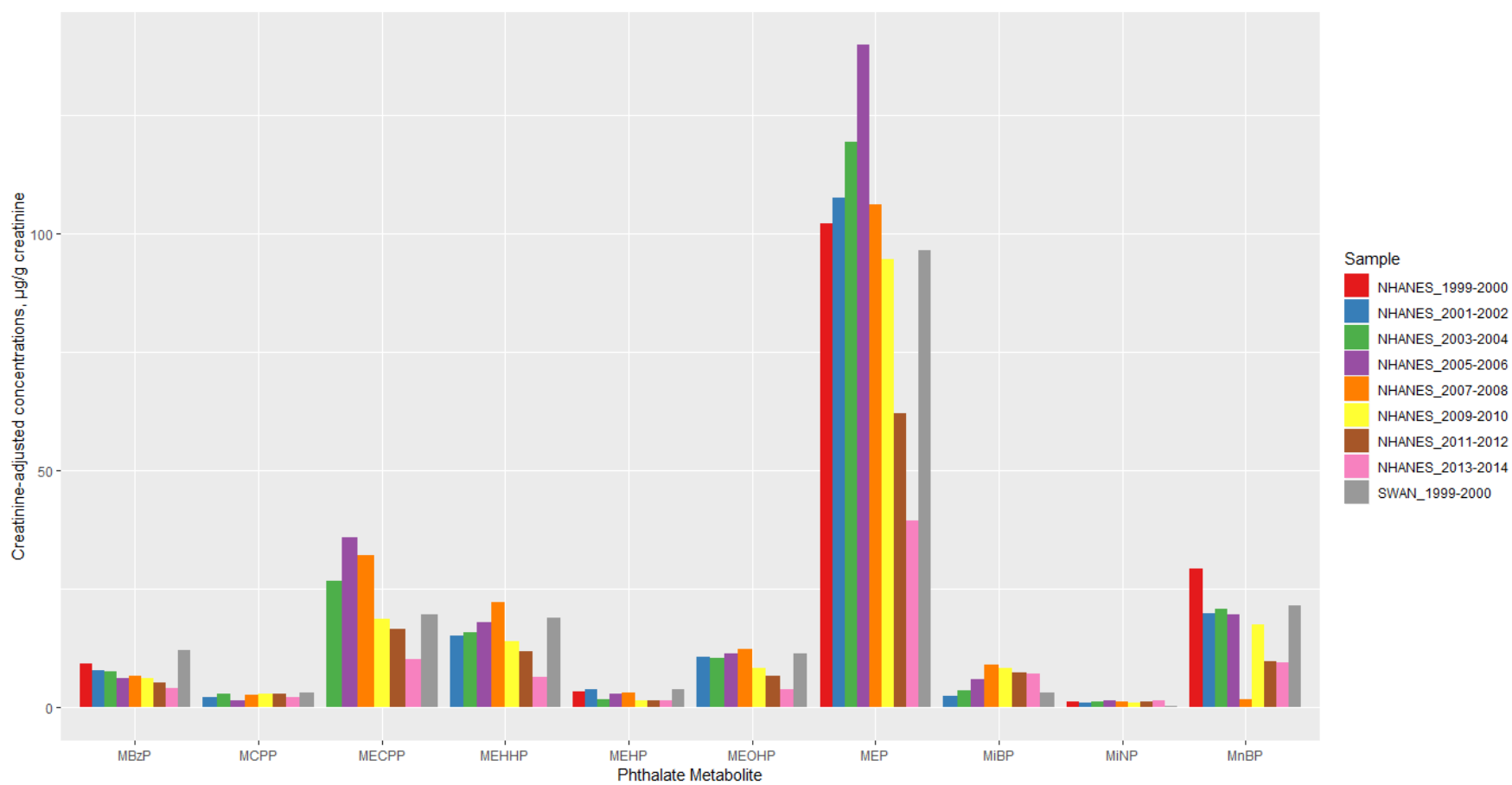
Phthalate metabolites	Total	Stratification by menopausal status		
		Premenopausal	Early and late perimenopausal	Postmenopausal
	Percent change (95% CI)	Percent change (95% CI)	Percent change (95% CI)	Percent change (95% CI)
HMW metabolites				
MBzP	-0.60 (-2.61, 1.45)	0.34 (-5.92, 7.03)	-1.35 (-3.96, 1.33)	-0.11 (-4.32, 4.29)
MCOP	-1.72 (-3.66, 0.26)	3.80 (-1.84, 9.77)	-3.02 (-5.54, -0.42)	-1.13 (-5.19, 3.12)
MCNP	-0.68 (-2.51, 1.17)	1.82 (-4.82, 8.92)	-1.56 (-3.97, 0.90)	-1.66 (-5.38, 2.20)
MCPP	-0.29 (-2.72, 2.20)	10.57 (2.27, 19.53)	-1.04 (-4.19, 2.22)	-1.29 (-6.47, 4.18)
MECPP	-0.49 (-2.24, 1.29)	4.85 (-1.14, 11.19)	-0.40 (-2.67, 1.92)	-1.44 (-5.17, 2.44)
MEHHP	-0.39 (-2.01, 1.27)	4.60 (-0.77, 10.26)	-0.34 (-2.44, 1.81)	-0.39 (-3.96, 3.32)
MEHP	-0.31 (-1.91, 1.31)	5.64 (-0.22, 11.84)	-0.51 (-2.57, 1.60)	0.13 (-3.26, 3.64)
MEOHP	-0.42 (-2.08, 1.26)	4.33 (-1.14, 10.10)	-0.44 (-2.60, 1.76)	-0.30 (-3.88, 3.42)
LMW metabolites				
MEP	0.67 (-0.82, 2.18)	2.00 (-2.92, 7.17)	-0.65 (-2.57, 1.32)	2.80 (-0.26, 5.95)
MiBP	1.68 (-0.57, 3.97)	5.49 (-1.50, 12.98)	1.60 (-1.42, 4.73)	0.57 (-3.84, 5.17)
MnBP	1.41 (-0.93, 3.80)	2.95 (-4.58, 11.08)	0.88 (-2.09, 3.95)	0.97 (-4.03, 6.23)
Sum of metabolites				
∑DEHP	-0.40 (-2.12, 1.34)	5.27 (-0.57, 11.45)	-0.37 (-2.58, 1.90)	-0.74 (-4.46, 3.13)
∑LMW	1.09 (-0.65, 2.87)	2.76 (-3.17, 9.04)	-0.25 (-2.51, 2.06)	2.82 (-0.79, 6.56)
∑HMW	-0.68 (-2.57, 1.24)	5.09 (-1.36, 11.96)	-0.91 (-3.36, 1.61)	-1.29 (-5.40, 2.99)
∑Anti-androgenic	-0.13 (-2.21, 1.99)	5.90 (-1.19, 13.51)	-0.44 (-3.12, 2.32)	-0.88 (-5.42, 3.88)
∑Estrogenic	0.93 (-0.89, 2.79)	2.61 (-3.81, 9.44)	-0.60 (-2.95, 1.80)	2.81 (-0.95, 6.72)

Models were adjusted for age (time-varying), race/ethnicity, study site, education, smoking status (time-varying), physical activity (time-varying), parity, BMI (time-varying), menopausal status (time-varying), and urinary creatinine (time-varying).
FDR *P<0.05

Figure S1 Overall study design flowchart.

Figure S2. Comparison of creatinine-adjusted median urinary concentrations of phthalate metabolites between SWAN V03 and NHANES 1999-2014 among women aged 45-56 years. Complex sampling design was incorporated into analyses of NHANES data.