Associations between school lunch consumption and urinary phthalate metabolite concentrations in US children and adolescents: Results from NHANES 2003-2014

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**Figure S1.** Median urinary phthalate metabolite concentrations (µg/g creatinine) in children (ages 6-11) and adolescents (ages 12-19) by NHANES sampling cycle.

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| **Table S1.** Crudea percent change in urinary phthalate metabolite concentrations for those who Sometimes or Always vs. Never eat school lunch in weighted NHANES data 2003-2014. |
|  | School Lunch Consumption |
|  |  | Sometimes | Always |
| Children (6-11) | n | %∆ | 95% CI | p | %∆ | 95% CI | p |
| ∑DEHP | 2055 | 7.57 | (-10.2, 28.8) | 0.43 | 35.0 | (14.9, 58.5) | <0.01 |
| MCNP | 1741 | 7.25 | (-13.6, 33.1) | 0.54 | 8.87 | (-8.02, 28.9) | 0.33 |
| MCOP | 1741 | 44.2 | (10.2, 88.6) | <0.01 | 25.2 | (-1.79, 59.7) | 0.07 |
| MBzP | 2055 | -6.29 | (-29.6, 24.8) | 0.66 | 30.7 | (4.97, 62.8) | 0.02 |
| MnBP | 2055 | -2.66 | (-20.9, 19.8) | 0.80 | 27.8 | (11.0, 47.1) | <0.01 |
| MiBP | 2055 | -0.30 | (-17.2, 20.1) | 0.98 | 20.0 | (1.55, 41.7) | 0.03 |
| MEP | 2055 | -11.2 | (-28.7, 10.6) | 0.29 | 35.5 | (15.4, 59.2) | <0.01 |
|  | Sometimes |  | Always |
| Adolescents (12-19) | n | %∆ | 95% CI |  | %∆ | 95% CI |  |
| ∑DEHP | 2154 | 7.79 | (-10.2, 29.3) | 0.42 | -0.40 | (-14.2, 15.6) | 0.96 |
| MCNP | 1651 | 4.60 | (-13.5, 26.5) | 0.65 | 2.33 | (-11.0, 17.6) | 0.75 |
| MCOP | 1651 | 11.63 | (-16.0, 48.3) | 0.45 | 16.65 | (-9.06, 49.6) | 0.23 |
| MBzP | 2154 | 9.64 | (-6.64, 28.8) | 0.27 | 14.34 | (-2.06, 33.5) | 0.10 |
| MnBP | 2154 | 7.57 | (-8.04, 25.8) | 0.37 | 4.39 | (-7.19, 17.4) | 0.47 |
| MiBP | 2154 | 5.44 | (-9.68, 23.1) | 0.50 | 13.66 | (0.65, 28.3) | 0.04 |
| MEP | 2154 | -1.59 | (-23.4, 26.5) | 0.90 | -9.15 | (-26.1, 11.6) | 0.36 |

aModels adjusted for urinary creatinine (continuous, ln-transformed) and restricted to individuals who had data on covariates included in full models. Abbreviations: %∆, crude percent change compared to participants who reported Never consuming school lunch; CI, confidence interval.

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| **Table S2.** Adjusteda percent change in urinary phthalate metabolite concentrations for those who Sometimes or Always vs. Never eat school lunch in weighted NHANES data 2003-2014. |
|  | School Lunch Consumption |  |
|  |  | Sometimes | Always |  |
| Children (6-11) | n | %∆ | 95% CI | %∆ | 95% CI | p trend |
| ∑DEHP | 2055 | 9.86 | (-4.42, 26.3) | 26.7 | (8.78, 47.7) | <0.01 |
| MCNP | 1741 | 10.5 | (-10.9, 37.1) | 14.1 | (-5.46, 37.7) | 0.19 |
| MCOP | 1741 | 36.9 | (7.56, 74.2) | 43.2 | (16.6, 75.9) | <0.01 |
| MBzP | 2055 | -5.16 | (-25.5, 20.7) | 12.0 | (-7.78, 35.9) | 0.13 |
| MnBP | 2055 | -1.59 | (-16.0, 15.4) | 16.7 | (2.09, 33.3) | 0.01 |
| MiBP | 2055 | -1.19 | (-17.0, 17.6) | 9.42 | (-7.01, 28.8) | 0.17 |
| MEP | 2055 | -7.13 | (-24.4, 14.1) | 4.60 | (-11.8, 24.1) | 0.34 |
| Adolescents (12-19) |  |
| ∑DEHP | 2154 | 8.00 | (-6.58, 24.9) | 4.71 | (-8.90, 20.3) | 0.57 |
| MCNP | 1651 | 4.60 | (-13.3, 26.3) | 5.55 | (-8.88, 22.3) | 0.49 |
| MCOP | 1651 | 12.19 | (-11.0, 41.4) | 21.8 | (-2.61, 52.3) | 0.09 |
| MBzP | 2154 | 5.65 | (-8.07, 21.4) | 8.00 | (-8.03, 26.8) | 0.36 |
| MnBP | 2154 | 3.15 | (-8.83, 16.7) | 5.23 | (-6.63, 18.6) | 0.40 |
| MiBP | 2154 | 0.80 | (-13.0, 16.8) | 2.12 | (-9.39, 15.1) | 0.72 |
| MEP | 2154 | -5.92 | (-23.0, 14.9) | -1.69 | (-16.6, 15.9) | 0.90 |
| a Models adjusted for urinary creatinine (continuous, ln-transformed), age (continuous), gender (categorical), family PIR (continuous), race/ethnicity (categorical), and sampling cycle (categorical). Note: BMI z-score not included. Abbreviations: %∆, adjusted percent change compared to participants who reported Never consuming school lunch; CI, confidence interval.  |

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| **Table S3.** Adjusteda percent change in urinary phthalate metabolite concentrations for medium or high total energy intake from cafeteria food compared to low total energy intake from cafeteria food.b  |
|  | Total Energy Intake from cafeteria food (%) |  |
|  |  | Medium (1.45-35.2) | High (35.2-100) |  |
| Children (6-11) | n | %∆ | 95% CI | %∆ | 95% CI | p trend |
| ∑DEHP | 1883 | -4.11 | (-15.8, 9.13) | 1.11 | (-12.7, 17.1) | 0.93 |
| MCNP | 1593 | -12.1 | (-23.4, 0.82) | -1.19 | (-15.5, 15.6) | 0.44 |
| MCOP | 1593 | -0.40 | (-13.7, 14.9) | 12.5 | (-7.00, 36.1) | 0.29 |
| MBzP | 1883 | -15.8 | (-29.0, -0.15) | -1.98 | (-19.7, 19.7) | 0.39 |
| MnBP | 1883 | -6.39 | (-20.6, 10.4) | 3.36 | (-11.1, 20.2) | 0.97 |
| MiBP | 1883 | -8.33 | (-20.7, 5.98) | -3.25 | (-15.2, 10.3) | 0.35 |
| MEP | 1883 | 2.94 | (-10.8, 18.8) | 8.76 | (-6.84, 27.0) | 0.28 |
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|  |  | Medium (1.85-33.7) | High (33.9-100) |  |
| Adolescents (12-19) | n | %∆ | 95% CI | %∆ | 95% CI | p trend |
| ∑DEHP | 2078 | -3.44 | (-14.5, 9.04) | -4.40 | (-24.0, 20.2) | 0.63 |
| MCNP | 1584 | 6.08 | (-6.43, 20.3) | -2.66 | (-15.3, 11.9) | 0.94 |
| MCOP | 1584 | 9.09 | (-11.0, 33.8) | 10.85 | (-10.1, 36.7) | 0.25 |
| MBzP | 2078 | -3.92 | (-19.3, 14.4) | 0.10 | (-14.4, 17.1) | 0.83 |
| MnBP | 2078 | -4.50 | (-15.6, 8.06) | 16.77 | (-2.69, 40.1) | 0.24 |
| MiBP | 2078 | 1.92 | (-9.92, 15.3) | 5.65 | (-11.4, 26.0) | 0.54 |
| MEP | 2078 | -9.61 | (-22.7, 5.74) | 22.02 | (-1.84, 51.7) | 0.27 |
| aModels adjusted for urinary creatinine (continuous, ln-transformed), age (continuous), gender (categorical), family PIR (continuous), race/ethnicity (categorical), BMI z-score (continuous) and sampling cycle (categorical). bReference category is Low (0%) intake from cafeteria food, and Medium/High categories represent exposed individuals divided by the median percent. Abbreviations: %∆, adjusted percent change; CI, confidence interval. |

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| **Table S4.** Adjusteda percent change in urinary phthalate metabolite concentrations for medium or high cafeteria food-derived total fat intake compared to low cafeteria food-derived total fat intake.b  |
|  | Cafeteria food-derived total fat intake (% of TEI) |  |
|  |  | Medium (0.04-10.3) | High (10.3-35.8) |  |
| Children | n | %∆ | 95% CI | %∆ | 95% CI | p trend |
| ∑DEHP | 1883 | -3.63 | (-16.6, 11.4) | 1.82 | (-11.9, 17.7) | 0.96 |
| MCNP | 1593 | -11.1 | (-23.4, 3.14) | -3.34 | (-15.1, 10.0) | 0.33 |
| MCOP | 1593 | 4.08 | (-11.2, 22.0) | 5.97 | (-9.05, 23.5) | 0.42 |
| MBzP | 1883 | -19.7 | (-32.9, -3.79) | 3.87 | (-12.2, 22.9) | 0.66 |
| MnBP | 1883 | -7.78 | (-21.8, 8.72) | 6.29 | (-8.24, 23.1) | 0.73 |
| MiBP | 1883 | -12.9 | (-23.5, -0.86) | 3.15 | (-10.1, 18.3) | 0.79 |
| MEP | 1883 | 9.09 | (-6.01, 26.6) | 1.51 | (-10.8, 15.5) | 0.55 |
|  |  |
|  |  | Medium (0.03-10.5) | High (10.6-39.3) |  |
| Adolescents | n | %∆ | 95% CI | %∆ | 95% CI | p trend |
| ∑DEHP | 2078 | -1.29 | (-14.6, 14.1) | -6.39 | (-22.9, 13.7) | 0.52 |
| MCNP | 1584 | 2.12 | (-9.74, 15.5) | 2.33 | (-13.2, 20.6) | 0.72 |
| MCOP | 1584 | 5.13 | (-13.8, 28.1) | 14.80 | (-10.7, 47.5) | 0.24 |
| MBzP | 2078 | 2.43 | (-15.3, 23.9) | -6.76 | (-20.8, 9.71) | 0.51 |
| MnBP | 2078 | -3.63 | (-14.7, 8.82) | 10.74 | (-6.44, 31.1) | 0.35 |
| MiBP | 2078 | 0.04 | (-11.6, 13.2) | 6.50 | (-10.4, 26.6) | 0.51 |
| MEP | 2078 | -5.92 | (-20.0, 10.7) | 10.30 | (-10.9, 36.6) | 0.51 |
| aModels adjusted for urinary creatinine (continuous, ln-transformed), age (continuous), gender (categorical), family PIR (continuous), race/ethnicity (categorical), BMI z-score (continuous) and sampling cycle (categorical). bReference category is Low (0%) intake from cafeteria food, and Medium/High categories represent exposed individuals divided by the median percent. Abbreviations: %∆, adjusted percent change; CI, confidence interval; TEI, total energy intake. |

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| **Table S5.** Total energy intake from cafeteria food (%) and total energy intake from fat from cafeteria food (%) by school lunch consumption category: weighted mean (95% confidence interval). |
|  | Total energy intake from cafeteria food (%) | Total energy intake from fat in cafeteria food (%) |
| Children (6-11) | Mean | 95% CI | Mean | 95% CI |
| Never | 2.11 | (0.74, 3.49) | 0.69  | (0.19, 1.18) |
| Sometimes | 6.98  | (4.80, 9.16) | 2.69 | (1.58, 3.15) |
| Always | 12.4 | (10.9, 13.9) | 3.97 | (3.45, 4.48) |
| Adolescents (12-19) |  |
| Never | 1.41  | (0.75, 2.06) | 0.54 | (0.27, 0.80) |
| Sometimes | 5.14 | (3.52, 6.77) | 1.78 | (1.17, 2.39) |
| Always | 8.69 | (7.41, 9.97) | 2.97  | (2.52, 3.40) |