Supplemental Material

Gestational Exposures to Phthalates and Folic Acid, and Autistic Traits in Canadian Children

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Table S1: Sociodemographic and perinatal factors among MIREC participants who completed the SRS (n=601) compared to those who enrolled at the beginning of study in the same 7 study sites (n=1590).

| Characteristics                              | Completed Follow-Up (N=601) | Enrolled at baseline (N=1590) | p-value difference (t-test or χ² test) |
|----------------------------------------------|----------------------------|-------------------------------|---------------------------------------|
| Maternal characteristics                     |                            |                               |                                       |
| Maternal Age (years)                         | 32.6                       | 32.3                          | 0.26                                  |
| Maternal Race/Ethnicity                      |                            |                               |                                       |
| White                                        | 530 (88%)                  | 1,323 (83%)                   | 0.004                                 |
| Other                                        | 71 (12%)                   | 267 (17%)                     |                                       |
| Maternal Education                          |                            |                               | 0.21                                  |
| Graduate Degree                              | 163 (27%)                  | 401 (25%)                     |                                       |
| University Degree                            | 239 (40%)                  | 610 (39%)                     |                                       |
| Some College, Trade School, or Diploma       | 167 (28%)                  | 444 (28%)                     |                                       |
| High School or Less                          | 30 (5%)                    | 133 (8%)                      |                                       |
| Missing                                      | 2                          | 2                             |                                       |
| Marital Status                               |                            |                               | 0.59                                  |
| Married or Living with Partner               | 578 (96%)                  | 1,521 (96%)                   |                                       |
| Not Married or Living Alone                  | 23 (4%)                    | 69 (4%)                       |                                       |
| Household Income (CAD)                       |                            |                               | 0.29                                  |
| >$100K                                       | 231 (39%)                  | 609 (38%)                     |                                       |
| $80K-100K                                    | 116 (19%)                  | 302 (19%)                     |                                       |
| $40K-$80K                                    | 144 (24%)                  | 337 (21%)                     |                                       |
| <$40K                                        | 110 (18%)                  | 342 (22%)                     |                                       |
| Maternal Smoking During Pregnancy            |                            |                               | 0.01                                  |
| No                                           | 585 (97%)                  | 1,504 (95%)                   |                                       |
| Yes                                          | 16 (3%)                    | 84 (5%)                       |                                       |
| Missing                                      | 0                          | 2                             |                                       |
| Prenatal Folic Acid Supplement Use           |                            |                               | 0.86                                  |
| No                                           | 60 (11%)                   | 144 (11%)                     |                                       |
| Yes                                          | 492 (89%)                  | 1,216 (89%)                   |                                       |
| Missing                                      | 49                         | 230                           |                                       |
| Child characteristics                        |                            |                               | 0.04                                  |
| Child Sex                                    |                            |                               |                                       |
| Boys                                         | 290 (48%)                  | 821 (53%)                     |                                       |
| Girls                                        | 311 (52%)                  | 727 (47%)                     |                                       |
| Missing                                      | 0                          | 35                            |                                       |
| Phthalates concentrations (GM)               | N=556                      | N=1436                        |                                       |
| DEHP                                         | 18.1                       | 21.0                          | 0.001                                 |
| MBP                                          | 12.8                       | 13.6                          | 0.12                                  |
| MBzP                                         | 5.4                        | 5.9                           | 0.09                                  |
| MCPP                                         | 0.98                       | 1.05                          | 0.14                                  |
| MEP                                          | 33.1                       | 38.0                          | 0.05                                  |
Table S2: Distribution of maternal SG-standardized urinary phthalates metabolites (in µg/L).

| Phthalate | N   | GM  | IQR      | Min  | Max  |
|-----------|-----|-----|----------|------|------|
| MBP       | 556 | 12.8| 7.9, 19.2| 0.4  | 525.9|
| MBzP      | 555 | 5.4 | 3.1, 9.1 | 0.1  | 182  |
| MEP       | 556 | 33.1| 12.4, 70.3| 0.8  | 20,800|
| MCPP      | 556 | 0.98| 0.49, 1.76| 0.08 | 72   |
| ΣDEHP     | 552 | 18.1| 12.0, 25.4| 1.1  | 668.4|

GM: Geometric mean; IQR: Interquartile range, Min: Minimum; Max: Maximum
Table S3: Associations between maternal SG-standardized urinary phthalate concentrations (for a two-fold increase) and children’s SRS-2 T-scores at 3-4 years, stratified by folic acid (FA) supplementation during pregnancy.

| SRS subscale                      | Phthalate | Inadequate folate status (<400µg/day) | Adequate folate status (≥400µg/day) | p-phthalate X FA |
|-----------------------------------|-----------|--------------------------------------|-------------------------------------|-----------------|
|                                   |           | β (95% CI)                           | β (95% CI)                          |                 |
| Total SRS Score                   | MBP       | 1.3 (0.4, 2.3)                       | 0.4 (-0.1, 0.8)                     | 0.04            |
|                                   | MBzP      | 1.2 (0.2, 2.2)                       | 0.0 (-0.4, 0.4)                     | 0.03            |
|                                   | MEP       | 0.4 (-0.4, 1.2)                      | -0.2 (-0.4, 0.1)                    | 0.17            |
|                                   | MCPP      | 1.8 (1.0, 2.6)                       | 0.3 (0.0, 0.7)                      | <0.001          |
|                                   | DEHP      | 1.5 (0.5, 2.5)                       | -0.1 (-0.6, 0.4)                    | <0.001          |
| Social Awareness                  | MBP       | 1 (-0.2, 2.2)                        | 0.2 (-0.4, 0.8)                     | 0.19            |
|                                   | MBzP      | 1.2 (-0.2, 2.5)                      | 0.3 (-0.2, 0.8)                     | 0.20            |
|                                   | MEP       | 0.9 (-0.2, 1.9)                      | -0.1 (-0.5, 0.2)                    | 0.06            |
|                                   | MCPP      | 1.2 (0.1, 2.3)                       | 0.0 (-0.4, 0.5)                     | 0.04            |
|                                   | DEHP      | 0.9 (-0.4, 2.1)                      | -0.5 (-1.2, 0.1)                    | 0.03            |
| Social Cognition                  | MBP       | 1.7 (0.7, 2.6)                       | 0.4 (-0.1, 0.8)                     | 0.01            |
|                                   | MBzP      | 1.7 (0.7, 2.8)                       | 0.0 (-0.4, 0.4)                     | <0.001          |
|                                   | MEP       | 0.7 (-0.1, 1.5)                      | -0.1 (-0.4, 0.1)                    | 0.06            |
|                                   | MCPP      | 1.9 (1.1, 2.8)                       | 0.1 (-0.3, 0.4)                     | <0.001          |
|                                   | DEHP      | 1.7 (0.7, 2.7)                       | -0.2 (-0.7, 0.3)                    | <0.001          |
| Social Communication              | MBP       | 1.0 (0.1, 1.9)                       | 0.5 (0.0, 0.9)                      | 0.27            |
|                                   | MBzP      | 0.6 (-0.4, 1.6)                      | 0.0 (-0.4, 0.4)                     | 0.21            |
|                                   | MEP       | 0.3 (-0.6, 1.1)                      | -0.1 (-0.4, 0.2)                    | 0.37            |
|                                   | MCPP      | 1.4 (0.6, 2.3)                       | 0.5 (0.2, 0.9)                      | 0.04            |
|                                   | DEHP      | 1.3 (0.3, 2.3)                       | 0.1 (-0.4, 0.6)                     | 0.02            |
| Social Motivation                 | MBP       | 1.2 (0.1, 2.4)                       | 0.3 (-0.2, 0.8)                     | 0.09            |
|                                   | MBzP      | 0.8 (-0.4, 2)                        | 0.0 (-0.5, 0.5)                     | 0.18            |
|                                   | MEP       | 0.1 (-0.8, 1.1)                      | -0.3 (-0.6, 0)                      | 0.39            |
|                                   | MCPP      | 1.6 (0.6, 2.6)                       | 0.2 (-0.2, 0.6)                     | 0.01            |
|                                   | DEHP      | 1.2 (0.0, 2.4)                       | -0.2 (-0.8, 0.3)                    | 0.01            |
| Restricted Interests / Repetitive Behavior | MBP       | 1.0 (0.0, 2.1)                       | 0.4 (-0.1, 0.9)                     | 0.19            |
|                                   | MBzP      | 1.1 (0.0, 2.3)                       | 0.1 (-0.3, 0.6)                     | 0.08            |
|                                   | MEP       | -0.1 (-1.0, 0.8)                     | -0.1 (-0.4, 0.2)                    | 0.99            |
|                                   | MCPP      | 1.9 (0.9, 2.8)                       | 0.4 (0.0, 0.8)                      | <0.001          |
|                                   | DEHP      | 1.4 (0.3, 2.6)                       | 0.1 (-0.5, 0.6)                     | 0.01            |
| DSM 5 compatible Social Communication | MBP       | 1.3 (0.4, 2.2)                       | 0.4 (0.0, 0.8)                      | 0.05            |
|                                   | MBzP      | 1.1 (0.1, 2.1)                       | 0.0 (-0.4, 0.4)                     | 0.03            |
|                                   | MEP       | 0.4 (-0.4, 1.2)                      | -0.2 (-0.5, 0.1)                    | 0.13            |
|                                   | MCPP      | 1.7 (0.9, 2.5)                       | 0.3 (0.0, 0.6)                      | <0.001          |
### DSM 5 compatible Restricted Interests and Repetitive Behavior

|     | DEHP   | MBP    | MBzP   | MEP    | MCPP   | DEHP   |
|-----|--------|--------|--------|--------|--------|--------|
|     | 1.4 (0.5, 2.4) | -0.1 (-0.6, 0.4) | 0.1 (-0.6, 0.4) | <0.001 | 0.19   | 0.08   |
| MBP | 1.0 (0.0, 2.1)  | 0.4 (-0.1, 0.9)   | 0.4 (-0.3, 0.6)  | 0.99   | 0.08   | 0.01   |
| MBzP| 1.1 (0.0, 2.3)  | 0.1 (-0.3, 0.6)   | 0.1 (-0.4, 0.2)  | 0.99   | 0.08   | 0.01   |
| MEP | -0.1 (-1, 0.8)  | -0.1 (-0.4, 0.2)  | -0.1 (-0.3, 0.6) | 0.99   | 0.08   | 0.01   |
| MCPP| 1.8 (0.9, 2.8)  | 0.4 (0.0, 0.8)    | 0.4 (-0.1, 0.9)  | <0.001 | 0.08   | 0.01   |
| DEHP| 1.4 (0.3, 2.5)  | 0.1 (-0.5, 0.6)   | 0.1 (-0.3, 0.6)  | 0.99   | 0.08   | 0.01   |

All models were adjusted for study city, child sex, household income, maternal education, maternal age, parity, marital status, race/ethnicity, and year of enrollment. Corresponding estimates and 95% CI are provided in Figure 3. p-phthalate X FA: p-value for the interaction between phthalates concentrations and FA supplementation (<400µg/day / ≥400µg/day).
Table S4: Associations between maternal SG-standardized urinary phthalate concentrations and children’s SRS-2 T-scores at 3-4 years, with adjustment for additional predictors of SRS scores. β represents the change in point score for a two-fold increase in urinary phthalate concentration.

| SRS subscale                  | Phthalate | All       | Boys       | Girls      | p-value | β (95% CI) | β (95% CI) | β (95% CI) | p-value | β (95% CI) | β (95% CI) |
|-------------------------------|-----------|-----------|------------|------------|---------|------------|------------|------------|---------|------------|------------|
|                               |           | p-value   |            |            |         |            |            |            |         |            |            |
| Total SRS Score               |           |           |            |            |         |            |            |            |         |            |            |
| MEP                           | MBP       | 0.6 (0.1, 1.0) | 0.01       | 1.1 (0.5, 1.7) | 0.0 (0.6, 0.7) | 0.02 |
| MEP                           | MBzP      | 0.2 (-0.2, 0.6) | 0.27       | 0.5 (-0.1, 1.1) | 0.0 (0.6, 0.5) | 0.17 |
| MEP                           | MEP       | -0.2 (-0.4, 0.1) | 0.23       | 0.1 (-0.2, 0.5) | -0.4 (-0.8, -0.1) | 0.03 |
| MEP                           | MCPPP     | 0.5 (0.2, 0.8) | <0.001     | 0.5 (0.1, 0.9) | 0.4 (0.1, 1.0) | 0.82 |
| MEP                           | DEHP      | 0.0 (-0.5, 0.5) | 0.96       | 0.2 (-0.5, 0.9) | -0.3 (-1.0, 0.5) | 0.36 |
| Social Awareness              |           |           |            |            |         |            |            |            |         |            |            |
| MEP                           | MBP       | 0.4 (-0.2, 1.0) | 0.20       | 0.9 (0.1, 1.7) | -0.2 (-1.1, 0.7) | 0.08 |
| MEP                           | MBzP      | 0.5 (0.0, 1.0) | 0.06       | 0.9 (0.1, 1.6) | 0.2 (-0.6, 0.9) | 0.17 |
| MEP                           | MEP       | -0.1 (-0.5, 0.2) | 0.44       | -0.1 (-0.6, 0.3) | -0.1 (-0.6, 0.4) | 0.95 |
| MEP                           | MCPPP     | 0.2 (-0.3, 0.6) | 0.44       | 0.3 (-0.2, 0.9) | -0.1 (-0.8, 0.6) | 0.39 |
| MEP                           | DEHP      | -0.4 (-1.1, 0.3) | 0.23       | -0.3 (-1.3, 0.6) | -0.5 (-1.5, 0.5) | 0.83 |
| Social Cognition              |           |           |            |            |         |            |            |            |         |            |            |
| MEP                           | MBP       | 0.6 (0.2, 1.1) | 0.01       | 1.1 (0.5, 1.7) | 0.1 (-0.6, 0.7) | 0.02 |
| MEP                           | MBzP      | 0.2 (-0.3, 0.6) | 0.47       | 0.3 (-0.3, 0.9) | 0.0 (-0.5, 0.6) | 0.53 |
| MEP                           | MEP       | -0.1 (-0.3, 0.2) | 0.63       | 0.2 (-0.1, 0.6) | -0.4 (-0.7, 0.0) | 0.03 |
| MEP                           | MCPPP     | 0.3 (0.0, 0.7) | 0.08       | 0.5 (0.0, 0.9) | 0.0 (-0.5, 0.6) | 0.20 |
| MEP                           | DEHP      | 0.0 (-0.5, 0.5) | 0.99       | 0.4 (-0.4, 1.1) | -0.4 (-1.1, 0.3) | 0.15 |
| Social Communication          |           |           |            |            |         |            |            |            |         |            |            |
| MEP                           | MBP       | 0.6 (0.1, 1.1) | 0.01       | 1.0 (0.4, 1.6) | 0.1 (-0.6, 0.8) | 0.05 |
| MEP                           | MBzP      | 0.1 (-0.3, 0.5) | 0.64       | 0.3 (-0.3, 0.8) | 0.0 (-0.6, 0.5) | 0.46 |
| MEP                           | MEP       | -0.1 (-0.4, 0.1) | 0.35       | 0.2 (-0.2, 0.6) | -0.5 (-0.8, -0.1) | 0.02 |
| MEP                           | MCPPP     | 0.6 (0.3, 0.9) | <0.001     | 0.6 (0.2, 1.0) | 0.6 (0.1, 1.2) | 0.94 |
| MEP                           | DEHP      | 0.2 (-0.4, 0.7) | 0.54       | 0.4 (-0.3, 1.1) | -0.1 (-0.8, 0.7) | 0.40 |
| Social Motivation             |           |           |            |            |         |            |            |            |         |            |            |
| MEP                           | MBP       | 0.5 (0.0, 1.1) | 0.06       | 0.9 (0.1, 1.6) | 0.1 (-0.7, 0.9) | 0.17 |
| MEP                           | MBzP      | 0.2 (-0.3, 0.7) | 0.36       | 0.4 (-0.3, 1.1) | 0.1 (-0.6, 0.8) | 0.57 |
| MEP                           | MEP       | -0.3 (-0.6, 0.0) | 0.08       | 0.1 (-0.4, 0.5) | -0.6 (-1.1, -0.2) | 0.03 |
| MEP                           | MCPPP     | 0.4 (0.0, 0.8) | 0.05       | 0.3 (-0.2, 0.8) | 0.5 (-0.1, 1.2) | 0.63 |
| MEP                           | DEHP      | 0.0 (-0.7, 0.6) | 0.91       | 0.1 (-0.8, 0.9) | -0.2 (-1.1, 0.7) | 0.68 |
| Restricted Interests / Repetitive Behavior |           |           |            |            |         |            |            |            |         |            |            |
| MEP                           | MBP       | 0.5 (0.0, 1.0) | 0.07       | 0.9 (0.2, 1.6) | 0.0 (-0.8, 0.7) | 0.07 |
| MEP                           | MBzP      | 0.2 (-0.2, 0.7) | 0.28       | 0.6 (0.0, 1.3) | -0.1 (-0.7, 0.5) | 0.08 |
| MEP                           | MEP       | -0.1 (-0.4, 0.2) | 0.43       | 0.1 (-0.3, 0.5) | -0.4 (-0.8, 0.0) | 0.10 |
| MEP                           | MCPPP     | 0.5 (0.2, 0.9) | <0.001     | 0.5 (0.0, 1.0) | 0.6 (0.0, 1.2) | 0.80 |
| MEP                           | DEHP      | 0.0 (-0.6, 0.6) | 0.99       | 0.0 (-0.7, 0.8) | 0.0 (-0.8, 0.8) | 0.91 |
| DSM 5 compatible Social Communication |           |           |            |            |         |            |            |            |         |            |            |
| MEP                           | MBP       | 0.6 (0.1, 1.1) | 0.01       | 1.1 (0.5, 1.7) | 0.0 (-0.6, 0.7) | 0.03 |
| MEP                           | MBzP      | 0.2 (-0.2, 0.6) | 0.32       | 0.4 (-0.2, 1.0) | 0.0 (-0.5, 0.6) | 0.33 |
| MEP                           | MEP       | -0.2 (-0.4, 0.1) | 0.20       | 0.1 (-0.2, 0.5) | -0.5 (-0.8, -0.1) | 0.03 |
| MEP                           | MCPPP     | 0.4 (0.1, 0.8) | 0.01       | 0.5 (0.1, 1.0) | 0.4 (-0.1, 0.9) | 0.64 |
|      | DEHP      | MBP   | MBzP   | MEP    | MCPP   | DEHP   |
|------|-----------|-------|--------|--------|--------|--------|
| 0.0  | (-0.5, 0.5) | 0.95  | 0.2    | -0.2   | -0.6   | 0.0    |
| 0.99 | (0.0, 0.8)  | 0.95  | 0.2    | -0.1   | -0.1   | 0.0    |

**DSM 5 compatible Restricted Interests and Repetitive Behavior**

|   |   |   |   |   |   |   |
|---|---|---|---|---|---|---|
| p | p | p | p | p | p | p |

All models were adjusted for study city, child sex, household income, maternal education, maternal age, parity, marital status, race/ethnicity, folic acid supplementation, year of enrollment, smoking during pregnancy, alcohol during pregnancy, 1st trimester blood lead concentrations, admission at a neonatal intensive care unit, Home Observation and Measurement of the Environment (HOME) scores, and exclusive breastfeeding duration. p-phthalate X Sex: p-value for the interaction term between phthalates concentrations and Sex in the models.
Table S5: Sex-stratified associations between maternal SG-standardized urinary phthalate concentrations and children’s SRS-2 T-scores at 3-4 years. \( \beta \) represents the change in point score for a two-fold increase in urinary phthalate concentration.

| SRS subscale                        | Phthalate | Boys       |   | Girls       |   | p-difference |
|-------------------------------------|-----------|------------|---|--------------|---|--------------|
|                                     |           | \( \beta \) (95% CI) | p-value | \( \beta \) (95% CI) | p-value |    |
| Total SRS Score                     | MBP       | 0.9 (0.2, 1.6) | 0.01 | 0.2 (-0.4, 0.7) | 0.54 | 0.05 |
|                                     | MBzP      | 0.4 (-0.2, 1.1) | 0.21 | 0.1 (-0.4, 0.6) | 0.62 | 0.23 |
|                                     | MEP       | 0.2 (-0.3, 0.6) | 0.45 | -0.3 (-0.6, 0.0) | 0.05 | 0.04 |
|                                     | MCPP      | 0.5 (0.0, 1.0) | 0.07 | 0.4 (-0.1, 0.8) | 0.12 | 0.39 |
|                                     | DEHP      | 0.2 (-0.6, 1.0) | 0.62 | -0.2 (-0.8, 0.4) | 0.51 | 0.22 |
| Social Awareness                    | MBP       | 0.6 (-0.2, 1.5) | 0.15 | 0.1 (-0.7, 0.9) | 0.77 | 0.20 |
|                                     | MBzP      | 0.6 (-0.2, 1.5) | 0.12 | 0.4 (-0.3, 1.1) | 0.25 | 0.32 |
|                                     | MEP       | -0.1 (-0.7, 0.4) | 0.61 | 0.1 (-0.3, 0.6) | 0.59 | 0.23 |
|                                     | MCPP      | 0.2 (-0.4, 0.8) | 0.5  | 0.1 (-0.6, 0.7) | 0.78 | 0.39 |
|                                     | DEHP      | -0.6 (-1.6, 0.4) | 0.24 | -0.3 (-1.2, 0.6) | 0.52 | 0.33 |
| Social Cognition                    | MBP       | 1.0 (0.3, 1.7) | <0.001 | 0.4 (-0.2, 1.0) | 0.24 | 0.08 |
|                                     | MBzP      | 0.2 (-0.4, 0.9) | 0.47 | 0.4 (-0.1, 0.9) | 0.16 | 0.37 |
|                                     | MEP       | 0.3 (-0.1, 0.7) | 0.18 | -0.3 (-0.7, 0.0) | 0.07 | 0.01 |
|                                     | MCPP      | 0.4 (-0.1, 0.9) | 0.14 | 0.2 (-0.3, 0.7) | 0.5  | 0.28 |
|                                     | DEHP      | 0.4 (-0.4, 1.3) | 0.29 | -0.2 (-0.9, 0.5) | 0.5  | 0.11 |
| Social Communication                | MBP       | 0.8 (0.1, 1.5) | 0.02 | 0.2 (-0.4, 0.8) | 0.51 | 0.09 |
|                                     | MBzP      | 0.2 (-0.4, 0.9) | 0.48 | 0.0 (-0.5, 0.5) | 0.97 | 0.29 |
|                                     | MEP       | 0.3 (-0.2, 0.7) | 0.25 | -0.3 (-0.6, 0.0) | 0.05 | 0.02 |
|                                     | MCPP      | 0.5 (0.0, 1.1) | 0.03 | 0.5 (0.0, 0.9) | 0.04 | 0.43 |
|                                     | DEHP      | 0.3 (-0.5, 1.1) | 0.47 | 0.0 (-0.7, 0.6) | 0.87 | 0.26 |
| Social Motivation                   | MBP       | 0.9 (0.1, 1.6) | 0.03 | 0.1 (-0.7, 0.9) | 0.79 | 0.09 |
|                                     | MBzP      | 0.3 (-0.4, 1.0) | 0.43 | 0.1 (-0.6, 0.8) | 0.79 | 0.35 |
|                                     | MEP       | 0.0 (-0.4, 0.5) | 0.91 | -0.5 (-0.9, -0.1) | 0.03 | 0.06 |
|                                     | MCPP      | 0.3 (-0.2, 0.9) | 0.23 | 0.3 (-0.4, 0.9) | 0.43 | 0.43 |
|                                     | DEHP      | 0.0 (-0.9, 0.9) | 0.93 | -0.3 (-1.2, 0.5) | 0.44 | 0.27 |
| Restricted Interests / Repetitive Behavior | MBP   | 0.8 (0.0, 1.6) | 0.05 | 0.1 (-0.6, 0.7) | 0.86 | 0.07 |
|                                     | MBzP      | 0.6 (-0.1, 1.4) | 0.11 | 0.0 (-0.6, 0.5) | 0.89 | 0.09 |
|                                     | MEP       | 0.2 (-0.3, 0.7) | 0.52 | -0.3 (-0.6, 0.1) | 0.14 | 0.08 |
|                                     | MCPP      | 0.6 (0.0, 1.1) | 0.06 | 0.5 (0.0, 1.0) | 0.04 | 0.47 |
|                                     | DEHP      | 0.3 (-0.6, 1.2) | 0.51 | 0.1 (-0.6, 0.8) | 0.84 | 0.34 |
| DSM 5 compatible Social Communication | MBP     | 0.9 (0.2, 1.6) | 0.01 | 0.2 (-0.3, 0.8) | 0.46 | 0.06 |
|                                     | MBzP      | 0.3 (-0.3, 1.0) | 0.32 | 0.2 (-0.3, 0.7) | 0.46 | 0.36 |
|                                     | MEP       | 0.1 (-0.3, 0.6) | 0.5  | -0.3 (-0.6, 0.0) | 0.04 | 0.04 |
|                                     | MCPP      | 0.5 (0.0, 1.0) | 0.07 | 0.3 (-0.1, 0.8) | 0.19 | 0.32 |
### DSM 5 compatible Restricted Interests and Repetitive Behavior

|        | DEHP         | MBP         | MEP         | MCPP        | DEHP        |
|--------|--------------|-------------|-------------|-------------|-------------|
|        | 0.2 (-0.6, 1.0) | 0.8 (0.0, 1.6) | 0.6 (-0.1, 1.4) | 0.6 (0.0, 1.1) | 0.3 (-0.6, 1.2) |
|        | 0.67         | 0.05        | 0.11        | 0.06        | 0.51        |
|        | -0.2 (-0.8, 0.4) | 0.1 (-0.6, 0.7) | 0.0 (-0.6, 0.5) | 0.5 (0.0, 1.0) | 0.1 (-0.6, 0.8) |
|        | 0.54         | 0.86        | 0.91        | 0.05        | 0.85        |
|        | 0.24         | 0.07        | 0.09        | 0.46        | 0.34        |

All models were adjusted for study city, household income, maternal education, maternal age, parity, marital status, race/ethnicity, folic acid supplementation, and year of enrollment. \( p \)-difference corresponds to the comparison of \( d/SE_d \) to the standard normal distribution, where \( d \) is the difference between the two estimates, and \( SE_d = \sqrt{SE_1^2 + SE_2^2} \) is the standard error of the difference.
Table S6: Associations between maternal urinary phthalate concentrations and children’s SRS-2 T-scores at 3-4 years, with adjustment for specific gravity as an independent predictor in the models. β represents the change in point score for a two-fold increase in urinary phthalate concentration.

| SRS subscale                  | Phthalate | All                      | Boys                    | Girls                   | p-value for phthalate X Sex |
|-------------------------------|-----------|--------------------------|-------------------------|-------------------------|-----------------------------|
|                               |           | β (95% CI)               | p-value                 | β (95% CI)              | β (95% CI)                  |
| Total SRS Score               |           |                          |                         |                         |                             |
| MBP                           | 0.5       | (0.1, 0.9)               | 0.03                    | 0.8                     | (0.3, 1.3)                 | 0.2                     | (0.3, 0.7) | 0.05 |
| MBzP                          | 0.1       | (-0.3, 0.5)              | 0.51                    | 0.3                     | (-0.2, 0.8)                | 0.0                    | (-0.5, 0.5) | 0.35 |
| MEP                           | -0.1      | (-0.4, 0.1)              | 0.32                    | 0.1                     | (-0.2, 0.5)                | -0.4                   | (-0.7, 0.0) | 0.03 |
| MCPP                          | 0.5       | (0.1, 0.8)               | 0.01                    | 0.6                     | (0.2, 1.0)                | 0.3                    | (-0.2, 0.8) | 0.33 |
| DEHP                          | 0.0       | (-0.5, 0.5)              | 0.88                    | 0.3                     | (-0.3, 0.8)                | -0.2                   | (-0.8, 0.4) | 0.17 |
| Social Awareness              |           |                          |                         |                         |                             |
| MBP                           | 0.3       | (-0.3, 0.8)              | 0.37                    | 0.6                     | (-0.1, 1.3)               | -0.1                   | (-0.8, 0.7) | 0.12 |
| MBzP                          | 0.4       | (-0.2, 0.9)              | 0.17                    | 0.6                     | (-0.1, 1.3)               | 0.2                    | (-0.5, 0.8) | 0.27 |
| MEP                           | -0.1      | (-0.4, 0.3)              | 0.72                    | -0.1                    | (-0.6, 0.4)               | -0.1                   | (-0.5, 0.4) | 0.94 |
| MCPP                          | 0.2       | (-0.3, 0.6)              | 0.48                    | 0.3                     | (-0.2, 0.9)               | -0.1                   | (-0.7, 0.5) | 0.21 |
| DEHP                          | -0.4      | (-1.0, 0.3)              | 0.23                    | -0.2                    | (-1.0, 0.6)               | -0.6                   | (-1.4, 0.2) | 0.32 |
| Social Cognition              |           |                          |                         |                         |                             |
| MBP                           | 0.5       | (0.1, 1.0)               | 0.02                    | 0.8                     | (0.3, 1.3)                | 0.3                    | (-0.3, 0.8) | 0.09 |
| MBzP                          | 0.1       | (-0.3, 0.5)              | 0.52                    | 0.2                     | (-0.4, 0.7)               | 0.1                    | (-0.4, 0.6) | 0.09 |
| MEP                           | -0.1      | (-0.4, 0.2)              | 0.56                    | 0.2                     | (-0.1, 0.6)               | -0.4                   | (-0.7, 0.0) | 0.02 |
| MCPP                          | 0.3       | (-0.1, 0.6)              | 0.13                    | 0.4                     | (0.0, 0.8)                | 0.1                    | (-0.4, 0.5) | 0.18 |
| DEHP                          | 0.0       | (-0.5, 0.5)              | 0.99                    | 0.2                     | (-0.4, 0.8)               | -0.2                   | (-0.9, 0.4) | 0.2  |
| Social Communication          |           |                          |                         |                         |                             |
| MBP                           | 0.5       | (0.1, 1.0)               | 0.02                    | 0.8                     | (0.3, 1.4)                | 0.2                    | (-0.3, 0.7) | 0.04 |
| MBzP                          | 0.0       | (-0.4, 0.4)              | 0.97                    | 0.2                     | (-0.4, 0.7)               | -0.1                   | (-0.6, 0.4) | 0.04 |
| MEP                           | -0.1      | (-0.4, 0.2)              | 0.47                    | 0.2                     | (-0.1, 0.6)               | -0.4                   | (-0.7, 0.0) | 0.01 |
| MCPP                          | 0.6       | (0.3, 0.9)               | <0.001                   | 0.7                     | (0.3, 1.1)                | 0.5                    | (0.0, 0.9) | 0.33 |
| DEHP                          | 0.2       | (-0.3, 0.7)              | 0.38                    | 0.5                     | (-0.1, 1.0)               | 0.0                    | (-0.6, 0.6) | 0.14 |
| Social Motivation             |           |                          |                         |                         |                             |
| MBP                           | 0.4       | (-0.1, 0.9)              | 0.14                    | 0.6                     | (0.0, 1.3)                | 0.2                    | (-0.5, 0.8) | 0.23 |
| MBzP                          | 0.0       | (-0.4, 0.5)              | 0.86                    | 0.1                     | (-0.5, 0.8)               | 0.0                    | (-0.6, 0.5) | 0.54 |
| MEP                           | -0.3      | (-0.6, 0.0)              | 0.07                    | 0.0                     | (-0.4, 0.4)               | -0.6                   | (-1.0, -0.2) | 0.04 |
| MCPP                          | 0.3       | (-0.1, 0.7)              | 0.12                    | 0.4                     | (-0.1, 0.9)               | 0.3                    | (-0.3, 0.8) | 0.75 |
| DEHP                          | -0.1      | (-0.7, 0.5)              | 0.75                    | 0.1                     | (-0.6, 0.8)               | -0.3                   | (-1.0, 0.4) | 0.32 |
| Restricted Interests / Repetitive Behavior | | | | | | |
| MBP                           | 0.5       | (-0.1, 0.9)              | 0.08                    | 0.6                     | (0.0, 1.2)                | 0.3                    | (-0.4, 0.9) | 0.27 |
| MBzP                          | 0.2       | (-0.2, 0.7)              | 0.29                    | 0.4                     | (-0.1, 1.0)               | 0.1                    | (-0.5, 0.6) | 0.31 |
| MEP                           | -0.1      | (-0.4, 0.2)              | 0.68                    | 0.1                     | (-0.3, 0.5)               | -0.2                   | (-0.6, 0.2) | 0.21 |
| MCPP                          | 0.5       | (0.1, 0.9)               | 0.01                    | 0.5                     | (0.1, 1.0)                | 0.5                    | (0.0, 1.0) | 0.82 |
| DEHP                          | 0.2       | (-0.4, 0.8)              | 0.48                    | 0.3                     | (-0.4, 0.9)               | 0.1                    | (-0.6, 0.8) | 0.7  |
| DSM 5 compatible Social Communication | | | | | | |
| MBP                           | 0.5       | (0.1, 0.9)               | 0.03                    | 0.8                     | (0.3, 1.3)                | 0.2                    | (-0.3, 0.7) | 0.05 |
| MBzP                          | 0.1       | (-0.3, 0.5)              | 0.63                    | 0.2                     | (-0.3, 0.7)               | 0.0                    | (-0.5, 0.5) | 0.48 |
| MEP                           | -0.2      | (-0.4, 0.1)              | 0.25                    | 0.1                     | (-0.2, 0.5)               | -0.4                   | (-0.7, -0.1) | 0.02 |
| MCPP                          | 0.4       | (0.1, 0.8)               | 0.01                    | 0.6                     | (0.2, 1.0)                | 0.3                    | (-0.2, 0.7) | 0.24 |
|        | DEHP        | MBP        | MBzP       | MEP        | MCPP       | DEHP       |
|--------|-------------|------------|------------|------------|------------|------------|
| 0.0 (-0.5, 0.5) | 0.9        | 0.3 (-0.3, 0.8) | -0.2 (-0.8, 0.4) | 0.16       |
| 0.5 (-0.1, 0.9)  | 0.08       | 0.6 (0.0, 1.2)    | 0.3 (-0.4, 0.9)  | 0.26       |
| 0.2 (-0.2, 0.7)  | 0.28       | 0.4 (-0.1, 1.0)    | 0.1 (-0.4, 0.6)  | 0.31       |
| -0.1 (-0.4, 0.2) | 0.68       | 0.1 (-0.3, 0.5)    | -0.2 (-0.6, 0.2) | 0.21       |
| 0.5 (0.1, 0.9)   | 0.01       | 0.5 (0.1, 1.0)     | 0.5 (0.0, 1.0)   | 0.82       |
| 0.2 (-0.4, 0.8)  | 0.48       | 0.3 (-0.4, 0.9)    | 0.1 (-0.6, 0.8)  | 0.69       |

All models were adjusted for study city, household income, maternal education, maternal age, parity, marital status, race/ethnicity, folic acid supplementation, specific gravity, and year of enrollment. p-phthalate X Sex: p-value for the interaction term between phthalates concentrations and Sex in the models.
Figure S1: Flow chart of the study participants.

Among the 2001 women who initially agreed to participate, only 1983 provided a final consent.

Among the 896 that were included in the child development follow-up study, 610 had an in-person home visit for assessment of autistic traits using the SRS.

9 children did not have valid SRS scores and 45 had missing phthalates concentrations.

46 children had missing data on covariates included in the main models.

4 sites not included due to delays in obtaining site ethics approval & setting up site contracts; delays at other sites resulted in missed opportunities to recruit families during funding window.
Figure S2. Directed acyclic graph representing the associations between phthalates, autistic traits, and potential confounders
Figure S3. Minimum set of covariates sufficient to identify the potential effect of phthalates on autistic traits. Red squares indicate the variables to adjust for.
Figure S4: Exposure-response relationship and 95% confidence intervals for the associations between between maternal SG-standardized urinary MCPP concentrations and child SRS T-scores at 3-4 years. DF: degrees of freedom for the smooth term; p-values for significance (p) were derived with Wald tests using the Bayesian covariance matrix for the coefficients and departure from linearity (p-departure) were derived by comparing the models with urinary phthalate concentrations introduced as a spline function and as a linear term.
Figure S5: Exposure-response relationship between maternal SG-standardized urinary phthalates concentrations and child total SRS T-scores at 3-4 years, by child sex
Figure S6: Difference (95% CI) for a two-fold increase in maternal SG-standardized urinary phthalate concentrations in relation to children’s SRS-2 T-scores at 3-4 years, using Inverse probability censoring weights to adjust for potential selection bias. $\beta$ represents the change in point score for a two-fold increase in urinary phthalate concentration. Significant effect-modification by sex at p<0.1 is indicated by red asterisks.
Figure S7: Difference (95% CI) for a two-fold increase in maternal SG-standardized urinary phthalate concentrations in relation to children’s SRS-2 T-scores at 3-4 years, stratified by folic acid supplementation during pregnancy categorized into three categories (<400 µg/day; 400-999 µg/day; ≥1000 µg/day).