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Supplemental Material

Polychlorinated Biphenyl and Organochlorine Pesticide Concentrations in Maternal Mid-Pregnancy Serum Samples: Association with Autism Spectrum Disorder and Intellectual Disability

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Appendix: PCB congeners included in summary variables examined

Sum of PCB congeners detected (primary, shown in tables):
PCBs 28, 99, 118, 138/158, 153, 170, 180, 187, 194, 196/203, 199

Sum of highly detected ($\geq 90\%$ above LOD) PCBs:
PCBs 138/158, 153, 180

Sum of highly detected ($\geq 80\%$ above LOD) PCBs:
PCBs 28, 118, 138/158, 153, 180

Sum of highly chlorinated PCBs:
PCBs 170, 180, 187, 194, 196/203, 199

Sum of non-dioxin-like PCBs:
PCBs 28, 99, 138/158, 153, 170, 180, 187, 194, 196/203, 199

Sum of cytochrome-p450 inducing PCBs:
PCBs 153, 180, 196/203
Note additional PCB congeners may fall within these groupings but were not detected at high enough frequencies in our study population to utilize in summary scores. Groupings were selected based on the literature.27,29
### Table S1: Correlation across analytes in the study population

| Analyte       | PCB2 8 | PCB9 18 | PCB1 18/158 | PCB13 0 | PCB153 0 | PCB170 4 | PCB180 6/203 | p,p’-DDE Trans-Nonachlor | p,p’-DDE Trans-Nonachlor |
|---------------|--------|---------|-------------|---------|-----------|-----------|--------------|--------------------------|--------------------------|
| PCB28         | 1      | 0.15    | <.0001      | 0.09    | 0.31      | 0.66      | 0.01         | 0.007                    | 0.44         | 0.03 | 0.33 | 0.29 | 0.69 | 0.79 |
| PCB99         | 1      | 0.87    | <.0001      | 0.87    | 0.81      | 0.66      | 0.64         | 0.67                     | 0.56         | 0.58 | 0.51 | 0.03 | 0.39 | <.0001 |
| PCB118        | 1      | 0.82    | <.0001      | 0.78    | 0.63      | 0.62      | 0.64         | 0.53                     | 0.56         | 0.49 | 0.04 | 0.41 | <.0001 |
| PCB138/158    | 1      | 0.98    | <.0001      | 0.89    | 0.86      | 0.81      | 0.71         | 0.73                     | 0.64         | 0.003 | 0.40 | <.0001 |
| PCB153        | 1      | 0.94    | <.0001      | 0.92    | 0.84      | 0.75      | 0.77         | 0.67                     | -0.01        | 0.73 | <.0001 |
| PCB170        | 1      | 0.98    | <.0001      | 0.84    | 0.85      | 0.84      | 0.75         | 0.75                     | -0.01        | 0.70 | <.0001 |
| PCB180        | 1      | 0.90    | 0.91        | 0.90    | 0.84      | -0.01     | 0.35         |                          |              |      |    |    |    |    |
|        | PCB187 | PCB194 | PCB196/203 | PCB199 | p,p’-DDE | Trans-Nonachlor |
|--------|--------|--------|------------|--------|----------|-----------------|
|        |        |        |            |        |          |                 |
| PCB187 | 1      | 0.88   | 0.90       | 0.07   | 0.34     |                 |
|        |        | <.0001 | <.0001     | <.0001 | <.0001   |                 |
| PCB194 | 1      | 0.96   | 0.94       | 0.006  | 0.29     |                 |
|        |        | <.0001 | <.0001     | <.0001 | 0.85     | <.0001         |
| PCB196/203 | 1      | 0.96   | -0.004     | 0.31   |          |                 |
|        |        | <.0001 | 0.89       |        | <.0001   |                 |
| PCB199 | 1      | 0.05   | 0.26       |        |          |                 |
|        |        |        | 0.13       |        |          |                 |
| p,p’-DDE | 1      | 0.05   |            |        |          |                 |
|        |        |        |            |        |          | 0.12           |

Pearson correlation coefficients of un-transformed concentrations.
Table S2: Demographic and basic characteristics by quartiles of selected analytes in controls

|                          | PCB153     |             | p,p'- DDE   |             |
|--------------------------|------------|-------------|-------------|-------------|
|                          | Q1         | Q4          | Q1          | Q4          |
|                          | N=108      | N=86        | N=114       | N=107       |
| Maternal age  (mean, std)| 25.1 (5.2) | 32.4 (4.1)  | 28.0 (5.5)  | 29.0 (5.1)  |
| Paternal age (mean, std) | 27.9 (5.9) | 34.5 (4.4)  | 30.6 (6.4)  | 32.1 (5.9)  |
| Child year of birth (mean, std) | 2001 (0.9) | 2001 (0.9) | 2001 (1.0) | 2001 (0.9) |
| # Prenatal visits (mean, std) | 13.0 (3.8) | 12.4 (3.2)  | 13.2 (4.7)  | 12.4 (3.7)  |
| # Total live births (mean, std) | 2.2 (1.2) | 1.9 (0.9)   | 1.9 (0.9)   | 2.3 (1.1)   |
| Child birth weight in grams (mean, std) | 3423 (518) | 3377 (539)  | 3459 (550)  | 3342 (535)  |
| Child gestational age  in days (mean, std) | 277 (17.4) | 275 (12.2)  | 283 (51)    | 275 (23)    |
| Multiparous (n, %)       | 68 (63%)   | 53 (62%)    | 69 (61%)    | 73 (68%)    |
| Maternal birth place (n, %) | *          |             | *           |             |
| US                       | 41 (38%)   | 32 (37%)    | 95 (83%)    | 6 (6%)      |
| Mexico                   | 62 (57%)   | 9 (10%)     | 8 (7%)      | 60 (56%)    |
| Other                    | 5 (5%)     | 45 (52%)    | 11 (10%)    | 41 (38%)    |
| Maternal race/ethnicity (n, %) |   |   |   |   |
|-------------------------------|---|---|---|---|
| Non-Hispanic White            | 16 (15%) | 31 (36%) | 67 (59%) | 3 (3%) |
| Asian                         | 1 (1%) | 31 (36%) | 2 (2%) | 29 (27%) |
| Black, PI & Other             | 3 (3%) | 10 (12%) | 10 (9%) | 9 (8%) |
| Hispanic                      | 87 (81%) | 14 (16%) | 34 (30%) | 66 (62%) |
| Missing                       | 1 (1%) | 0 | 1 (1%) | 0 |
| Maternal education (n, %)     |   |   |   |   |
| Less than high school         | 54 (51%) | 6 (7%) | 14 (12%) | 43 (40%) |
| High school                   | 31 (29%) | 17 (20%) | 33 (29%) | 29 (27%) |
| Some college/College degree   | 19 (18%) | 42 (49%) | 43 (38%) | 29 (27%) |
| Post-graduate                 | 3 (3%) | 21 (24%) | 23 (20%) | 6 (6%) |
| Maternal age ≥35 years (n, %) | 6 (6%)* | 28 (33%) | 11 (10%) | 14 (13%) |
| Paternal age ≥35 years (n, %) | 21 (19%)* | 45 (52%) | 28 (25%)* | 40 (39%) |
| Insurance status at delivery  |   |   |   |   |
| Self & other                  | 8 (7%) | 1 (1%) | 4 (4%) | 2 (2%) |
| Private insurance             | 23 (21%) | 57 (66%) | 66 (58%) | 35 (33%) |
| Government program            | 77 (71%) | 28 (33%) | 44 (39%) | 70 (65%) |
| Child sex (n, %) |   |   |   |   |
|-----------------|---|---|---|---|
| Male            | 82 (76%) | 76 (88%) | 92 (81%) | 86 (80%) |
| Female          | 26 (24%) | 10 (12%) | 22 (19%) | 21 (20%) |
| Child preterm (<37 weeks) (n, %) | 12 (12%) | 6 (7%) | 10 (9%) | 12 (12%) |
| Child low birth weight (<2500g) (n, %) | 2 (2%) | 2 (2%) | 6 (5%) | 3 (3%) |

1PCB153 and p,p-DDE chosen as representative of exposure to the class of PCBs and pesticides in this analysis, respectively, and due to high % detected above the LOD. Only quartiles 1 and 4 are shown for comparison/summary purposes. 2Child sex was a matching factor to ASD cases, hence the unequal distribution.

+= significant difference according to t-test comparing Q1 vs Q4 on values of the variable.

*= significant difference according to Chi-square test comparing Q1 vs Q4 across categories of the covariate/demographic factor.
Table S3: Geometric means by diagnostic status

| Compound     | ASD N=548 | ID N=181 | GP N=418 |
|--------------|-----------|----------|----------|
|              | Geometric mean (95% CI) |          |          |
| **PCBs**     |           |          |          |
| PCB28        | 15.6 (14.0, 17.3) | 17.4 (14.5, 21.0) | 13.6 (12.0, 15.3) |
| PCB99        | 1.57 (1.49, 1.65)  | 1.25 (1.17, 1.34) | 1.41 (1.33, 1.49) |
| PCB118       | 2.59 (2.45, 2.74)  | 1.94 (1.77, 2.12) | 2.29 (2.14, 2.45) |
| PCB138/158   | 6.60 (6.18, 7.05)  | 4.69 (4.23, 5.20) | 5.39 (4.99, 5.83) |
| PCB153       | 8.74 (8.19, 9.34)  | 3.91 (3.41, 4.48) | 7.26 (6.74, 7.83) |
| PCB170       | 3.09 (2.89, 3.30)  | 2.10 (1.88, 2.35) | 2.60 (2.41, 2.81) |
| PCB180       | 7.49 (6.99, 8.02)  | 4.79 (4.28, 5.35) | 6.07 (5.60, 6.57) |
| PCB187       | 2.27 (2.10, 2.46)  | 1.51 (1.34, 1.70) | 1.87 (1.70, 2.04) |
| PCB194       | 1.81 (1.70, 1.94)  | 1.27 (1.15, 1.40) | 1.56 (1.44, 1.68) |
| PCB196/203   | 1.98 (1.85, 2.12)  | 1.35 (1.22, 1.49) | 1.70 (1.57, 1.84) |
| PCB199       | 1.73 (1.60, 1.87)  | 1.13 (1.01, 1.26) | 1.44 (1.32, 1.58) |
| Sum of above PCBs | 62.4 (58.7, 66.4) | 51.7 (46.5, 57.6) | 54.6 (50.9, 58.5) |
| **OC Pesticides** |           |          |          |
| p,p’-DDE     | 254.0 (232.4, 277.6) | 304.6 (258.0, 359.7) | 277.4 (247.3, 311.2) |
| Trans- \*nonachlor | 5.11 (4.85, 5.39) | 4.54 (4.12, 5.01) | 4.76 (4.48, 5.05) |
ASD = autism spectrum disorder cases; ID = intellectual disability (without ASD) group; GP = general population controls; PCBs = polychlorinated biphenyls; OC = organochlorine.
Table S4: Association between the top decile of organochlorine chemicals and risk of ASD and ID

|                  | ASD vs. GP  | ID vs. GP  |
|------------------|-------------|------------|
| **AOR (95% CI)^1** |             |            |
|                  |             |            |
| **PCBs**         |             |            |
| PCB28            |             |            |
| Lowest 10th percentile | 1.0     | 1.0        |
| 10th-25th        | 1.07 (0.60, 1.88) | 2.66 (1.12, 6.31) |
| IQR              | 1.23 (0.75, 2.03)  | 1.71 (0.76, 3.82)  |
| 75th-90th        | 1.06 (0.60, 1.88)  | 1.49 (0.61, 3.63)  |
| Highest 10th percentile | 1.70 (0.94, 3.07) | 2.69 (1.10, 6.61) |
| PCB99            |             |            |
| Lowest 10th percentile | 1.0     | 1.0        |
| 10th-25th        | 1.13 (0.66, 1.96)  | 1.77 (0.82, 3.83)  |
| IQR              | 1.19 (0.75, 1.89)  | 1.71 (0.86, 3.41)  |
| 75th-90th        | 1.20 (0.68, 2.10)  | 2.14 (0.88, 5.23)  |
| Highest 10th percentile | 1.37 (0.74, 2.52) | 1.24 (0.40, 3.85) |
| PCB118           |             |            |
| Lowest 10th percentile | 1.0     | 1.0        |
| 10th-25th        | 0.85 (0.45, 1.59)  | 1.64 (0.73, 3.66)  |
| IQR              | 1.20 (0.72, 2.01)  | 1.60 (0.80, 3.23)  |
| 75th-90th        | 1.18 (0.64, 2.16)  | 1.43 (0.58, 3.57)  |
| Highest 10th percentile | 0.78 (0.39, 1.56) | 0.71 (0.20, 2.56) |
| PCB138/158       |             |            |
| Lowest 10th percentile | 1.0     | 1.0        |
|                | 10th-25th | IQR       | 75th-90th | Highest 10th percentile |
|----------------|-----------|-----------|-----------|------------------------|
|                |           |           |           |                        |
| **PCB153**     |           |           |           |                        |
| Lowest 10th percentile | 1.0      | 1.0       | 1.0       |                        |
| 10th-25th      | 1.00 (0.55, 1.81) | 1.56 (0.77, 3.17) |
| IQR            | 1.28 (0.75, 2.16)  | 1.63 (0.83, 3.22)  |
| 75th-90th      | 2.02 (1.06, 3.85)  | 2.67 (1.11, 6.47)  |
| Highest 10th percentile | 1.50 (0.73, 3.06) | 2.44 (0.81, 7.34) |
| **PCB170**     |           |           |           |                        |
| Lowest 10th percentile | 1.0      | 1.0       | 1.0       |                        |
| 10th-25th      | 0.85 (0.47, 1.54)  | 0.98 (0.48, 1.97)  |
| IQR            | 1.07 (0.65, 1.76)  | 0.90 (0.47, 1.70)  |
| 75th-90th      | 1.29 (0.68, 2.42)  | 1.37 (0.58, 3.25)  |
| Highest 10th percentile | 1.50 (0.74, 3.05) | 1.57 (0.53, 4.61) |
| **PCB180**     |           |           |           |                        |
| Lowest 10th percentile | 1.0      | 1.0       | 1.0       |                        |
| 10th-25th      | 1.33 (0.73, 2.45)  | 2.42 (1.14, 5.13)  |
| IQR            | 1.30 (0.74, 2.28)  | 1.82 (0.86, 3.85)  |
| 75th-90th      | 1.70 (0.86, 3.35)  | 2.39 (0.89, 6.41)  |
| Highest 10th percentile | 1.87 (0.89, 3.94) | 3.20 (1.02, 9.97) |
| **PCB187**     |           |           |           |                        |
| Lowest 10th percentile | 1.0      | 1.0       | 1.0       |                        |
|                        | 10\(^{th}\)-25\(^{th}\) | IQR         | 75\(^{th}\)-90\(^{th}\) | Highest 10\(^{th}\) percentile |
|------------------------|--------------------------|-------------|--------------------------|-------------------------------|
| PCB194                 |                          |             |                          |                               |
| Lowest 10\(^{th}\) percentile | 1.0                      | 1.0         | 1.0                      |                               |
| 10\(^{th}\)-25\(^{th}\) | 1.17 (0.66, 2.07)       | 1.85 (0.89, 3.84) |
| IQR                    | 1.11 (0.69, 1.78)       | 1.37 (0.71, 2.64) |
| 75\(^{th}\)-90\(^{th}\) | 1.29 (0.71, 2.76)       | 1.83 (0.75, 4.49) |
| Highest 10\(^{th}\) percentile | 1.41 (0.72, 2.76)       | 1.79 (0.55, 5.84) |
| PCB196/203             |                          |             |                          |                               |
| Lowest 10\(^{th}\) percentile | 1.0                      | 1.0         | 1.0                      |                               |
| 10\(^{th}\)-25\(^{th}\) | 1.22 (0.68, 2.21)       | 2.51 (1.09, 5.79) |
| IQR                    | 1.14 (0.66, 1.98)       | 2.58 (1.16, 5.74) |
| 75\(^{th}\)-90\(^{th}\) | 1.18 (0.61, 2.29)       | 3.22 (1.19, 8.71) |
| Highest 10\(^{th}\) percentile | 1.62 (0.78, 3.34)       | 3.21 (0.90, 11.4) |
| PCB199                 |                          |             |                          |                               |
| Lowest 10\(^{th}\) percentile | 1.0                      | 1.0         | 1.0                      |                               |
| 10\(^{th}\)-25\(^{th}\) | 1.50 (0.74, 3.04)       | 3.11 (1.10, 8.82) |
| IQR                    | 1.44 (0.73, 2.83)       | 2.95 (1.06, 8.23) |
| 75\(^{th}\)-90\(^{th}\) | 1.34 (0.61, 2.93)       | 4.03 (1.23, 13.3) |
| Highest 10\(^{th}\) percentile | 1.81 (0.77, 4.24)       | 2.67 (0.56, 12.7) |

Sum of above PCBs

| Lowest 10\(^{th}\) percentile | 1.0 | 1.0 |
| Pesticide         | 10<sup>th</sup>-25<sup>th</sup> | IQR           | 75<sup>th</sup>-90<sup>th</sup> | Highest 10<sup>th</sup> percentile |
|-------------------|----------------------------------|---------------|----------------------------------|-------------------------------------|
| Trans-Nonachlor   | 0.47 (0.26, 0.86)                | 0.71 (0.44, 1.17) | 0.97 (0.54, 1.73)                | 0.87 (0.46, 1.66)                  |
|                   | 1.00 (0.46, 2.18)                | 1.10 (0.57, 2.14) | 1.41 (0.63, 3.18)                | 1.44 (0.57, 3.66)                  |
| p,p-DDE           | 1.0                              | 1.12 (0.64, 1.96) | 1.74 (0.94, 3.23)                | 1.77 (0.91, 3.46)                  |
|                   | 1.37 (0.56, 3.37)                | 1.96 (0.90, 4.24) | 1.35 (0.54, 3.25)                | 1.29 (0.49, 3.43)                  |

<sup>1</sup> Adjusted as in Tables 3 and 4 for matching factors (child sex, month and year of birth), maternal age, weight at sample collection, education, race/ethnicity, parity.
Table S5: Stratified and Subgroup Analyses of Prenatal PCB and OC Pesticide levels in association with ASD (vs GP controls)

|                      | Stratified analyses | ASD phenotypic subgroup analyses |
|----------------------|---------------------|----------------------------------|
|                      | Males               | Females                          | Non-Hispanic White | Hispanic | ASD with ID | ASD without ID |
|                      | n=791               | n=172                            | n=330              | n=415    | n= 705      | n=676          |
|                      | (446 cases)         | (99 cases)                        | (192 cases)        | (218 cases) | (287 cases) | (258 cases)   |

Adjusted OR (95% CI)\(^1\)

**PCBs**

| PCB28         |          |          |          |          |          |          |
|---------------|----------|----------|----------|----------|----------|----------|
| Q1            | 1.0      | 1.0      | 1.0      | 1.0      | 1.0      | 1.0      |
| Q2            | 1.31 (0.85, 2.02) | 0.74 (0.25, 2.22) | 1.38 (0.67, 2.82) | 1.29 (0.72, 2.31) | 1.32 (0.83, 2.09) | 0.96 (0.58, 1.59) |
| Q3            | 1.29 (0.84, 1.97) | 1.17 (0.38, 3.58) | 1.43 (0.73, 2.78) | 1.10 (0.61, 1.99) | 1.13 (0.71, 1.80) | 1.32 (0.82, 2.13) |
| Q4            | 1.43 (0.94, 2.17) | 0.86 (0.29, 2.53) | 1.95 (0.98, 3.87) | 1.13 (0.65, 1.98) | 1.23 (0.79, 1.94) | 1.31 (0.81, 2.11) |

**PCB99**

|          |          |          |          |          |          |          |
|----------|----------|----------|----------|----------|----------|----------|
| Q1       | 1.0      | 1.0      | 1.0      | 1.0      | 1.0      | 1.0      |
| PCB118   | Q2 | Q3 | Q4 |
|----------|----|----|----|
| Q1       | 1.0 | 1.0 | 1.0 |
| Q2       | 1.29 (0.82, 2.04) | 1.29 (0.46, 3.58) | 1.29 (0.60, 2.78) | 1.52 (0.89, 2.60) | 1.47 (0.89, 2.41) | 1.06 (0.63, 1.79) |
| Q3       | 1.34 (0.83, 2.16) | 1.92 (0.67, 5.54) | 1.36 (0.62, 2.96) | 1.44 (0.80, 2.57) | 1.59 (0.95, 2.65) | 1.15 (0.67, 1.98) |
| Q4       | 1.07 (0.64, 1.79) | 1.75 (0.52, 5.82) | 1.47 (0.67, 3.26) | 1.18 (0.54, 2.54) | 1.22 (0.70, 2.14) | 1.06 (0.59, 1.87) |

| PCB138/158 | Q1 | Q2 | Q3 | Q4 |
|------------|----|----|----|----|
| Q1         | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 |
| Q2         | 1.22 (0.77, 1.92) | 2.49 (0.84, 7.39) | 0.86 (0.38, 1.99) | 1.85 (1.09, 3.15) | 1.44 (0.88, 2.36) | 1.26 (0.73, 2.14) |
| Q3         | 1.22 (0.75, 1.98) | 1.80 (0.60, 5.41) | 1.25 (0.53, 2.92) | 1.32 (0.74, 2.38) | 1.67 (1.00, 2.80) | 1.02 (0.58, 1.78) |
| Q4         | 1.70 (1.00, 2.89) | 1.92 (0.48, 7.75) | 1.61 (0.66, 3.92) | 1.85 (0.84, 4.07) | 1.71 (0.95, 3.07) | 1.89 (1.03, 3.46) |

| PCB153    | Q1 | Q2 |
|-----------|----|----|
| Q1        | 1.0 | 1.0 |
| Q2        | 1.27 (0.80, 1.99) | 1.12 (0.38, 3.32) | 0.90 (0.35, 2.31) | 1.54 (0.93, 2.54) | 1.26 (0.77, 2.03) | 1.41 (0.82, 2.44) |
|   | Q3     | Q4     | Q1     | Q2     | Q3     |
|---|--------|--------|--------|--------|--------|
| PCB170 |        |        |        |        |        |
| Q1   | 1.0    | 1.0    | 1.0    | 1.0    | 1.0    |
| Q2   | 1.02   | 1.94   | 0.38   | 1.75   | 1.28   |
| Q3   | 0.98   | 2.36   | 0.49   | 1.63   | 1.47   |
| Q4   | 1.23   | 3.94   | 0.68   | 1.31   | 1.61   |
| PCB180 |        |        |        |        |        |
| Q1   | 1.0    | 1.0    | 1.0    | 1.0    | 1.0    |
| Q2   | 0.95   | 1.20   | 0.40   | 1.28   | 0.93   |
| Q3   | 1.09   | 1.29   | 0.69   | 1.44   | 1.21   |
| Q4   | 1.35   | 2.08   | 0.71   | 1.51   | 1.51   |
| PCB187 |        |        |        |        |        |
| Q1   | 1.0    | 1.0    | 1.0    | 1.0    | 1.0    |
| Q2   | 0.76   | 1.67   | 0.60   | 1.15   | 0.86   |
| Q3   | 1.15   | 1.48   | 1.18   | 1.29   | 1.32   |
|   | Q4         | PCB194                  | PCB196/203                | PCB199                  |
|---|------------|-------------------------|---------------------------|-------------------------|
|   |            | 1.22 (0.69, 2.16)       | 1.58 (0.43, 5.80)         | 0.93 (0.35, 2.48)       |
|   |            | 1.76 (0.71, 4.35)       | 1.25 (0.69, 2.28)         | 1.39 (0.74, 2.61)       |
| Q1 | 1.0        | 1.0                     | 1.0                       | 1.0                     |
| Q2 | 1.01 (0.64, 1.61) | 0.96 (0.33, 2.79) | 1.07 (0.40, 2.83) | 1.22 (0.72, 2.07) |
| Q3 | 1.02 (0.63, 1.66) | 1.38 (0.48, 3.98) | 1.43 (0.54, 3.81) | 0.85 (0.47, 1.54) |
| Q4 | 1.20 (0.69, 2.09) | 1.86 (0.55, 6.26) | 1.52 (0.50, 4.58) | 1.28 (0.57, 2.90) |
|   |            | 1.0                     | 1.0                       | 1.0                     |
| Q1 | 0.78 (0.48, 1.25) | 1.04 (0.36, 2.98) | 0.64 (0.25, 1.66) | 0.95 (0.56, 1.62) |
| Q2 | 1.03 (0.64, 1.65) | 1.24 (0.42, 3.70) | 0.94 (0.39, 2.27) | 1.10 (0.61, 1.98) |
| Q3 | 1.05 (0.60, 1.84) | 1.72 (0.47, 6.34) | 1.06 (0.38, 2.98) | 0.98 (0.43, 2.25) |
| Q4 |            | 1.0                     | 1.0                       | 1.0                     |
|   |            | 0.80 (0.51, 1.28)       | 1.96 (0.67, 5.73)         | 0.83 (0.33, 2.10)       |
| Q2 |            | 1.09 (0.67, 1.76)       | 1.58 (0.51, 4.87)         | 1.19 (0.48, 2.95)       |
| Q3 |            |                         | 1.16 (0.64, 2.09)         | 1.23 (0.75, 2.04)       |
| Q4 | 1.02 (0.58, 1.81) | 1.91 (0.51, 7.12) | 1.03 (0.36, 2.93) | 0.86 (0.36, 2.02) |
|   |            | 0.81 (0.50, 1.33)       | 1.10 (0.64, 1.89)         | 1.11 (0.64, 1.93)       |
| Q2 |            | 1.22 (0.65, 1.89)       | 1.20 (0.75, 2.04)         | 1.11 (0.64, 1.93)       |
| Q3 |            | 1.00 (0.54, 1.85)       | 1.22 (0.65, 2.29)         | 1.00 (0.54, 1.85)       |
| Q4 |            |                         | 1.22 (0.65, 2.29)         | 1.22 (0.65, 2.29)       |
|                | Q1        | Q2        | Q3        | Q4        |
|----------------|-----------|-----------|-----------|-----------|
| **Sum of above PCBs** | 1.0       | 1.0       | 1.0       | 1.0       |
| Q1             | 1.0       | 0.95 (0.60, 1.50) | 0.90 (0.56, 1.45) | 0.90 (0.56, 1.45) |
| Q2             | 2.80 (0.92, 8.56) | 1.66 (0.74, 3.71) | 1.08 (0.62, 1.88) | 1.09 (0.67, 1.76) |
| Q3             | 1.91 (0.65, 5.61) | 1.37 (0.61, 3.12) | 0.72 (0.40, 1.31) | 0.74 (0.44, 1.25) |
| Q4             | 1.33 (0.82, 2.16) | 2.06 (0.90, 4.74) | 1.32 (0.69, 2.51) | 1.28 (0.77, 2.12) |

**OC Pesticides**

|                | Q1        | Q2        | Q3        | Q4        |
|----------------|-----------|-----------|-----------|-----------|
| **p,p-DDE**    |           |           |           |           |
| Q1             | 1.18 (0.78, 1.77) | 1.16 (0.70, 1.92) | 1.31 (0.84, 2.03) | 1.48 (0.94, 2.34) |
| Q2             | 2.86 (1.05, 7.82) | 1.44 (0.73, 2.84) | 1.06 (0.65, 1.71) | 1.38 (0.83, 2.31) |
| Q3             | 1.51 (0.53, 4.32) | 1.17 (0.61, 2.25) | 0.84 (0.50, 1.42) | 1.11 (0.62, 1.99) |
| Q4             | 1.29 (0.42, 4.03) | 0.96 (0.49, 1.89) |           |           |

|                | Q1        | Q2        | Q3        | Q4        |
|----------------|-----------|-----------|-----------|-----------|
| **Trans-Nonachlor** |           |           |           |           |
| Q1             | 0.89 (0.57, 1.38) | 1.25 (0.60, 2.59) | 0.76 (0.48, 1.21) | 1.14 (0.69, 1.87) |
| Q2             | 1.16 (0.44, 3.10) | 0.94 (0.54, 1.64) | 0.76 (0.47, 1.22) | 0.93 (0.55, 1.55) |
| Q3             | 1.37 (0.46, 4.14) | 1.00 (0.54, 1.86) |           |           |
|   | Q3     | Q4     | Q3     | Q4     | Q3     | Q4     |
|---|--------|--------|--------|--------|--------|--------|
| Q3 | 0.78 (0.49, 1.26) | 1.05 (0.37, 2.95) | 1.13 (0.54, 2.33) | 1.02 (0.52, 2.00) | 0.76 (0.46, 1.25) | 0.96 (0.57, 1.62) |

Estimates stratified by maternal age not shown given small $n$ in the advanced maternal age stratum. \(^1\) Adjusted as in primary tables 3 and 4, for matching factors (child sex, month and year of birth), maternal age, race/ethnicity, education, weight at sample collection, and parity.
Table S6: Sensitivity Analyses of Prenatal PCB and OC Pesticide levels in association with ASD (vs GP controls)

|                | CLR matched pairs\(^1\) n=788 | Uncensored laboratory data\(^2\) n=963 | Multiple imputation\(^3\) n=963 | Exclusion of ID to ASD group\(^4\) n=831 |
|----------------|--------------------------------|---------------------------------------|-----------------------------------|----------------------------------------|
| **Adjusted OR (95% CI)\(^5\)** |                                |                                       |                                   |                                        |
| **PCB28**      |                                |                                       |                                   |                                        |
| Q1             | 1.0                            | 1.0                                   | 1.0                               | 1.0                                    |
| Q2             | 1.41 (0.85, 2.33)              | 1.15 (0.77, 1.71)                     | 1.94 (1.31, 2.88)                 | 1.05 (0.68, 1.60)                      |
| Q3             | 1.67 (0.97, 2.87)              | 1.20 (0.81, 1.77)                     | 1.43 (0.96, 2.13)                 | 1.15 (0.75, 1.74)                      |
| Q4             | 1.56 (0.86, 2.83)              | 1.26 (0.86, 1.85)                     | 1.94 (1.31, 2.87)                 | 1.20 (0.80, 1.82)                      |
| **PCB99**      |                                |                                       |                                   |                                        |
| Q1             | 1.0                            | 1.0                                   | 1.0                               | 1.0                                    |
| Q2             | 1.17 (0.70, 1.93)              | 0.95 (0.63, 1.45)                     | 0.79 (0.33, 1.91)                 | 1.09 (0.69, 1.72)                      |
| Q3             | 1.30 (0.77, 2.19)              | 1.07 (0.71, 1.59)                     | 1.20 (0.56, 2.58)                 | 1.17 (0.76, 1.81)                      |
| Q4             | 1.17 (0.66, 2.07)              | 1.01 (0.64, 1.59)                     | 0.95 (0.44, 2.05)                 | 1.17 (0.72, 1.88)                      |
| PCB118          | Q1    | Q2          | Q3          | Q4          |
|----------------|-------|-------------|-------------|-------------|
|                | 1.0   | 1.0         | 1.0         | 1.0         |
| Q2             | 1.19 (0.73, 1.95) | 1.32 (0.87, 2.00) | 1.01 (0.66, 1.57) | 1.28 (0.82, 1.99) |
| Q3             | 1.41 (0.84, 2.36) | 1.40 (0.91, 2.16) | 1.17 (0.75, 1.84) | 1.33 (0.84, 2.11) |
| Q4             | 1.07 (0.61, 1.86) | 1.17 (0.73, 1.87) | 1.00 (0.64, 1.57) | 1.14 (0.70, 1.88) |

| PCB138_158     | Q1    | Q2          | Q3          | Q4          |
|----------------|-------|-------------|-------------|-------------|
|                | 1.0   | 1.0         | 1.0         | 1.0         |
| Q2             | 1.19 (0.73, 1.94) | 1.39 (0.92, 2.10) | 1.34 (0.88, 2.05) | 1.15 (0.73, 1.81) |
| Q3             | 1.21 (0.73, 2.00) | 1.34 (0.87, 2.07) | 1.25 (0.80, 1.95) | 1.16 (0.73, 1.85) |
| Q4             | 1.60 (0.90, 2.83) | 1.79 (1.10, 2.92) | 1.57 (0.96, 2.59) | 1.61 (0.95, 2.72) |

| PCB153        | Q1    | Q2          | Q3          | Q4          |
|---------------|-------|-------------|-------------|-------------|
|                | 1.0   | 1.0         | 1.0         | 1.0         |
| Q2             | 1.11 (0.66, 1.85) | 1.38 (0.92, 2.09) | 1.11 (0.73, 1.70) | 1.12 (0.71, 1.75) |
| Q3             | 1.18 (0.70, 1.97) | 1.28 (0.82, 2.00) | 1.05 (0.67, 1.67) | 1.14 (0.71, 1.84) |
| Q4             | 1.64 (0.91, 2.96) | 1.89 (1.14, 3.13) | 1.49 (0.88, 2.50) | 1.88 (1.09, 3.24) |

| PCB170        | Q1    | Q2          | Q3          | Q4          |
|---------------|-------|-------------|-------------|-------------|
|                | 1.0   | 1.0         | 1.0         | 1.0         |
|     | Q1            | Q2            | Q3            | Q4            |
|-----|---------------|---------------|---------------|---------------|
| Q1  | 1.0           | 1.0           | 1.0           | 1.0           |
| Q2  | 1.14 (0.69, 1.89) | 1.16 (0.76, 1.76) | 1.02 (0.65, 1.62) | 1.04 (0.66, 1.64) |
| Q3  | 1.06 (0.62, 1.82) | 1.17 (0.75, 1.84) | 1.04 (0.65, 1.67) | 1.05 (0.65, 1.70) |
| Q4  | 1.31 (0.71, 2.42) | 1.49 (0.88, 2.51) | 1.34 (0.78, 2.29) | 1.44 (0.82, 2.51) |

**PCB180**

|     | Q1            | Q2            | Q3            | Q4            |
|-----|---------------|---------------|---------------|---------------|
| Q1  | 1.0           | 1.0           | 1.0           | 1.0           |
| Q2  | 0.93 (0.57, 1.53) | 1.04 (0.69, 1.56) | 0.85 (0.55, 1.29) | 0.88 (0.56, 1.36) |
| Q3  | 1.06 (0.64, 1.75) | 1.20 (0.77, 1.85) | 1.03 (0.66, 1.62) | 1.01 (0.63, 1.62) |
| Q4  | 1.43 (0.80, 2.58) | 1.53 (0.92, 2.55) | 1.08 (0.63, 1.83) | 1.53 (0.88, 2.66) |

**PCB187**

|     | Q1            | Q2            | Q3            | Q4            |
|-----|---------------|---------------|---------------|---------------|
| Q1  | 1.0           | 1.0           | 1.0           | 1.0           |
| Q2  | 0.77 (0.46, 1.29) | 1.19 (0.78, 1.81) | 0.82 (0.49, 1.38) | 0.80 (0.51, 1.26) |
| Q3  | 1.21 (0.72, 2.04) | 1.44 (0.93, 2.24) | 1.00 (0.58, 1.72) | 1.14 (0.72, 1.80) |
| Q4  | 1.33 (0.73, 2.42) | 1.58 (0.94, 2.66) | 1.04 (0.60, 1.81) | 1.39 (0.80, 2.39) |

**PCB194**

|     | Q1            | Q2            | Q3            | Q4            |
|-----|---------------|---------------|---------------|---------------|
| Q1  | 1.0           | 1.0           | 1.0           | 1.0           |
|       | PCB196_203 |       |       |       |
|-------|------------|-------|-------|-------|
|       |       |       |       |       |
| Q2    | 0.92 (0.54, 1.55) | 1.03 (0.68, 1.57) | 0.98 (0.55, 1.73) | 0.93 (0.59, 1.46) |
| Q3    | 0.93 (0.55, 1.56) | 1.17 (0.74, 1.83) | 1.34 (0.78, 2.31) | 1.00 (0.63, 1.59) |
| Q4    | 1.21 (0.67, 2.18) | 1.33 (0.79, 2.23) | 1.32 (0.74, 2.37) | 1.32 (0.78, 2.23) |
| PCB199 |       |       |       |       |
|       |       |       |       |       |
| Q1    | 1.0 | 1.0 | 1.0 | 1.0 |
| Q2    | 0.68 (0.40, 1.14) | 0.97 (0.64, 1.49) | 0.89 (0.55, 1.43) | 0.73 (0.46, 1.16) |
| Q3    | 0.93 (0.56, 1.54) | 1.12 (0.72, 1.73) | 1.16 (0.71, 1.91) | 0.97 (0.62, 1.54) |
| Q4    | 1.22 (0.67, 2.22) | 1.24 (0.74, 2.07) | 1.26 (0.75, 2.11) | 1.20 (0.70, 2.05) |
| Sum of above PCBs |       |       |       |       |
|       |       |       |       |       |
| Q1    | 1.0 | 1.0 | 1.0 | 1.0 |
| Q2    | 1.08 (0.65, 1.80) | 1.08 (0.71, 1.63) | 1.37 (0.77, 2.44) | 0.94 (0.60, 1.47) |
|   | Q1       | Q2       | Q3       | Q4       |
|---|----------|----------|----------|----------|
| Q3 | 1.0      | 1.40     | 1.11     | 0.79     |
| Q4 | 1.0      | 1.35     | 1.16     | 0.90     |

**p,p-DDE**

|   | Q1       | Q2       | Q3       | Q4       |
|---|----------|----------|----------|----------|
| Q1 | 1.0      | 1.0      | 1.0      | 1.0      |
| Q2 | 1.40      | 1.35     | 1.16     | 0.90     |
| Q3 | 1.11      | 1.16     | 1.11     | 0.80     |
| Q4 | 0.79      | 0.90     | 0.80     | 0.95     |

**Trans-Nonachlor**

|   | Q1       | Q2       | Q3       | Q4       |
|---|----------|----------|----------|----------|
| Q1 | 1.0      | 1.20     | 1.06     | 1.02     |
| Q2 | 0.86      | 1.20     | 0.73     | 0.93     |
| Q3 | 1.00      | 1.06     | 0.73     | 0.93     |
| Q4 | 0.96      | 1.02     | 0.93     | 0.94     |

N listed for each column includes ASD cases + GP controls.

1CLR= conditional logistic regression; 394 pairs of ASD cases and GP controls, matched on sex, year and month of birth, were used in these analyses. 2Original concentrations received from laboratory analysis of these chemicals included censoring of values with small volumes, due to potential bias. These analyses include all concentration data, even those with small sample volumes, in order to examine potential differences in censored vs uncensored data (and as a comparison to the primary method of replacing values <LOD with
Results using SAS Proc MI, as described in the text, for those individuals with values <LOD (as a comparison to the primary method of replacing values <LOD with LOD/√2). These results exclude the n=132 cases who were originally identified as having ID/developmental delay through the California DDS system, but were classified as ASD in our study following expert review of DDS records. All adjusted models shown in this table include: maternal race/ethnicity (Non-Hispanic White, Asian, Black/Pacific Islander/other, Hispanic, or missing), maternal weight at time of sample collection (quartiles), parity (multi- vs primiparous), and maternal education (<high school, high school, college, graduate). CLR matched pairs model (results column 1) is stratified by matched pairs, while the other models include adjustment for the matching factors in logistic regression models. Models additionally adjusted for the PCs overall produced similar estimates.

Tests of trend were non-significant. *Validity of MI model fit questionable; CIs may not be valid.