Sex Differences in the Association of Urinary Concentrations of Phthalate Metabolites with Self-reported Diabetes and Cardiovascular Diseases in Shanghai Adults

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In order to assess the co-exposure, we performed principal component analysis (PCA) using the measured values of ten metabolites (Table S1). The major component accounted for 38.9% of the source variance and was dominated by the five metabolites of DEHP. We therefore assessed the co-exposure by calculating the micromolar sum of DEHP metabolites (ΣDEHP) including MEHP, MEHHP, MECPP, MEOHP and MCMHP.

Table S1. The rotated eigenvectors of the three components after principal component analysis.

	PC1	PC2	PC3
MEOHP	0.940	0.114	0.065
MECPP	0.920	0.146	0.040
MCMHP	0.886	0.098	0.075
MEHHP	0.846	0.140	−0.065
MEHP	0.765	0.125	−0.098
MiBP	0.135	0.809	0.041
MnBP	0.229	0.798	0.022
MMP	0.069	0.615	−0.208
MEP	0.019	0.317	0.072
MBzP	0.006	0.026	0.976
Eigenvalues	3.894	1.850	1.029
Variance explained (in %)	0.389	0.185	0.103
Cumulative variance (in %)	0.389	0.574	0.677

Table S2 shows the adjusted (without adjusting the dietary factors) odds of each individual outcome (DM vs. normal; hypertension vs. normal; hyperlipidemia vs. normal; CHD vs. normal; stroke vs. normal; CVD vs. normal) by quartile of phthalate concentrations.

Table S2. Logistic regression analyses of quartile metabolites of phthalates in association with self-reported DM and CVD (*n* = 2330).

		DM	Hypertension	Hyperlipidaemia	CHD	Stroke	CVD
MMP	Q2 vs. Q1	1.00 (0.61, 1.65) [a]	0.97 (0.71, 1.33)	1.33 (0.75, 2.34)	1.27 (0.70, 2.30)	2.25 (0.43, 11.81)	1.36 (0.78, 2.39)
	Q3 vs. Q1	0.93 (0.57, 1.52)	1.03 (0.76, 1.39)	1.45 (0.84, 2.52)	0.82 (0.43, 1.54)	0.95 (0.13, 6.84)	0.82 (0.45, 1.51)
	Q4 vs. Q1	1.55 (0.99, 2.42)	1.23 (0.91, 1.66)	2.06 (1.23, 3.44) *	1.37 (0.79, 2.39)	4.07 (0.82, 20.28)	1.58 (0.94, 2.67)
	P for trend [b]	0.060	0.159	0.005	0.457	0.131	0.213
MEP	Q2 vs. Q1	1.04 (0.64, 1.68)	1.04 (0.77, 1.41)	0.70 (0.40, 1.22)	1.20 (0.67, 2.16)	1.02 (0.75, 1.41)	1.43 (0.81, 2.53)
	Q3 vs. Q1	1.03 (0.64, 1.67)	1.06 (0.79, 1.44)	0.97 (0.58, 1.61)	0.89 (0.48, 1.64)	0.95 (0.69, 1.31)	1.15 (0.65, 2.08)
	Q4 vs. Q1	1.47 (0.94, 2.30)	1.15 (0.85, 1.56)	1.42 (0.88, 2.27)	1.39 (0.80, 2.43)	1.28 (0.93, 1.75)	1.18 (1.05, 3.10)
	P for trend	0.096	0.354	0.035	0.379	0.007	0.061
M_iBP	Q2 vs. Q1	1.05 (0.67, 1.65)	0.86 (0.64, 1.15)	1.54 (0.93, 2.58)	1.47 (0.84, 2.58)	2.29 (0.44, 11.95)	1.56 (0.91, 2.66)
	Q3 vs. Q1	1.16 (0.74, 1.84)	0.81 (0.60, 1.09)	1.27 (0.74, 2.15)	0.94 (0.51, 1.75)	0.58 (0.05, 6.49)	0.93 (0.51, 1.70)
	Q4 vs. Q1	0.91 (0.57, 1.46)	0.94 (0.69, 1.26)	1.33 (0.79, 2.22)	1.14 (0.63, 2.05)	4.99 (1.03, 24.17)	1.46 (0.84, 2.51)
	P for trend	0.824	0.585	0.305	0.937	0.057	0.473
M_nBP	Q2 vs. Q1	0.73 (0.45, 1.19)	0.80 (0.59, 1.08)	1.41 (0.84, 2.38)	0.61 (0.33, 1.11)	1.58 (0.26, 9.64)	0.67 (0.38, 1.18)
	Q3 vs. Q1	0.98 (0.62, 1.55)	0.78 (0.58, 1.06)	1.41 (0.842.36)	0.83 (0.47, 1.47)	2.86 (0.54, 15.22)	0.94 (0.58, 1.67)
	Q4 vs. Q1	1.07 (0.69, 1.66)	0.78 (0.58, 1.04)	1.12 (0.66, 1.88)	0.83 (0.48, 1.43)	4.05 (0.79, 20.88)	1.02 (0.61, 1.71)
	P for trend	0.516	0.101	0.493	0.750	0.057	0.623
MB_zP	Q2 vs. Q1	0.66 (0.40, 1.07)	0.76 (0.56, 1.03)	0.89 (0.53, 1.51)	0.61 (0.33, 1.14)	1.69 (0.48, 5.92)	0.75 (0.43, 1.31)
	Q3 vs. Q1	0.93 (0.60, 1.45)	0.73 (0.54, 0.98)	1.09 (0.67, 1.77)	0.68 (0.38, 1.20)	0.49 (0.09, 2.74)	0.67 (0.38, 1.13)
	Q4 vs. Q1	1.05 (0.67, 1.63)	0.98 (0.72, 1.31)	1.21 (0.75, 1.98)	1.22 (0.72, 2.05)	0.76 (0.17, 3.47)	1.15 (0.70, 1.89)
	P for trend	0.529	0.809	0.321	0.427	0.397	0.680
MEHP	Q2 vs. Q1	0.90 (0.56, 1.44)	0.88 (0.65, 1.19)	0.64 (0.38, 1.06)	0.48 (0.25, 0.94)	0.95 (0.25, 3.60)	0.54 (0.30, 1.00)
	Q3 vs. Q1	0.92 (0.58, 1.46)	0.71 (0.52, 0.96)	0.52 (0.31, 0.88)	0.87 (0.50, 1.53)	0.67 (0.16, 2.89)	0.84 (0.49, 1.42)
	Q4 vs. Q1	1.00 (0.64, 1.57)	1.07 (0.79, 1.45)	0.91 (0.58, 1.43)	1.07 (0.63, 1.81)	1.02 (0.26, 3.40)	1.07 (0.65, 1.76)
	P for trend	0.947	0.977	0.675	0.399	0.892	0.454
MEOHP	Q2 vs. Q1	0.85 (0.50, 1.45)	0.83 (0.62, 1.13)	0.75 (0.43, 1.30)	1.06 (0.60, 1.86)	1.14 (0.28, 4.69)	1.08 (0.64, 1.84)
	Q3 vs. Q1	1.69 (1.06, 2.70)*	0.75 (0.55, 1.01)	1.30 (0.79, 2.13)	0.72 (0.40, 1.31)	1.00 (0.22, 4.61)	0.76 (0.44, 1.32)
	Q4 vs. Q1	1.52 (0.94, 2.45)	1.02 (0.75, 1.38)	1.25 (0.76, 2.07)	0.96 (0.54, 1.70)	1.69 (0.44, 6.56)	1.04 (0.61, 1.78)
	P for trend	0.011	0.942	0.124	0.599	0.493	0.802
MEHHP	Q2 vs. Q1	1.72 (0.86, 2.36)	0.67 (0.51, 0.95)	0.80 (0.47, 1.37)	0.57 (0.32, 1.03)	2.16 (0.38, 12.15)	0.68 (0.39, 1.18)
	Q3 vs. Q1	1.40 (0.84, 2.32)	0.79 (0.58, 1.07)	1.31 (0.81, 2.14)	0.69 (0.39, 1.21)	3.52 (0.68, 18.16)	0.85 (0.50, 1.44)
	Q4 vs. Q1	1.70 (1.03, 2.79)	1.08 (0.79, 1.47)	0.85 (0.50, 1.46)	0.72 (0.41, 1.28)	2.48 (0.44, 14.08)	0.84 (0.49, 1.44)
	P for trend	0.059	0.387	0.884	0.443	0.246	0.771
MECPP	Q2 vs. Q1	1.29 (0.76, 2.17)	0.87 (0.64, 1.17)	0.83 (0.49, 1.43)	0.75 (0.41, 1.36)	1.00 (0.25, 4.11)	0.77 (0.44, 1.35)
	Q3 vs. Q1	1.77 (1.08, 2.90) *	0.88 (0.66, 1.19)	1.41 (0.87, 2.29)	0.96 (0.55, 1.68)	1.10 (0.27, 4.54)	0.97 (0.58, 1.64)
	Q4 vs. Q1	1.86 (1.151, 3.12) *	1.13 (0.83, 1.54)	1.20 (0.72, 2.01)	0.98 (0.55, 1.74)	1.34 (0.32, 5.61)	1.01 (0.59, 1.74)
	P for trend	0.005	0.455	0.175	0.811	0.684	0.741

Table S2. *Cont*.

MCMHP	Q2 vs. Q1	1.17 (0.72, 1.90)	0.98 (0.72, 1.31)	1.37 (0.80.2.34)	1.06 (0.61, 1.83)	1.31 (0.34, 4.96)	1.10 (0.66, 1.83)
	Q3 vs. Q1	1.55 (0.98, 2.46)	0.82 (0.61, 1.11)	1.96 (1.18, 3.25) *	0.65 (0.36, 1.17)	0.89 (0.20, 4.07)	0.66 (0.38, 1.16)
	Q4 vs. Q1	1.25 (0.77, 2.03)	1.17 (0.86, 1.59)	1.55 (0.90, 2.65)	1.02 (0.59, 1.78)	1.25 (0.30, 5.17)	1.04 (0.62, 1.75)
	P for trend	0.207	0.577	0.047	0.661	0.676	0.895
ΣDEHP	Q2 vs. Q1	0.98 (0.59, 1.63)	0.78 (0.57, 1.06)	0.91 (0.54, 1.53)	0.71 (0.39, 1.29)	1.10 (0.31, 3.93)	0.76 (0.44, 1.32)
	Q3 vs. Q1	1.19 (0.74, 1.92)	0.82 (0.60, 1.11)	0.92 (0.55, 1.52)	0.62 (0.35, 1.12)	0.42 (0.08, 2.24)	0.59 (0.34, 1.03)
	Q4 vs. Q1	1.42 (0.89, 2.27)	1.12 (0.83, 1.51)	1.16 (0.71, 1.89)	0.99 (0.57, 1.70)	0.97 (0.25, 3.80)	0.98 (0.59, 1.64)
	p for trend	0.088	0.410	0.520	0.965	0.683	0.827

Q1 is set as the reference. [a] Odds ratios (95% confidence intervals). Models were adjusted for age, sex, education, marriage, smoking, BMI. [b] *p*-value for trends across the lowest quartile (Q1) to the highest quartile (Q4). * $p < 0.05$ for tested odds ratios. BMI = body mass index; DM = diabetes mellitus; CVD = cardiovascular disease; CHD = coronary heart disease; Q = quartile.