**Supplementary File.**

Singer AB et al. “Prenatal Alcohol Exposure in Relation to Autism Spectrum Disorder: Findings from the Study to Explore Early Development (SEED)”

**Supplemental Figure 1.** Diagram depicting screening and assessment process.

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**Supplemental Table 1.** Percent of women reporting any alcohol use during the three months preconception, trimester 1, trimester 2, and trimester 3 by study sample characteristics among population controls (N=962)

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Sample Characteristics | N |  | % Reporting Any Alcohol Use |   |   |
|   |   |   | Preconception | Trimester 1 | Trimester 2 | Trimester 3 |
| Maternal Race/Ethnicitya |  |  |  |  |  |  |
| Non-Hispanic white | 677 |  | 48.2 | 23.2 | 8.3 | 14.5 |
| Non-Hispanic black | 122 |  | 23.8 | 10.7 | <5.0 | <5.0 |
| Hispanic | 81 |  | 42.0 | 18.5 | 6.2 | 7.4 |
| All other/multi-racial | 76 |  | 30.3 | 23.7 | <5.0 | 6.6 |
| Maternal Education at Deliveryb |  |  |  |  |  |
| High school diploma or less | 125 |  | 30.4 | 16.8 | <5.0 | <5.0 |
| Some college/trade | 220 |  | 35.9 | 18.6 | 6.4 | 9.5 |
| Bachelor’s degree | 354 |  | 48.3 | 24.6 | 8.5 | 13.3 |
| Advanced degree | 262 |  | 47.7 | 20.6 | 8.4 | 16.0 |
| Maternal Parityc |  |  |  |  |  |  |
| 0 | 435 |  | 48.3 | 24.6 | 6.0 | 10.8 |
| 1+ | 525 |  | 38.9 | 18.5 | 8.0 | 12.6 |
| Maternal Psychiatric Conditions |  |  |  |  |  |  |
| No | 745 |  | 41.1 | 19.1 | 6.3 | 11.1 |
| Yes | 217 |  | 49.8 | 28.6 | 9.7 | 13.8 |
| Maternal Smoking In Any Monthd |  |  |  |  |  |  |
| No | 872 |  | 41.4 | 18.8 | 7.1 | 12.0 |
| Yes | 89 |  | 59.6 | 43.8 | 6.7 | 9.0 |
| Maternal Age |  |  |  |  |  |  |
| <25 years | 109 |  | 33.0 | 18.3 | <5.0 | 4.6 |
| 25-29 years | 209 |  | 44.0 | 20.6 | 3.3 | 4.8 |
| 30-34 years | 358 |  | 47.5 | 24.6 | 9.5 | 14.2 |
| 35-39 years | 248 |  | 41.5 | 19.8 | 8.9 | 17.7 |
| ≥40 years | 38 |  | 34.2 | 10.5 | <10.0 | <10.0 |
| Child's Sex |  |  |  |  |  |  |
| Female | 451 |  | 41.2 | 20.8 | 8.2 | 12.6 |
| Male | 511 |  | 44.6 | 21.5 | 6.1 | 11.0 |
| Pregnancy Household Income ($)e |  |  |  |  |  |  |
| <30,000 | 150 |  | 27.3 | 17.3 | 4.0 | 3.3 |
| 30,000-<70,000 | 268 |  | 43.3 | 22.0 | 6.0 | 8.6 |
| 70,000-<110,000 | 305 |  | 46.2 | 22.0 | 8.9 | 14.4 |
| ≥110,000 | 221 |   | 49.3 | 23.1 | 8.1 | 18.6 |
| Hypertension |  |  |  |  |  |  |
| No | 855 |  | 42.6 | 20.8 | 7.0 | 12.2 |
| Yes | 107 |  | 46.7 | 24.3 | 7.5 | 8.4 |
| Diabetes |  |  |  |  |  |  |
| No | 885 |  | 43.5 | 20.8 | 7.2 | 12.0 |
| Yes | 77 |  | 37.7 | 26.0 | <10.0 | 9.1 |
| Pre-pregnancy BMIf |  |  |  |  |  |  |
| Underweight | 41 |  | 43.9 | 17.1 | 0.0 | <5.0 |
| Normal | 581 |  | 46.5 | 21.5 | 7.9 | 13.4 |
| Overweight | 203 |  | 38.4 | 22.7 | 5.9 | 10.8 |
| Obese | 125 |  | 35.2 | 20.0 | 8.0 | 9.6 |

an=6 missing maternal race/ethnicity, bn=1 missing maternal education, cn=2 missing maternal parity, dn=1 missing smoking in any month (three months preconception and the pregnancy), en=18 missing pregnancy household income, fn=12 missing BMI

**Supplemental Table 2.** Number and percent of women reporting any alcohol use in time period A among women reporting any alcohol use in time period B (N=2515: 684 ASD, 869 DD, 962 POP).

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | **Time Period A** |  |  |  |
|  | PreconceptionN (%) | Trimester 1N (%) | Trimester 2N (%) | Trimester 3N (%) |
| **Time Period B** |  |  |  |  |
| Preconception(N= 983 exposed) | .  | 386 (39.3) | 91 (9.3) | 134 (13.6) |
| Trimester 1(N= 486 exposed) | 386 (79.4) | . | 70 (14.4) | 85 (17.5) |
| Trimester 2(N= 136 exposed) | 91 (66.9) | 70 (51.5) | . | 85 (62.5) |
| Trimester 3(N= 206 exposed) | 134 (65.0) | 85 (41.3) | 85 (41.3) |  . |

**Supplemental Table 3.** Crude odds ratios (cOR) and adjusteda odds ratios (aOR) for ASD and DD relative to POP controls comparing ever versus never maternal alcohol use in each of the following time periods: three months preconception, trimester 1, trimester 2, and trimester 3.

|  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | Ever | ASD |  | DD |  | POP |  | ASD vs POP |   |  | DD vs POP |   |
| Time Period | Use | N |   | N |   | N |   | cOR (95% CI) | aOR (95% CI) |   | cOR (95% CI) | aOR (95% CI) |
| Preconception | No | 445 |  | 539 |  | 548 |  | Reference | Reference |  | Reference | Reference |
|  | Yes | 239 |  | 330 |  | 414 |  | 0.7 (0.6, 0.9) | 0.7 (0.6, 0.9) |  | 0.8 (0.7, 1.0) | 0.9 (0.7, 1.1) |
| Trimester 1 | No | 560 |  | 711 |  | 758 |  | Reference | Reference |  | Reference | Reference |
|  | Yes | 124 |  | 158 |  | 204 |  | 0.8 (0.6, 1.1) | 0.8 (0.6, 1.1) |  | 0.8 (0.7, 1.0) | 0.9 (0.7, 1.1) |
| Trimester 2 | No | 657 |  | 828 |  | 894 |  | Reference | Reference |  | Reference | Reference |
|  | Yes | 27 |  | 41 |  | 68 |  | 0.5 (0.3, 0.9) | 0.6 (0.4, 1.0) |  | 0.7 (0.4, 1.0) | 0.7 (0.4, 1.0) |
| Trimester 3 | No | 653 |  | 807 |  | 849 |  | Reference | Reference |  | Reference | Reference |
|   | Yes | 31 |   | 62 |   | 113 |   | 0.4 (0.2, 0.5) | 0.4 (0.3, 0.7) |   | 0.6 (0.4, 0.8) | 0.7 (0.5, 0.9) |

ASD = autism spectrum disorder, DD = other developmental disabilities, POP = general population controls, CI = confidence interval

a Analyses adjusted for: child’s sex, total household income in the year prior to the pregnancy, self-reported maternal race/ethnicity, maternal education at delivery, maternal parity, at least one maternal psychiatric condition, maternal smoking in any month during preconception and pregnancy, and maternal age at birth.

**Supplemental Table 4.** Crude and adjusteda odds ratios and 95% confidence intervals for ASD and DD relative to POP comparing maternal drinking of an average of <1 drink per week, 1-2 drinks per week, and 3+ drinks per week to no alcohol use in each monthb.

|  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  |  | ASD |  | DD |  | POP |  | ASD vs POP |  |  | DD vs POP |  |
| Month | Dose | % |   | % |   | % |   | cOR (95% CI) | aOR (95% CI) |   | cOR (95% CI) | aOR (95% CI) |
| -3 | None | 70 |  | 67.4 |  | 60.4 |  | Reference | Reference |  | Reference | Reference |
|  | <1/wk | 12.2 |  | 12.9 |  | 13.3 |  | 0.8 (0.6, 1.1) | 0.8 (0.6, 1.1) |  | 0.9 (0.7, 1.2) | 0.9 (0.7, 1.2) |
|  | 1-2/wk | 8.4 |  | 11 |  | 16.1 |  | 0.4 (0.3, 0.6) | 0.5 (0.3, 0.7) |  | 0.6 (0.5, 0.8) | 0.7 (0.5, 0.9) |
|  | 3+/wk | 9.4 |  | 8.7 |  | 10.2 |  | 0.8 (0.6, 1.1) | 0.8 (0.6, 1.2) |  | 0.8 (0.5, 1.0) | 0.8 (0.6, 1.2) |
| -2 | None | 70.7 |  | 67.5 |  | 62 |  | Reference | Reference |  | Reference | Reference |
|  | <1/wk | 11.2 |  | 12.3 |  | 12.7 |  | 0.8 (0.6, 1.0) | 0.8 (0.6, 1.1) |  | 0.9 (0.7, 1.2) | 0.9 (0.7, 1.3) |
|  | 1-2/wk | 9.1 |  | 11.8 |  | 15.4 |  | 0.5 (0.4, 0.7)  | 0.6 (0.4, 0.8) |  | 0.7 (0.5, 0.9) | 0.8 (0.6, 1.1) |
|  | 3+/wk | 9 |  | 8.4 |  | 9.9 |  | 0.8 (0.6, 1.1) | 0.8 (0.6, 1.2)  |  | 0.8 (0.6, 1.1) | 0.8 (0.6, 1.2) |
| -1 | None | 71.3 |  | 69.4 |  | 63.2 |  | Reference | Reference |  | Reference | Reference |
|  | <1/wk | 11.5 |  | 10.8 |  | 13.3 |  | 0.8 (0.6, 1.0) | 0.8 (0.5, 1.1) |  | 0.7 (0.6, 1.0) | 0.8 (0.6, 1.0) |
|  | 1-2/wk | 8.4 |  | 11.1 |  | 14.8 |  | 0.5 (0.4, 0.7) | 0.5 (0.4, 0.7) |  | 0.7 (0.5, 0.9) | 0.8 (0.6, 1.0) |
|  | 3+/wk | 8.8 |  | 8.8 |  | 8.7 |  | 0.9 (0.6, 1.3) | 0.9 (0.6, 1.4) |  | 0.9 (0.7, 1.3) | 1.0 (0.7, 1.4) |
| 1 | None | 84 |  | 83.2 |  | 79.9 |  | Reference | Reference |  | Reference | Reference |
|  | <1/wk | 6.9 |  | 6.2 |  | 8 |  | 0.8 (0.6, 1.2) | 0.8 (0.6, 1.3) |  | 0.7 (0.5, 1.1) | 0.8 (0.5, 1.1) |
|  | 1-2/wk | 4.3 |  | 5.9 |  | 6.9 |  | 0.6 (0.4, 0.9) | 0.5 (0.3, 0.9) |  | 0.8 (0.6, 1.2) | 0.9 (0.6, 1.3) |
|  | 3+/wk | 4.9 |  | 4.6 |  | 5.1 |  | 0.9 (0.6, 1.4) | 1.0 (0.6, 1.7) |  | 0.9 (0.6, 1.3) | 0.9 (0.6, 1.5) |
| 2 | None | 94.1 |  | 94.2 |  | 93.2 |  | Reference | Reference |  | Reference | Reference |
|  | <1/wk | 2.6 |  | 2.1 |  | 3.4 |  | 0.8 (0.4, 1.4) | 0.8 (0.4, 1.4) |  | 0.6 (0.3, 1.1) | 0.6 (0.3, 1.0) |
|   | 1-2/wk | 1.8 |  | 1.7 |  | 2.5 |   | 0.7 (0.3, 1.4) | 0.6 (0.3, 1.3) |   | 0.7 (0.4, 1.3) | 0.6 (0.3, 1.2) |
|  | 3+/wk | 1.5 |  | 2 |  | 0.8 |  | 1.7 (0.7, 4.4) | 1.6 (0.6, 4.4)  |  | 2.3 (1.0, 5.4) | 2.1 (0.9, 5.1) |
| 3 | None | 96.8 |  | 97.2 |  | 95.7 |  | Reference | Reference |  | Reference | Reference |
|  | <1/wk | 1.9 |  | 1.7 |  | 2.4 |  | 0.8 (0.4, 1.6) | 0.7 (0.3, 1.5) |  | 0.7 (0.4, 1.4)  | 0.7 (0.4, 1.4) |
|  | 1-2/wk | 0.7 |  | 0.6 |  | 1.6 |  | 0.5 (0.2, 1.3) | 0.4 (0.1, 1.4) |  | 0.4 (0.1, 1.0) | 0.4 (0.1, 1.0) |
| 4 | None | 98.2 |  | 96.9 |  | 95.6 |  | Reference | Reference |  | Reference | Reference |
|  | <1/wk | 1 |  | 2.1 |  | 2.7 |  | 0.4 (0.2, 0.9) | 0.5 (0.2, 1.1) |  | 0.8 (0.4, 1.4) | 0.8 (0.4, 1.4) |
| 5 | None | 97.8 |  | 97.1 |  | 95.3 |  | Reference | Reference |  | Reference | Reference |
|  | <1/wk | 1.6 |  | 1.7 |  | 3.2 |  | 0.5 (0.2, 1.0) | 0.6 (0.3, 1.3) |  | 0.5 (0.3, 1.0) | 0.5 (0.3, 1.0)  |
| 6 | None | 97.4 |  | 96.9 |  | 94.7 |  | Reference | Reference |  | Reference | Reference |
|  | <1/wk | 2.2 |  | 2.1 |  | 3.7 |  | 0.6 (0.3, 1.1) | 0.6 (0.3, 1.2) |  | 0.6 (0.3, 1.0) | 0.5 (0.3, 1.0) |
| 7 | None | 97.9 |  | 96.2 |  | 93.8 |  | Reference | Reference |  | Reference | Reference |
|  | <1/wk | 1.8 |  | 2.3 |  | 4.2 |  | 0.4 (0.2, 0.8) | 0.5 (0.2, 0.9) |  | 0.5 (0.3, 0.9)  | 0.6 (0.3, 1.0) |
| 8 | None | 97.6 |  | 96.3 |  | 92.7 |  | Reference | Reference |  | Reference | Reference |
|  | <1/wk | 2.1 |  | 2.3 |  | 5.1 |  | 0.4 (0.2, 0.7) | 0.5 (0.3, 0.9) |  | 0.4 (0.3, 0.7) | 0.5 (0.3, 0.8) |
| 9 | None | 97.8 |  | 95.8 |  | 92.2 |  | Reference | Reference |  | Reference | Reference |
|  | <1/wk | 1.9 |  | 2.7 |  | 5 |  | 0.4 (0.2, 0.7) | 0.4 (0.2, 0.8) |  | 0.5 (0.3, 0.8) | 0.5 (0.3, 0.9) |
| 10 | None | 97.8 |  | 96.2 |  | 93.1 |  | Reference | Reference |  | Reference | Reference |
|  | <1/wk | 1.3 |  | 2.4 |  | 4.6 |  | 0.3 (0.1, 0.6) | 0.4 (0.2, 0.7) |  | 0.5 (0.3, 0.9) | 0.6 (0.3, 1.0) |
|  | 1-2/wk | 0.7 |  | 1 |  | 1.9 |  | 0.4 (0.1, 1.0) | 0.4 (0.1, 1.4) |  | 0.5 (0.2, 1.2) | 0.6 (0.3, 1.5) |

ASD = autism spectrum disorder, DD = other developmental disabilities, POP = general population controls, CI = confidence interval

a Analyses adjusted for: child’s sex, total household income in the year prior to the pregnancy, self-reported maternal race/ethnicity, maternal education at delivery, maternal parity, at least one maternal psychiatric condition, maternal smoking in any month during preconception and pregnancy, and maternal age at birth.

b Analyses included 680 ASD, 865 DD, and 957 POP with information on alcohol dose in the preconception months and the first two months of pregnancy. Exposure categories are not included in the table when there are less than five observations in the ASD, DD, or POP groups.

**Supplemental Table 5.** Adjustedodds ratios and 95% confidence intervals for ASD and DD relative to POP controls comparing maternal alcohol use ever versus never during the three months preconception, trimester 1, trimester 2, and trimester 3 where (1) analyses exclude preterm births and (2) analyses adjust for diabetes, hypertension, body mass index, child’s sex, total household income in the year prior to the pregnancy, self-reported maternal race/ethnicity, maternal education at delivery, maternal parity, at least one maternal psychiatric condition, maternal smoking in any month during preconception and pregnancy, and maternal age at birth.

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
|  |  | Excluding Preterma |   |  | Adjusting for Diabetes, Hypertension, and BMIb |
| Time Period | Ever Use | ASD vs POP | DD vs POP |   | ASD vs POP | DD vs POP |
| Preconception | No | Reference | Reference |  | Reference | Reference |
|  | Yes | 0.7 (0.6, 1.0) | 0.9 (0.7, 1.1) |  | 0.7 (0.6, 0.9) | 0.9 (0.7, 1.1) |
| Trimester 1 | No | Reference | Reference |  | Reference | Reference |
|  | Yes | 0.9 (0.7, 1.2) | 0.9 (0.7, 1.2) |  | 0.8 (0.6, 1.1) | 0.9 (0.7, 1.1) |
| Trimester 2 | No | Reference | Reference |  | Reference | Reference |
|  | Yes | 0.6 (0.3, 1.0) | 0.7 (0.5, 1.1) |  | 0.6 (0.4, 1.0) | 0.7 (0.4, 1.0) |
| Trimester 3 | No | Reference | Reference |  | Reference | Reference |
|   | Yes | 0.4 (0.3, 0.7) | 0.7 (0.5, 1.0) |   | 0.5 (0.3, 0.7) | 0.7 (0.5, 0.9) |

aAnalysis includes 572 children with ASD (autism spectrum disorder), 672 children with DD (other developmental disabilities), and 874 POP (general population control) children.

bAnalysis includes 684 ASD, 869 DD, and 962 POP.

**Supplemental Table 6.** Crude odds ratios (cOR) and adjusteda odds ratios (aOR) for ASD and DD relative to POP controls comparing ever versus never maternal alcohol use restricted to primiparous women who became pregnant in 6 months or less.

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
|  | Ever | ASD vs POP |  |  | DD vs POP |  |
| Time Period | Use | cOR (95% CI) | aORa (95% CI) |  | cOR (95% CI) | aORa (95% CI) |
| Preconception | No | Reference | Reference |  | Reference | Reference |
|  | Yes | 0.7 (0.5, 0.9) | 0.6 (0.4, 1.0) |  | 0.8 (0.6, 1.1) | 0.8 (0.6, 1.2) |
| Trimester 1 | No | Reference | Reference |  | Reference | Reference |
|  | Yes | 0.9 (0.6, 1.4) | 0.8 (0.5, 1.3) |  | 1.0 (0.7, 1.4) | 1.0 (0.7, 1.5) |
| Trimester 2 | No | Reference | Reference |  | Reference | Reference |
|  | Yes | 1.1 (0.5, 2.2) | 1.0 (0.4, 2.1) |  | 0.9 (0.4, 1.9) | 0.8 (0.4, 1.8) |
| Trimester 3 | No | Reference | Reference |  | Reference | Reference |
|   | Yes | 0.4 (0.2, 0.8) | 0.5 (0.2, 1.0) |  | 0.8 (0.4, 1.3) | 0.9 (0.5, 1.6) |

ASD = autism spectrum disorder, DD = other developmental disabilities, POP = general population controls, CI = confidence interval, 219 ASD, 245 DD, and 305 POP.

a Analyses adjusted for: child’s sex, total household income in the year prior to the pregnancy, self-reported maternal race/ethnicity, maternal education at delivery, at least one maternal psychiatric condition, maternal smoking in any month during preconception and pregnancy, and maternal age at birth.

**Supplemental Table 7.** Crude odds ratios (cOR) and adjusteda odds ratios (aOR) for ASD and DD relative to POP controls comparing ever versus never binge drinking in each of the following time periods: three months preconception and trimester one.

|  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | Ever | ASD |  | DD |  | POP |  | ASD vs POP |   |  | DD vs POP |   |
| Time Period | Use | N |   | N |   | N |   | cOR (95% CI) | aOR (95% CI) |   | cOR (95% CI) | aOR (95% CI) |
| Preconception | No | 639 |  | 821 |  | 893 |  | Reference | Reference |  | Reference | Reference |
|  | Yes | 40 |  | 44 |  | 64 |  | 0.9 (0.6, 1.3) | 0.8 (0.5, 1.3) |  | 0.7 (0.5, 1.1) | 0.7 (0.5, 1.1) |
| Trimester 1 | No | 656 |  | 840 |  | 926 |  | Reference | Reference |  | Reference | Reference |
|  | Yes | 23 |  | 25 |  | 31 |  | 1.0 (0.6, 1.8) | 0.9 (0.5, 1.6) |  | 0.9 (0.5, 1.5) | 0.9 (0.5, 1.5) |

ASD = autism spectrum disorder, DD = other developmental disabilities, POP = general population controls, CI = confidence interval

a Analyses adjusted for: child’s sex, total household income in the year prior to the pregnancy, self-reported maternal race/ethnicity, maternal education at delivery, maternal parity, at least one maternal psychiatric condition, maternal smoking in any month during preconception and pregnancy, and maternal age at birth.

b Trimesters two and three are not included in the because there were less than five exposed individuals in the ASD, DD, or POP groups.