| Table 3. Adjustedᵃ associations between chemical mixtures and SRS-2 T-scores using quantile g-computation, and individual chemicals and SRS-2 scores using linear regression, the MIREC study, Canada, 2008-2011 (n = 601). | |
| --- | --- |
| Mixture or chemical name | Effect estimate (95% CI)ᵃ |
| Metalsᵇ | 0.4 (-0.4, 1.2) |
| OC Pesticidesᶜ | 0.0 (-0.6, 0.7) |
| PFASᵈ | -0.5 (-1.1, 0.1) |
| PCBsᵉ | 0.4 (-0.2, 0.9) |
| All POPsᶠ | 0.1 (-0.9, 1.0) |
| Arsenic | 0.2 (-0.4, 0.7) |
| Cadmium | 0.2 (-0.3, 0.7) |
| Lead | 0.9 (0.2, 1.6) |
| Mercury | -0.1 (-0.4, 0.3) |
| β-HCH | 0.4 (0.0, 0.7) |
| DDE | 0.3 (-0.1, 0.8) |
| Oxychlordane | 0.0 (-0.7, 0.6) |
| trans-Nonachlor | -0.3 (-1.0, 0.4) |
| PFHxS | 0.0 (-0.5, 0.4) |
| PFOS | -0.4 (-1.1, 0.2) |
| PFOA | -0.6 (-1.2, 0.0) |
| PCB118 | 0.3 (-0.3, 0.9) |
| PCB138 | 0.7 (0.1, 1.2) |
| PCB153 | 0.5 (0.0, 1.1) |
| PCB180 | 0.4 (-0.1, 0.9) |
| BDE47 | 0.3 (-0.1, 0.6) |
| a: Controls for the following variables: child sex, gestational folic acid supplementation, child age at SRS-2 assessment, HOME score, household income, relationship status, maternal education, maternal race, maternal age, parity, smoking status, city of residence, and year of enrollment. Effect estimates are pooled across 10 multiply imputed datasets. Stabilized inverse probability weights are applied. b: The metals mixture includes arsenic, cadmium, lead, mercury. c: The OC pesticides mixture includes β-HCH, DDE, oxychlordane, trans-nonachlor. d: The PFAS mixture includes PFHxS, PFOS, PFOA. e: The PCBs mixture includes PCB118, PCB138, PCB153, PCB180. f: The POP mixture includes β-HCH, DDE, oxychlordane, trans-nonachlor, PFHxS, PFOS, PFOA, PCB118, PCB138, PCB153, PCB180, BDE47. Abbreviations: BDE, brominated diphenyl ether; CI; Confidence interval; DDE, Dichlorodiphenyldichloroethylene; HOME, Home Observation for Measurement of the Environment; MICE, Multiple imputation by chained equations; MIREC, Maternal-Infant Research on Environmental Chemicals Study; OC, Organochlorine; PCB, Polychlorinated biphenyl; PFAS, Per- and polyfluoroalkyl substances; PFHxS, Perfluorohexanesulfonic acid; PFOA, Perfluorooctanoic acid; PFOS, Perfluorooctanesulfonic acid; POP, Persistent organic pollutant; SRS-2, Social Responsiveness Scale-2; β-HCH, β-Hexachlorocyclohexane. | |

| Table 4. Adjustedᵃ associations between chemical mixtures and SRS-2 T-scores using quantile g-computation, and individual chemicals and SRS-2 scores using linear regression, assessing modification by gestational folic acid supplementation and plasma total folate concentrations, the MIREC study, Canada, 2008-2011 (n = 601). | | | | | | | | | | | | |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | Folic acid supplementationᵇ (µg/day) | | | | | | Plasma total folate concentrationᶜ | | | | | |
|  | Effect estimate (95% CI)ᵃ | | | p-interaction | | | Effect estimate (95% CI)ᵃ | | | p-interaction | | |
| Mixture or chemical name | <400 | 400-1000 | >1000 | <400‎ | 400-1000‎ | >1000‎ | <10ᵗʰ %ile | 10ᵗʰ-80ᵗʰ %ile | >80ᵗʰ %ile | <10ᵗʰ %ile‎ | 10ᵗʰ-80ᵗʰ %ile‎ | >80ᵗʰ %ile‎ |
| Metalsᵈ | 0.6 (-1.6, 2.8) | -0.2 (-1.1, 0.7) | 2.4 (0.8, 3.9) | 0.49 | ref. | 0.003\* | -0.1 (-3.1, 2.8) | -0.1 (-1.0, 0.8) | 1.9 (0.4, 3.3) | 0.97 | ref. | 0.01\* |
| OC Pesticidesᵉ | 1.3 (-0.8, 3.3) | -0.3 (-1.1, 0.5) | 0.6 (-0.7, 1.8) | 0.13 | ref. | 0.18 | 0.2 (-1.7, 2.1) | 0.0 (-0.8, 0.7) | 0.4 (-0.9, 1.7) | 0.80 | ref. | 0.53 |
| PFASᶠ | 1.4 (-0.8, 3.6) | -0.8 (-1.4, -0.1) | -0.3 (-1.3, 0.8) | 0.06 | ref. | 0.38 | -0.5 (-2.4, 1.5) | -0.3 (-0.9, 0.4) | -1.5 (-2.6, -0.3) | 0.84 | ref. | 0.06 |
| PCBsᵍ | 1.9 (0.0, 3.8) | -0.1 (-0.8, 0.6) | 1.0 (0.0, 2.0) | 0.04\* | ref. | 0.05\* | 0.4 (-1.4, 2.2) | 0.4 (-0.2, 1.0) | 0.3 (-0.9, 1.5) | 0.97 | ref. | 0.88 |
| All POPsʰ | 2.9 (-0.8, 6.6) | -0.6 (-1.8, 0.5) | 0.7 (-1.4, 2.7) | 0.06 | ref. | 0.25 | 1.1 (-1.7, 4.0) | 0.2 (-0.9, 1.4) | -1.9 (-4.3, 0.6) | 0.55 | ref. | 0.08 |
| Arsenic | -0.4 (-2.4, 1.6) | -0.4 (-1.1, 0.3) | 1.2 (0.3, 2.1) | 0.98 | ref. | 0.004\* | 0.7 (-1.6, 2.9) | -0.2 (-0.8, 0.5) | 0.8 (-0.1, 1.7) | 0.46 | ref. | 0.08 |
| Cadmium | -0.3 (-2.1, 1.5) | 0.0 (-0.6, 0.6) | 0.7 (-0.1, 1.5) | 0.72 | ref. | 0.12 | -0.1 (-1.4, 1.3) | -0.3 (-0.9, 0.3) | 1.2 (0.4, 2.0) | 0.77 | ref. | 0.002\* |
| Lead | 2.3 (-0.6, 5.1) | 0.3 (-0.5, 1.2) | 2.2 (0.8, 3.5) | 0.20 | ref. | 0.02\* | 3.8 (1.4, 6.3) | 0.4 (-0.5, 1.2) | 1.6 (0.2, 2.9) | 0.008\* | ref. | 0.13 |
| Mercury | -0.1 (-1.2, 0.9) | -0.4 (-0.8, 0.0) | 0.8 (0.1, 1.4) | 0.66 | ref. | 0.002\* | -0.4 (-1.7, 0.9) | -0.2 (-0.6, 0.2) | 0.4 (-0.3, 1.1) | 0.77 | ref. | 0.13 |
| β-HCH | 0.3 (-0.8, 1.4) | 0.0 (-0.4, 0.5) | 0.9 (0.3, 1.5) | 0.61 | ref. | 0.009\* | 0.1 (-1.1, 1.3) | 0.4 (0.0, 0.8) | 0.4 (-0.3, 1.0) | 0.60 | ref. | 0.88 |
| DDE | 2.1 (0.5, 3.8) | -0.1 (-0.6, 0.5) | 0.8 (-0.1, 1.7) | 0.01\* | ref. | 0.07 | 1.0 (-0.4, 2.3) | 0.3 (-0.2, 0.9) | -0.1 (-1.3, 1.0) | 0.36 | ref. | 0.41 |
| Oxychlordane | 0.7 (-1.7, 3.2) | -0.4 (-1.2, 0.5) | 0.5 (-0.7, 1.7) | 0.39 | ref. | 0.21 | -1.0 (-3.2, 1.3) | -0.2 (-0.9, 0.6) | 0.7 (-0.7, 2.2) | 0.48 | ref. | 0.24 |
| trans-Nonachlor | 0.7 (-1.5, 2.9) | -0.4 (-1.3, 0.5) | -0.3 (-1.7, 1.0) | 0.32 | ref. | 0.96 | -0.5 (-2.5, 1.4) | -0.3 (-1.3, 0.6) | 0.0 (-1.6, 1.5) | 0.86 | ref. | 0.68 |
| PFHxS | 0.5 (-1.6, 2.7) | -0.2 (-0.7, 0.2) | 0.4 (-0.4, 1.2) | 0.49 | ref. | 0.14 | -0.7 (-2.5, 1.0) | 0.0 (-0.4, 0.5) | -0.3 (-1.3, 0.7) | 0.38 | ref. | 0.53 |
| PFOS | 3.3 (0.8, 5.8) | -1.0 (-1.7, -0.3) | 0.3 (-0.9, 1.4) | 0.001\* | ref. | 0.07 | 1.1 (-0.8, 3.1) | -0.4 (-1.2, 0.3) | -1.2 (-2.4, 0.1) | 0.13 | ref. | 0.27 |
| PFOA | -0.4 (-2.9, 2.2) | -0.8 (-1.5, -0.1) | -0.1 (-1.2, 1.0) | 0.74 | ref. | 0.28 | -0.8 (-3.0, 1.4) | -0.4 (-1.1, 0.3) | -1.1 (-2.4, 0.2) | 0.74 | ref. | 0.32 |
| PCB118 | 1.5 (-0.3, 3.2) | -0.3 (-1.0, 0.4) | 1.5 (0.4, 2.6) | 0.06 | ref. | 0.006\* | -0.3 (-2.2, 1.6) | 0.5 (-0.2, 1.1) | 0.3 (-1.0, 1.6) | 0.45 | ref. | 0.79 |
| PCB138 | 2.2 (0.5, 4.0) | 0.1 (-0.5, 0.8) | 1.5 (0.5, 2.6) | 0.03\* | ref. | 0.02\* | 0.9 (-0.8, 2.6) | 0.7 (0.1, 1.4) | 0.4 (-0.7, 1.6) | 0.83 | ref. | 0.63 |
| PCB153 | 1.9 (0.3, 3.5) | 0.1 (-0.5, 0.7) | 1.3 (0.2, 2.3) | 0.04\* | ref. | 0.05 | 0.6 (-1.1, 2.3) | 0.6 (0.0, 1.2) | 0.4 (-0.6, 1.5) | >.99 | ref. | 0.79 |
| PCB180 | 1.8 (0.2, 3.3) | 0.1 (-0.5, 0.6) | 0.9 (-0.1, 1.8) | 0.04\* | ref. | 0.13 | 0.3 (-1.3, 1.9) | 0.4 (-0.1, 1.0) | 0.3 (-0.6, 1.2) | 0.91 | ref. | 0.79 |
| BDE47 | 1.9 (0.1, 3.7) | 0.1 (-0.3, 0.5) | 0.4 (-0.2, 0.9) | 0.06 | ref. | 0.39 | 1.1 (-0.1, 2.4) | 0.5 (0.1, 0.9) | -0.5 (-1.2, 0.2) | 0.31 | ref. | 0.01\* |
| a: Controls for the following variables: child sex, child age at SRS-2 assessment, HOME score, household income, relationship status, maternal education, maternal race, maternal age, parity, smoking status, city of residence, and year of enrollment. Effect estimates are pooled across 10 multiply imputed datasets. Stabilized inverse probability weights are applied. b: The metals mixture includes arsenic, cadmium, lead, mercury. c: The OC pesticides mixture includes β-HCH, DDE, oxychlordane, trans-nonachlor. d: The PFAS mixture includes PFHxS, PFOS, PFOA. e: The PCBs mixture includes PCB118, PCB138, PCB153, PCB180. f: The POP mixture includes β-HCH, DDE, oxychlordane, trans-nonachlor, PFHxS, PFOS, PFOA, PCB118, PCB138, PCB153, PCB180, BDE47. Abbreviations: BDE, brominated diphenyl ether; CI; Confidence interval; DDE, Dichlorodiphenyldichloroethylene; HOME, Home Observation for Measurement of the Environment; MICE, Multiple imputation by chained equations; MIREC, Maternal-Infant Research on Environmental Chemicals Study; OC, Organochlorine; PCB, Polychlorinated biphenyl; PFAS, Per- and polyfluoroalkyl substances; PFHxS, Perfluorohexanesulfonic acid; PFOA, Perfluorooctanoic acid; PFOS, Perfluorooctanesulfonic acid; POP, Persistent organic pollutant; ref, reference level; THF, Tetrahydrofolate; UMFA, Unmetabolized folic acid; SRS-2, Social Responsiveness Scale-2; β-HCH, β-Hexachlorocyclohexane; %ile, Percentile. | | | | | | | | | | | | |