Data Article

Processed data for CHMS 2007–2009: Bisphenol A, phthalates and lead and learning and behavioral problems in Canadian children 6–19 years of age

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A R T I C L E   I N F O

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A B S T R A C T

This article presents processed data from an analysis of cross-sectional data from Cycle 1 of the Canadian Health Measures Survey (CHMS) to examine the potential association between urinary concentrations of BPA and phthalate metabolites and child learning and behavioral problems, considering important covariates such as gender, blood lead and environmental tobacco smoke (ETS). These processed data are related to the research on a subset of the children (Arbuckle et al., 2016) [1]. The Strengths and Difficulties Questionnaire (SDQ) outcomes of interest were emotional symptoms, hyperactivity/inattention, and a total difficulties SDQ score, with borderline and abnormal scores grouped together and compared with children with normal scores. Other outcomes studied included reported learning disability, ADD/ADHD (attention deficit disorder/attention deficit hyperactivity disorder) and use of psychotropic medications to treat behavioral disorders in the past month. Data are presented for all children 6–19 years of age combined.

Weighted simple logistic regression estimates for important covariates of each of the outcomes from CHMS Cycle 1 children are reported. Odds ratios based on weighted multiple logistic regression estimates for urinary BPA and phthalate metabolites (including specific gravity as a covariate) and blood lead are presented for the
reported outcomes ADD/ADHD, learning disability and psychotropic medications, as well as the SDQ outcomes emotional symptoms, hyperactivity/inattention and total difficulties.

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## Specifications Table

| Subject area                  | Psychology                      |
|-------------------------------|---------------------------------|
| More specific subject area    | Environmental health            |
| Type of data                  | Tables                          |
| How data was acquired         | Survey                          |
| Data format                   | Analyzed                        |
| Experimental factors          | Restricted to children with environmental chemical biomonitoring data |
| Experimental features         | Applied survey weights          |
| Data source location          | Canada                          |
| Data accessibility            | Data are within this article     |

## Value of the data

- Cross-sectional analysis of associations between child levels of BPA, phthalates and lead with indicators of adverse child behavior, controlling for wide set of covariates.
- Generates exploratory data useful for examination in prospective cohort studies.
- Could be compared with similar data from US NHANES for further insight.

## 1. Data

Tables of results of simple weighted regression analysis of important covariates and weighted multiple logistic regression analysis for chemicals examined. Child behavioral outcomes considered were reported learning disability, ADD/ADHD and taking psychotropic medications, as well as Strengths and Difficulties Questionnaire scores for hyperactivity/inattention, emotional symptoms and total difficulties.

## 2. Experimental design, materials and methods

The Canadian Health Measures Survey (CHMS) was designed to collect key information on the health of Canadians using direct physical measurements, collection of blood and urine and household and clinic interviews [2,3]. The target population for Cycle 1 were individuals between 6 and 79 years of age living in privately occupied dwellings, representing 97% of Canadians. This dataset was restricted to children and adolescents 6–19 years of age (n=2097). Information on child behavior, demographic, socioeconomic and lifestyle factors was collected by a questionnaire administered to the parent or guardian of children 6–11 years of age or directly to the child 12 years and older.

Blood was analysed for lead, while urine was analysed for BPA and phthalate metabolites. Creatinine was measured to adjust for urine dilution differences between spot urine samples. Chemical lab measures below the limit of detection were imputed as half the limit of detection.

For children 6–19 years of age, outcomes examined were reports of self-, or in the case of children 6–11 years, parent-reported learning disability (any, ADD or ADHD) and whether any medications used to treat behavioral disorders were taken in the past month. Respondents reported medications
by Drug Identification Numbers (http://www.hc-sc.gc.ca/dhp-mps/prodpharma/activit/fs-fj/dinfs_fd-eng.php) which were coded to Anatomical Therapeutic Chemical (ATC) codes (http://www.whocc.no/atc_ddd_index/). One of the co-authors (KB), a clinical child psychiatrist, provided a table of medications potentially used for treating behavioral disorders in children (see Supplemental Material, Table S1 [1]).

For children 6–17 years of age, borderline and abnormal scores from the Strengths and Difficulties Questionnaire (SDQ) (www.sdqinfo.com) were grouped together and compared with children with normal scores for the outcomes emotional symptoms, hyperactivity/inattention, and the total difficulties scores.

Initially, for each outcome of interest, weighted univariate models were considered for each contaminant. Subsequently, potential risk factors were evaluated. Covariates identified through reviews of the literature included child’s age, body mass index, number of hours slept per night, gender, highest level of household education (secondary school or less vs. at least some post-secondary studies), income adequacy (low/lower middle vs. upper middle/higher income), whether the child fasted prior to specimen collection, and ETS exposure in the home. For children 6–11 years of age only, additional covariates were available and considered: prenatal smoking, birth any time prior to due date, admission to a special neonatal unit or an intensive care unit prior to leaving hospital, and breast feeding (less than 3 months vs. three months or longer), as well as number of days in a neonatal unit, birth weight, and mother’s age at birth.

Since the CHMS employed a complex, multistage survey design, survey weights were used in statistical modeling to account for the unequal probabilities of selection. Due to the complex sampling scheme of the CHMS Cycle 1 survey, direct calculation of standard errors and confidence intervals were not possible. To that end, Statistics Canada [3] provided bootstrap weights in order to calculate standard errors, confidence intervals and coefficients of variation for each estimate using the bootstrap method.

Weighted simple logistic regression modelling was done for each of the identified covariates and the outcomes (Tables A1–A7). Weighted multiple logistic regression models were then run considering the environmental contaminants and other important covariates identified in the simple regressions (Tables B1–B6). For urinary chemicals, creatinine concentration was included in all the multiple regression models as a separate independent variable [4].

In order to determine which of the available variables resulted in the best fit, a stepwise procedure was implemented. The natural-log of the contaminant concentrations was used since the contaminants were lognormally distributed based on the Anderson–Darling test. However since the complex survey design limited the number of degrees of freedom to 11, a stepwise selection method was used to determine which covariates were most significant to improve the model fit. The contaminant and creatinine concentrations were retained in the model, and then other covariates were sequentially added to the model based on the smallest p-value (i.e. the most significant variables). This approach facilitated the evaluation of demographic variables one-at-a-time with respect to their p-value, conditional on other variables already in the model. This approach also served to examine the effect of multicollinearity, which could inflate standard errors and provide misleading results. For some models, after examining the main effects, sufficient degrees of freedom were available to evaluate an interaction term between highly significant covariates. Furthermore, to compare models, the model with significant terms and with the lowest value of the Akaike Information Criterion (AIC) was selected. Goodness of fit was assessed using the Hosmer–Lemeshow test. Odds ratios were calculated from weighted multiple logistic regression models for a 1-unit increase in the log of the contaminant concentration (Tables C1 and C2).

The software package SAS (Statistical Analysis System) Enterprise Guide 4.2 was used for statistical analysis. For regression modeling, the software programs BOOTVAR and SUDAAN were used along with the bootstrap weights, in order to correctly calculate such estimates. Finally, for all statistical analysis performed, an inference was deemed significant at $\alpha=5\%$ unless otherwise indicated.
A. Simple logistic regressions – weighted results for children 6–19 years of age, CHMS cycle 1

See Tables A1–A7

Table A1
Weighted simple logistic regression estimates for covariates from CHMS Cycle 1 with outcome reported ADHD (6–19 years of age).

| Factor (reference category)                  | n   | Estimate | Standard error | P-value | Odds ratio (OR) | 95% CI for Odds ratio |
|---------------------------------------------|-----|----------|----------------|---------|-----------------|-----------------------|
| Child's age                                 | 2087| 0.14     | 0.06           | 0.05    | 1.15            | 1.00-1.33             |
| BMI – measured                              | 2081| 0.00     | 0.04           | 0.97    | 1.00            | 0.91-1.09             |
| Gender (males)                              | 2087| 1.04     | 0.58           | 0.10    | 2.83            | 0.79-10.06            |
| Education (secondary school or less)        | 2031| 0.73     | 0.52           | 0.18    | 2.07            | 0.67-6.45             |
| Income (low/lower middle)                   | 1927| 1.04     | 0.48           | 0.05    | 2.83            | 0.99-8.09             |
| Prenatal smoking (yes)                      | 1038| 0.27     | 0.71           | 0.71    | 1.31            | 0.24-7.10             |
| Born any time before due date (yes)         | 1047| 0.95     | 0.61           | 0.18    | 2.6             | 0.54-12.39            |
| Special neonatal unit care (yes)            | 1047| 1.24     | 0.4            | 0.01    | 3.47            | 1.40-8.57             |
| No. of days in neonatal unit                | 1066| 0.01     | 0.11           | 0.9     | 1.01            | 0.8-1.29              |
| Hours of sleep per night                    | 2087| 0.17     | 0.16           | 0.31    | 0.84            | 0.59-1.21             |
| Birth weight                                | 1039| –0.00    | 0.00           | 0.21    | 1.00            | 1.00-1.00             |
| Breast feeding (3 months or longer)         | 1037| –0.77    | 0.67           | 0.28    | 0.46            | 0.10-2.03             |
| Mother’s age at birth                       | 1065| –0.03    | 0.06           | 0.6     | 0.97            | 0.84-1.11             |
| Anyone smoking at home (yes)                | 2082| 1.48     | 0.49           | 0.01    | 4.38            | 1.49-12.88            |
| Fasted (yes)                                | 2087| –0.14    | 0.47           | 0.77    | 0.87            | 0.30-2.46             |

Table A2
Weighted simple logistic regression estimates for covariates from CHMS Cycle 1 with outcome reported ADD (6–19 years of age).

| Factor (reference category)                  | n   | Estimate | Standard error | P-value | Odds ratio (OR) | 95% CI for Odds ratio |
|---------------------------------------------|-----|----------|----------------|---------|-----------------|-----------------------|
| Child’s age                                 | 2087| 0.14     | 0.06           | 0.05    | 1.15            | 1.00-1.33             |
| BMI – measured                              | 2081| –0.05    | 0.04           | 0.16    | 0.95            | 0.87-1.03             |
| Gender (males)                              | 2087| 1.31     | 0.48           | 0.02    | 3.69            | 1.27-10.71            |
| Education (secondary school or less)        | 2031| –0.11    | 0.66           | 0.87    | 0.90            | 0.20-3.96             |
| Income (low/lowest middle)                  | 1927| 0.96     | 0.45           | 0.06    | 2.62            | 0.96-7.13             |
| Prenatal smoking (yes)                      | 1038| 1.22     | 0.35           | 0.006   | 3.39            | 1.55-7.40             |
| Born any time before due date (yes)         | 1047| 0.62     | 0.39           | 0.140   | 1.87            | 0.79-4.39             |
| Special neonatal unit care (yes)            | 1039| NR       | NR             | NR      | NR              | NR                    |
| No. of days in neonatal unit                | 1066| NR       | NR             | NR      | NR              | NR                    |
| Hours of sleep per night                    | 2087| –0.03    | 0.13           | 0.83    | 0.97            | 0.73-1.29             |
| Birth weight                                | 1039| 0.00     | 0.00           | 0.78    | 1.00            | 1.00-1.00             |
| Breast feeding (3 months or longer)         | 1037| –0.48    | 0.79           | 0.55    | 0.62            | 0.11-3.48             |
| Mother’s age at birth                       | 1065| –0.11    | 0.07           | 0.14    | 0.90            | 0.77-1.04             |
| Anyone smoking at home (Yes)                | 2082| 0.67     | 0.5            | 0.21    | 1.95            | 0.65-5.83             |
| Fasted (yes)                                | 2087| 0.38     | 0.33           | 0.26    | 1.47            | 0.72-3.00             |

NR – Not reported due to unacceptable quality.
### Table A3
Weighted simple logistic regression estimates for covariates from CHMS Cycle 1 with outcome reported learning disability (6–19 years of age).

| Factor (reference category) | n     | Estimate | Standard error | P-value | Odds ratio (OR) | 95% CI for odds ratio |
|----------------------------|-------|----------|----------------|---------|----------------|----------------------|
| Child's age                | 2094  | 0.04     | 0.03           | 0.33    | 1.04           | 0.96 1.12            |
| BMI – measured             | 2088  | 0.01     | 0.02           | 0.6     | 1.01           | 0.97 1.05            |
| Gender (males)             | 2094  | 0.85     | 0.31           | 0.02    | 2.34           | 1.19 4.60            |
| Education (secondary school or less) | 2038 | 0.26     | 0.26           | 0.33    | 1.30           | 0.74 2.3             |
| Income (low/lower middle)  | 1934  | 0.92     | 0.24           | 0.003   | 2.50           | 1.47 4.27            |
| Prenatal smoking (yes)     | 1043  | 0.71     | 0.35           | 0.07    | 2.04           | 0.94 4.42            |
| Born any time before due date (yes) | 1052 | 0.28     | 0.26           | 0.30    | 1.32           | 0.75 2.35            |
| Special neonatal unit care (yes) | 1072 | 0.82     | 0.35           | 0.04    | 2.27           | 1.06 4.86            |
| No. of days in neonatal unit | 1071 | 0.01     | 0.02           | 0.66    | 1.01           | 0.97 1.05            |
| Hours of sleep per night   | 2094  | –0.1     | 0.1            | 0.35    | 0.91           | 0.73 1.13            |
| Birth weight               | 1044  | 0        | 0              | 0.86    | 1.00           | 1.00 1.00            |
| Breast feeding (3 months or longer) | 1042 | –0.25    | 0.33           | 0.46    | 0.78           | 0.38 1.6             |
| Mother’s age at birth      | 1070  | –0.06    | 0.04           | 0.13    | 0.94           | 0.86 1.02            |
| Anyone smoking at home (yes) | 2089 | 0.84     | 0.21           | 0.002   | 2.32           | 1.48 3.64            |
| Fasted (yes)               | 2094  | 0.1      | 0.20           | 0.63    | 1.10           | 0.71 1.72            |

### Table A4
Weighted simple logistic regression estimates for covariates from CHMS Cycle 1 with outcome reported psychotropic medicines taken in past month (6–19 years of age).

| Factor (reference category) | n     | Estimate | Standard error | P-value | Odds ratio (OR) | 95% CI for odds ratio |
|----------------------------|-------|----------|----------------|---------|----------------|----------------------|
| Child's age                | 2096  | 0.00     | 0.03           | 0.99    | 1.00           | 0.94 1.06            |
| BMI – measured             | 2090  | 0.05     | 0.04           | 0.25    | 1.05           | 0.96 1.15            |
| Gender (males)             | 2096  | 0.79     | 0.26           | 0.01    | 2.21           | 1.25 3.93            |
| Education (secondary school or less) | 2041 | 0.67     | 0.59           | 0.28    | 1.95           | 0.53 7.14            |
| Income (low/lower middle)  | 1936  | 0.30     | 0.57           | 0.61    | 1.35           | 0.39 4.70            |
| Prenatal smoking (yes)     | 1043  | 0.87     | 0.6            | 0.17    | 2.40           | 0.64 9.01            |
| Born any time before due date (yes) | 1053 | 0.76     | 0.21           | 0.004   | 2.14           | 1.34 3.42            |
| Special neonatal unit care (yes) | 1073 | –0.07    | 0.49           | 0.89    | 0.93           | 0.32 2.77            |
| No. of days in neonatal unit | 1072 | 0.00     | 0.05           | 0.94    | 1              | 0.89 1.11            |
| Hours of sleep per night   | 2096  | –0.2     | 0.06           | 0.008   | 0.82           | 0.72 0.94            |
| Birth weight               | 1045  | 0.00     | 0.00           | 0.03    | 1.00           | 1.00 1.00            |
| Breast feeding (3 months or longer) | 1043 | –0.98    | 0.59           | 0.13    | 0.38           | 0.10 1.38            |
| Mother’s age at birth      | 1071  | –0.04    | 0.05           | 0.46    | 0.96           | 0.86 1.07            |
| Anyone smoking at home (yes) | 2091 | 0.67     | 0.61           | 0.30    | 1.95           | 0.51 7.55            |
| Fasted (yes)               | 2096  | 0.95     | 0.21           | 0.01    | 1.87           | 1.17 2.98            |
Table A5
Weighted simple logistic regression estimates for covariates from CHMS Cycle 1 with outcome SDQ emotional symptoms (ages 6–17 years).

| Factor (reference category)             | n    | Estimate | Standard error | P-value | Odds ratio (OR) | 95% CI for odds ratio |
|----------------------------------------|------|----------|----------------|---------|-----------------|-----------------------|
| Child’s age                            | 1717 | 0.02     | 0.02           | 0.48    | 1.02            | 0.97–1.07             |
| BMI – measured                         | 1715 | 0.06     | 0.03           | 0.05    | 1.06            | 1.00–1.13             |
| Gender (males)                         | 1717 | –0.44    | 0.17           | 0.03    | 0.65            | 0.44–0.95             |
| Education (Secondary school or less)    | 1676 | 0.65     | 0.29           | 0.04    | 1.92            | 1.03–3.61             |
| Income (low/lower middle)              | 1649 | 0.34     | 0.26           | 0.22    | 1.40            | 0.79–2.49             |
| Prenatal smoking (yes)                 | 1045 | 0.34     | 0.51           | 0.53    | 1.40            | 0.45–4.34             |
| Born any time before due date (yes)    | 1054 | 0.47     | 0.23           | 0.07    | 1.60            | 0.96–2.67             |
| Special neonatal unit care (yes)       | 1074 | 0.47     | 0.37           | 0.23    | 1.60            | 0.71–3.57             |
| No. of days in neonatal unit           | 1073 | 0.02     | –0.04          | 0.98    | 1.00            | 0.96–1.04             |
| Hours of sleep per night               | 1717 | –0.2     | 0.07           | 0.02    | 0.82            | 0.70–0.95             |
| Birth weight                           | 1046 | 0        | 0              | 0.12    | 1.00            | 1.00–1.00             |
| Breast feeding (3 months or longer)    | 1044 | –0.29    | 0.23           | 0.23    | 0.75            | 0.46–1.23             |
| Mother’s age at birth                  | 1072 | 0        | 0.01           | 0.91    | 1.00            | 0.97–1.03             |
| Anyone smoking at home (yes)           | 1713 | 0.24     | 0.26           | 0.38    | 1.27            | 0.71–2.27             |
| Fasted (yes)                           | 1717 | 0.5      | 0.18           | 0.02    | 1.65            | 1.10–2.47             |

Table A6
Weighted simple logistic regression estimates for covariates from CHMS Cycle 1 with outcome SDQ hyperactivity/inattention (ages 6–17 years).

| Factor (reference category)             | n    | Estimate | Standard error | P-value | Odds ratio (OR) | 95% CI for odds ratio |
|----------------------------------------|------|----------|----------------|---------|-----------------|-----------------------|
| Child’s age                            | 1717 | –0.05    | 0.04           | 0.15    | 0.95            | 0.88–1.02             |
| BMI – measured                         | 1715 | 0.00     | 0.02           | 0.84    | 1.00            | 0.96–1.04             |
| Gender (males)                         | 1717 | 0.51     | 0.14           | 0.004   | 1.66            | 1.22–2.24             |
| Education (secondary school or less)    | 1676 | 0.52     | 0.26           | 0.08    | 1.68            | 0.94–2.99             |
| Income (low/lower middle)              | 1649 | 0.52     | 0.20           | 0.02    | 1.68            | 1.09–2.58             |
| Prenatal smoking (yes)                 | 1045 | 0.9      | 0.28           | 0.009   | 2.47            | 1.32–4.61             |
| Born any time before due date (yes)    | 1054 | –0.07    | 0.14           | 0.63    | 0.93            | 0.69–1.27             |
| Special neonatal unit care (yes)       | 1074 | –0.1     | 0.36           | 0.79    | 0.90            | 0.41–2.02             |
| No. of days in neonatal unit           | 1073 | 0.02     | 0.95           | 0.95    | 1.00            | 0.96–1.04             |
| Hours of sleep per night               | 1717 | –0.04    | 0.08           | 0.68    | 0.97            | 0.81–1.16             |
| Birth weight                           | 1046 | 0        | 0              | 0.88    | 1.00            | 1.00–1.00             |
| Breast feeding (3 months or longer)    | 1044 | –0.41    | 0.18           | 0.04    | 0.66            | 0.45–0.98             |
| Mother’s age at birth                  | 1072 | –0.02    | 0.02           | 0.29    | 0.98            | 0.94–1.02             |
| Anyone smoking at home (yes)           | 1713 | 0.78     | 0.31           | 0.03    | 2.18            | 1.11–4.31             |
| Fasted (yes)                           | 1717 | 0.02     | 0.22           | 0.92    | 1.02            | 0.63–1.67             |
### Table A7
Weighted simple logistic regression estimates for covariates from CHMS Cycle 1 with outcome SDQ total difficulties (ages 6–17 years).

| Factor (reference category)                          | n   | Estimate | Standard error | P-value | Odds ratio (OR) | 95% CI for odds ratio |
|------------------------------------------------------|-----|----------|----------------|---------|-----------------|-----------------------|
| Child’s age                                          | 1717| -0.05    | 0.05           | 0.31    | 0.95            | 0.86                  |
| BMI – measured                                       | 1715| 0.04     | 0.03           | 0.30    | 1.04            | 0.97                  |
| Gender (males)                                       | 1717| 0.26     | 0.24           | 0.29    | 1.30            | 0.77                  |
| Education (secondary school or less)                 | 1676| 0.42     | 0.54           | 0.45    | 1.52            | 0.46                  |
| Income (low/lower middle)                            | 1649| 0.69     | 0.30           | 0.04    | 1.99            | 1.02                  |
| Prenatal smoking (yes)                               | 1045| 1.15     | 0.43           | 0.02    | 3.17            | 1.24                  |
| Born any time before due date (yes)                  | 1054| 0.32     | 0.20           | 0.13    | 1.38            | 0.90                  |
| Special neonatal unit care (yes)                     | 1074| 0.35     | 0.24           | 0.18    | 1.42            | 0.83                  |
| No. of days in neonatal unit                         | 1073| -0.00    | 0.01           | 0.85    | 1.00            | 0.98                  |
| Hours of sleep per night                             | 1717| -0.09    | 0.12           | 0.48    | 0.92            | 0.70                  |
| Birth weight                                         | 1046| 0.00     | 0.00           | 0.65    | 1.00            | 1.00                  |
| Breast feeding (3 months or longer)                  | 1044| -0.45    | 0.17           | 0.02    | 0.64            | 0.43                  |
| Mother’s age at birth                                | 1072| -0.03    | 0.03           | 0.35    | 0.97            | 0.91                  |
| Anyone smoking at home (yes)                         | 1713| 0.77     | 0.33           | 0.04    | 2.16            | 1.04                  |
| Fasted (yes)                                         | 1717| 0.37     | 0.28           | 0.21    | 1.45            | 0.78                  |

### B. Multiple logistic regressions – weighted results for all children

See Tables B1–B6
Table B1
Weighted multiple logistic regression estimates from CHMS Cycle 1 with reported ADD/ADHD (6–19 years of age).

| Exposure | Covariate | Estimate | SE  | P-value | Odds ratio | 95% CI for odds ratio |
|----------|-----------|----------|-----|---------|------------|-----------------------|
| BPA      | Intercept | -2.96    | 0.72| 0.0018  | 0.76       | 0.51 1.14             |
|          | ln(creatinine) | -0.28    | 0.18| 0.1626  | 1.29       | 0.86 1.94             |
|          | ln(BPA)   | 0.26     | 0.18| 0.06089 | 2.32       | 1.10 4.90             |
|          | Smoking at home (yes) | 0.84    | 0.34| 0.0312  | 1.95       | 0.99 3.83             |
|          | Child's age | 0.05    | 0.05| 0.3131  |            |                       |
|          | Income (low/low-middle) | 0.67    | 0.31| 0.0533  |            |                       |
|          | Gender (males) | -0.17   | 0.63| 0.7911  | 3.06       | 1.67 5.61             |
|          | BMI       | -0.10    | 0.03| 0.0152  | 0.91       | 0.84 0.98             |
|          | ln(lead)  | 0.83     | 0.26| 0.0087  | 2.28       | 1.29 4.04             |
|          | Gender*child's age | 0.10    | 0.05| 0.0593  | 1.16       | 1.06 1.27             |
|          | Age: males |         |     |         | 1.05       | 0.96 1.15             |
|          | Age: females |        |     |         |            |                       |
| Blood lead | Intercept | -4.13    | 0.40| < 0.0001| 2.39       | 1.32 4.32             |
|          | ln(lead)  | 0.87     | 0.27| 0.0080  | 2.54       | 1.18 5.46             |
|          | Smoking at home (yes) | 0.93    | 0.35| 0.0215  |            |                       |
|          | Gender (males) | 1.08    | 0.32| 0.0064  | 2.93       | 1.45 5.94             |
|          | Income (low/low-middle) | 0.76    | 0.38| 0.0674  | 2.15       | 0.94 4.91             |
| MBP      | Intercept | -2.67    | 0.68| 0.0029  | 1.42       | 0.82 2.48             |
|          | ln(creatinine) | 0.35    | 0.25| 0.1869  | 0.81       | 0.55 1.20             |
|          | ln(MBP)   | -0.21    | 0.18| 0.2637  | 3.61       | 1.30 10.03            |
|          | Income (low/low-middle) | -0.24  | 0.81| 0.7697  | 0.78       | 0.10 6.15             |
|          | Gender (males) | 0.44    | 0.41| 0.3151  |            |                       |
|          | ln(lead)  | 1.00     | 0.27| 0.0046  | 2.71       | 1.47 5.00             |
|          | Income*gender | 1.53    | 0.83| 0.0971  | 7.11       | 1.12 44.92            |
|          | Males vs. females (low/low-middle) |         |     |         | 1.55       | 0.69 3.46             |
|          | Males vs. females (middle/upper) |        |     |         |            |                       |
| MBzP     | Intercept | -4.04    | 0.87| 0.0007  | 0.76       | 0.45 1.29             |
|          | ln(creatinine) | -0.28   | 0.24| 0.2707  | 1.48       | 0.93 2.36             |
|          | ln(MBzP)  | 0.39     | 0.21| 0.0912  |            |                       |
|          | Child's age | 0.05    | 0.06| 0.4167  | 2.21       | 0.83 5.84             |
|          | Income (low/low-middle) | 0.79    | 0.44| 0.1013  |            |                       |
|          | Gender (males) | -1.07   | 0.67| 0.1390  | 2.81       | 1.45 5.45             |
|          | ln(lead)  | 0.84     | 0.25| 0.0066  | 2.33       | 1.33 4.06             |
|          | BMI       | -0.08    | 0.04| 0.0685  | 0.92       | 0.84 1.01             |
|          | Child's age*gender | 0.17    | 0.06| 0.0135  | 1.24       | 1.07 1.44             |
|          | Child's age: males |         |     |         | 1.05       | 0.94 1.18             |
|          | Child's age: females |         |     |         |            |                       |
| MCPP     | Intercept | -3.81    | 0.46| < 0.0001| 1.25       | 0.75 2.07             |
|          | ln(creatinine) | 0.22    | 0.23| 0.3578  | 0.98       | 0.72 1.34             |
|          | ln(MCPP)  | -0.02    | 0.14| 0.8977  |            |                       |
|          | Income (low/low-middle) | 0.90    | 0.53| 0.1187  | 2.45       | 0.76 7.84             |
|          | Gender (males) | 1.04    | 0.38| 0.0187  | 2.83       | 1.23 6.50             |
|          | ln(lead)  | 0.94     | 0.27| 0.0053  | 2.56       | 1.41 4.66             |
| MEHHP    | Intercept | -2.66    | 0.84| 0.0090  | 1.53       | 0.83 2.82             |
|          | ln(creatinine) | 0.43    | 0.28| 0.1517  |            |                       |
|          | ln(MEHHP) | -0.34    | 0.24| 0.1771  | 0.71       | 0.42 1.20             |
| Exposure Covariate                  | Estimate | SE  | P-value | Odds ratio | 95% CI for odds ratio |
|------------------------------------|----------|-----|---------|------------|----------------------|
| Income (low/low-middle)            | 0.89     | 0.53| 0.1180  | 2.44       | 0.77 7.78            |
| Gender (males)                     | 1.01     | 0.37| 0.0203  | 2.74       | 1.21 6.21            |
| ln(lead)                           | 0.99     | 0.28| 0.0050  | 2.70       | 1.45 5.05            |
| MEHP                               |          |     |         |            |                      |
| Intercept                          | −3.63    | 0.53| < 0.0001|            |                      |
| ln(creatinine)                     | 0.29     | 0.25| 0.2749  | 1.34       | 0.77 2.33            |
| ln(MEHP)                           | −0.16    | 0.14| 0.2830  | 0.85       | 0.62 1.17            |
| Income (low/low-middle)            | 0.92     | 0.53| 0.1070  | 2.51       | 0.79 7.99            |
| Gender (males)                     | 1.03     | 0.38| 0.0210  | 2.81       | 1.21 6.56            |
| ln(lead)                           | 0.97     | 0.28| 0.0048  | 2.64       | 1.44 4.85            |
| MEOHP                              |          |     |         |            |                      |
| Intercept                          | −2.82    | 0.82| 0.0054  |            |                      |
| ln(creatinine)                     | 0.42     | 0.29| 0.1808  | 1.52       | 0.80 2.89            |
| ln(MEOHP)                          | −0.34    | 0.25| 0.1935  | 0.71       | 0.41 1.22            |
| Income (low/low-middle)            | 0.89     | 0.53| 0.1173  | 2.44       | 0.77 7.78            |
| Gender (males)                     | 0.99     | 0.37| 0.0208  | 2.70       | 1.20 6.08            |
| ln(lead)                           | 0.99     | 0.28| 0.0051  | 2.70       | 1.44 5.05            |
| MEP                                |          |     |         |            |                      |
| Intercept                          | −2.70    | 0.99| 0.0193  | 1.61       | 0.67 3.88            |
| ln(creatinine)                     | 0.48     | 0.40| 0.2587  | 1.61       | 0.67 3.88            |
| ln(MEP)                            | −0.29    | 0.23| 0.2299  | 0.75       | 0.45 1.24            |
| Income (low/low-middle)            | 0.93     | 0.52| 0.1031  | 2.52       | 0.80 7.95            |
| Gender (males)                     | 0.97     | 0.36| 0.0218  | 2.64       | 1.19 5.90            |
| ln(lead)                           | 0.96     | 0.28| 0.0059  | 2.61       | 1.40 4.86            |

*Odds ratio calculated at average value of Child’s age*
Table B2
Weighted multiple logistic regression estimates from CHMS Cycle 1 with report of a learning disability (6–19 years of age).

| Exposure Covariate | Estimate | SE   | P-value   | Odds ratio | 95% CI for odds ratio |
|--------------------|----------|------|-----------|------------|-----------------------|
| BPA                | Intercept | 3.03 | 0.28      | 0.00001    | 3.03                  | 0.28      | 0.00001 |
|                    | ln(creatinine) | 0.10 | 0.11 | 0.3623 | 1.11 | 0.87 | 1.41 |
|                    | ln(BPA)   | 0.09  | 0.17 | 0.6089 | 1.09 | 0.76 | 1.57 |
|                    | Smoking at home (yes) | 0.50 | 0.19 | 0.0252 | 1.65 | 1.08 | 2.53 |
|                    | Gender (males) | 0.57 | 0.26 | 0.0467 | 1.78 | 1.01 | 3.12 |
|                    | ln(lead)   | 1.10  | 0.36 | 0.0116 | 1.11 | 0.87 | 1.41 |
|                    | Income (low/low-middle) | 0.66 | 0.35 | 0.0869 | 2.44 | 1.31 | 4.52 |
|                    | ln(lead)*Income | -1.27 | 0.45 | 0.0163 | 1.65 | 1.08 | 2.53 |

| Blood lead  | Intercept | 3.03 | 0.28      | 0.00001    | 3.03                  | 0.28      | 0.00001 |
|             | ln(lead)   | 1.02  | 0.35 | 0.0138 | 1.11 | 0.87 | 1.41 |
|             | Smoking at home (yes) | 0.57 | 0.18 | 0.0088 | 1.76 | 1.19 | 2.61 |
|             | Income (low/low-middle) | 0.64 | 0.33 | 0.0791 | 2.38 | 1.34 | 4.24 |
| MBP  | Intercept | -1.38 | 0.72 | 0.0825 | 1.61 | 1.18 | 2.21 |
|     | ln(creatinine) | 0.48 | 0.14 | 0.0064 | 1.61 | 1.18 | 2.21 |
|     | ln(MBP)    | -0.23 | 0.16 | 0.1797 | 0.79 | 0.56 | 1.13 |
|     | Gender (males) | 0.66 | 0.29 | 0.0422 | 1.93 | 1.03 | 3.62 |
|     | Income (low/low-middle) | -0.78 | 0.40 | 0.0790 | 0.46 | 0.19 | 1.11 |
|     | ln(lead)   | 0.85  | 0.28 | 0.0102 | 2.35 | 1.28 | 4.31 |

| MBzP   | Intercept | -2.96 | 0.60 | 0.0005 | 1.61 | 1.16 | 2.17 |
|        | ln(creatinine) | 0.15 | 0.15 | 0.3396 | 1.61 | 1.16 | 2.17 |
|        | ln(MBzP)   | 0.22  | 0.16 | 0.2017 | 1.24 | 0.87 | 1.77 |
|        | Gender (males) | 0.70 | 0.30 | 0.0383 | 2.02 | 1.05 | 3.98 |
|        | Income (low/low-middle) | -0.70 | 0.41 | 0.1184 | 0.50 | 0.20 | 1.23 |
|        | ln(lead)   | 0.80  | 0.28 | 0.0144 | 2.23 | 1.21 | 4.08 |

| MCP  | Intercept | -2.42 | 0.43 | 0.0002 | 1.38 | 0.99 | 1.93 |
|      | ln(creatinine) | 0.33 | 0.15 | 0.0356 | 1.38 | 0.99 | 1.93 |
|      | ln(MCPP)   | 0.17  | 0.16 | 0.3235 | 1.16 | 0.84 | 1.61 |
|      | Gender (males) | 0.97 | 0.32 | 0.0115 | 2.02 | 1.05 | 3.98 |
|      | Income (low/low-middle) | -0.74 | 0.41 | 0.0951 | 0.48 | 0.19 | 1.16 |
|      | ln(lead)   | 0.83  | 0.27 | 0.0111 | 2.29 | 1.26 | 4.17 |
|      | ln(MCPP) * gender | -0.28 | 0.09 | 0.0114 | 0.89 | 0.66 | 1.21 |

| MEHHP  | Intercept | -1.32 | 0.97 | 0.1986 | 1.62 | 1.02 | 2.55 |
|        | ln(creatinine) | 0.48 | 0.21 | 0.0415 | 1.62 | 1.02 | 2.55 |
|        | ln(MEHHP) | -0.27 | 0.25 | 0.2899 | 0.76 | 0.44 | 1.31 |
|        | Gender (males) | 0.66 | 0.28 | 0.0364 | 1.94 | 1.05 | 3.56 |
|        | Income (low/low-middle) | -0.72 | 0.39 | 0.0947 | 0.49 | 0.20 | 1.16 |
|        | ln(lead) | 0.86  | 0.27 | 0.0083 | 2.37 | 1.31 | 4.27 |
Table B2 (continued)

| Exposure | Covariate        | Estimate | SE     | P-value  | Odds ratio | 95% CI for odds ratio |
|----------|------------------|----------|--------|----------|------------|-----------------------|
| MEHP     | Intercept        | -2.03    | 0.38   | 0.0003   | 1.48       | 1.03 2.11             |
|          | ln(creatinine)   | 0.39     | 0.16   | 0.0344   | 1.48       | 1.03 2.11             |
|          | ln(MEHP)         | -0.17    | 0.16   | 0.3283   | 0.85       | 0.59 1.21             |
|          | Gender (males)   | 0.68     | 0.29   | 0.0366   | 1.98       | 1.05 3.71             |
|          | Income (low/low-Middle) | -0.75 | 0.40 | 0.0882   | 0.47       | 0.19 1.14             |
|          | ln(lead)         | 0.85     | 0.27   | 0.0096   | 2.34       | 1.29 4.26             |
| MEOHP    | Intercept        | -1.45    | 0.92   | 0.1421   | 1.60       | 1.00 2.58             |
|          | ln(creatinine)   | 0.47     | 0.22   | 0.0510   | 1.60       | 1.00 2.58             |
|          | ln(MEOHP)        | -0.27    | 0.26   | 0.3197   | 0.76       | 0.43 1.35             |
|          | Gender (males)   | 0.65     | 0.28   | 0.0377   | 1.92       | 1.05 3.51             |
|          | Income (low/low-Middle) | -0.72 | 0.40 | 0.0946   | 0.49       | 0.20 1.16             |
|          | ln(lead)         | 0.86     | 0.27   | 0.0085   | 2.37       | 1.31 4.28             |
| MEP      | Intercept        | -1.29    | 0.69   | 0.0874   | 1.70       | 1.01 2.88             |
|          | ln(creatinine)   | 0.53     | 0.24   | 0.0467   | 1.70       | 1.01 2.88             |
|          | ln(MEP)          | -0.24    | 0.17   | 0.1868   | 0.79       | 0.54 1.15             |
|          | Gender (males)   | 0.63     | 0.28   | 0.0451   | 1.88       | 1.02 3.49             |
|          | Income (low/low-middle) | -0.76 | 0.40 | 0.0837   | 0.47       | 0.19 1.13             |
|          | ln(lead)         | 0.84     | 0.29   | 0.0142   | 2.31       | 1.23 4.34             |

a Odds ratio calculated at average value of ln(Lead)
b Odds ratio calculated at average value of ln(MCPP)
Table B3
Weighted multiple logistic regression estimates from CHMS Cycle 1 with reported psychotropic medicine taken in past month for behavioral problems (6–19 years of age).

| Exposure Covariate       | Estimate | SE    | P-value | Odds ratio | 95% CI for odds ratio |
|--------------------------|----------|-------|---------|------------|-----------------------|
| **BPA**                  |          |       |         |            |                       |
| Intercept                | -2.53    | 0.44  | 0.0001  | 0.84       | 0.58 1.22              |
| ln(creatine)             | -0.17    | 0.17  | 0.3345  |            |                       |
| ln(BPA)                  | -0.03    | 0.15  | 0.8625  |            |                       |
| Hours slept              | -0.20    | 0.07  | 0.0119  | 0.82       | 0.70 0.95              |
| Gender (males)           | 0.54     | 0.28  | 0.0826  | 2.16       | 1.28 3.62              |
| Fasted (yes)             | 0.69     | 0.25  | 0.0195  | 1.98       | 1.14 3.45              |
| ln(BPA)*gender           | 0.65     | 0.21  | 0.0093  | 1.87       | 1.24 2.83              |
| **Blood lead**           |          |       |         |            |                       |
| Intercept                | -2.19    | 0.47  | 0.0007  | 2.08       | 1.01 4.29              |
| ln(lead)                 | 1.43     | 0.40  | 0.0042  |            |                       |
| Gender (males)           | 0.73     | 0.33  | 0.0485  | 2.25       | 1.19 4.26              |
| Fasted (yes)             | 0.51     | 0.30  | 0.1206  | 1.98       | 1.14 3.45              |
| ln(lead)*fasted          | -1.62    | 0.55  | 0.0135  | 4.20       | 1.92 9.17              |
| **MBP**                  |          |       |         |            |                       |
| Intercept                | -2.43    | 0.79  | 0.0103  | 1.19       | 0.68 2.11              |
| ln(creatine)             | 0.18     | 0.26  | 0.5067  |            |                       |
| ln(MBP)                  | -0.02    | 0.22  | 0.9369  | 0.98       | 0.60 1.60              |
| Hours slept              | -0.20    | 0.05  | 0.0010  | 0.82       | 0.74 0.90              |
| Gender (males)           | 0.92     | 0.31  | 0.0138  | 2.51       | 1.26 5.01              |
| Fasted (yes)             | 0.71     | 0.23  | 0.0108  | 2.04       | 1.22 3.40              |
| **MBzP**                 |          |       |         |            |                       |
| Intercept                | -1.62    | 0.63  | 0.0270  | 1.05       | 0.63 1.76              |
| ln(creatine)             | 0.05     | 0.23  | 0.8306  |            |                       |
| ln(MBzP)                 | -0.25    | 0.19  | 0.2147  | 0.98       | 0.60 1.60              |
| Hours slept              | -0.23    | 0.05  | 0.0008  | 0.80       | 0.70 0.90              |
| Gender (males)           | -1.14    | 0.49  | 0.0415  | 2.45       | 1.31 4.58              |
| Fasted (yes)             | 0.77     | 0.25  | 0.0110  | 2.16       | 1.24 3.77              |
| ln(MBzP)*gender          | 0.68     | 0.15  | 0.0010  | 1.54       | 1.07 2.23              |
| **MCPP**                 |          |       |         |            |                       |
| Intercept                | -2.90    | 0.51  | 0.0001  | 1.05       | 0.63 1.76              |
| ln(creatine)             | -0.32    | 0.29  | 0.2894  |            |                       |
| ln(MCPP)                 | 0.51     | 0.19  | 0.0202  | 1.66       | 1.10 2.51              |
| Hours slept              | -0.23    | 0.05  | 0.0008  | 0.79       | 0.71 0.89              |
| Gender (males)           | 0.93     | 0.33  | 0.0181  | 2.42       | 1.27 4.61              |
| Fasted (yes)             | 1.34     | 0.30  | 0.0010  | 2.45       | 1.50 3.99              |
| ln(creatinine)*gender    | 0.59     | 0.29  | 0.0640  | 1.66       | 1.15 2.40              |
| ln(MCPP)*fasted          | -0.51    | 0.15  | 0.0051  | 1.00       | 0.69 1.44              |
| **MEHHP**                |          |       |         |            |                       |
| Intercept                | -2.80    | 1.05  | 0.0221  | 1.09       | 0.56 2.10              |
| ln(creatine)             | -0.28    | 0.36  | 0.4473  |            |                       |
| ln(MEHHP)                | 0.08     | 0.30  | 0.7864  | 1.09       | 0.56 2.10              |
| Hours slept              | -0.20    | 0.05  | 0.0014  | 0.81       | 0.73 0.91              |
| Gender (males)           | 0.92     | 0.32  | 0.0159  | 2.39       | 1.28 4.46              |
| Fasted (yes)             | 0.73     | 0.22  | 0.0067  | 2.08       | 1.28 3.37              |
| ln(creatinine)*gender    | 0.62     | 0.29  | 0.0518  |             |                       |
| **MEHP**                 |          |       |         |            |                       |
| Intercept                | -2.55    | 0.66  | 0.0027  |            |                       |
| ln(creatine)             | -0.22    | 0.38  | 0.5757  |            |                       |
### Table B3 (continued)

| Exposure Covariate | Estimate | SE    | P-value | Odds ratio | 95% CI for odds ratio |
|--------------------|----------|-------|---------|------------|-----------------------|
| ln(MEHP)           | 0.01     | 0.32  | 0.9795  | 1.01       | 0.50 2.05             |
| Hours slept        | −0.20    | 0.05  | 0.0012  | 0.82       | 0.74 0.91             |
| Gender (males)     | 0.91     | 0.33  | 0.0184  | 2.37       | 1.26 4.48             |
| Fasted (yes)       | 0.71     | 0.23  | 0.0099  | 2.03       | 1.23 3.34             |
| ln(creatinine)     | 0.61     | 0.30  | 0.0671  |            |                       |

**MEOHP**

| Intercept          | −2.77    | 0.92  | 0.0120  |            |                       |
| ln(creatinine)     | −0.29    | 0.36  | 0.4405  |            |                       |
| ln(MEOHP)          | 0.09     | 0.30  | 0.7702  | 1.09       | 0.56 2.13             |
| Hours slept        | −0.21    | 0.05  | 0.0014  | 0.81       | 0.73 0.91             |
| Gender (males)     | 0.92     | 0.32  | 0.0147  | 2.40       | 1.29 4.46             |
| Fasted (yes)       | 0.73     | 0.22  | 0.0063  | 2.08       | 1.29 3.36             |
| ln(creatinine)     | 0.63     | 0.28  | 0.0486  |            |                       |

**MEP**

| Intercept          | −3.36    | 0.82  | 0.0018  |            |                       |
| ln(creatinine)     | −0.35    | 0.31  | 0.2853  |            |                       |
| ln(MEP)            | 0.16     | 0.13  | 0.2471  | 1.17       | 0.88 1.54             |
| Hours slept        | −0.18    | 0.05  | 0.0045  | 0.84       | 0.75 0.93             |
| Gender (males)     | 0.96     | 0.34  | 0.0168  | 2.50       | 1.30 4.80             |
| Fasted (yes)       | 0.71     | 0.23  | 0.0097  | 2.03       | 1.23 3.33             |
| ln(creatinine)     | 0.61     | 0.30  | 0.0664  |            |                       |

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* Odds ratio calculated at average value of ln(BPA)
* Odds ratio calculated at average value of ln(Lead)
* Odds ratio calculated at average value of ln(MBzP)
* Odds ratio calculated at average value of ln(creatinine)
* Odds ratio calculated at average value of ln(MCPP)
## Table B4
Weighted multiple logistic regression estimates from CHMS Cycle 1 with outcome SDQ Emotional Symptoms (ages 6–17 years).

| Exposure | Covariate               | Estimate | SE   | P-value | Odds ratio | 95% CI for odds ratio |
|----------|-------------------------|----------|------|---------|------------|-----------------------|
| BPA      | Intercept               | 1.50     | 1.12 | 0.2088  | 1.50       | 0.92                 | 2.63                 |
|          | ln(creatinine)          | 0.20     | 0.13 | 0.1416  | 1.23       | 0.92                 | 1.63                 |
|          | ln(BPA)                 | 0.07     | 0.05 | 0.1682  | 1.07       | 0.97                 | 1.19                 |
|          | Hours slept             | −0.27    | 0.10 | 0.0183  | 0.77       | 0.62                 | 0.95                 |
|          | Gender (males)          | −0.41    | 0.11 | 0.0032  | 0.66       | 0.52                 | 0.84                 |
|          | Fasted (yes)            | 0.49     | 0.21 | 0.0424  | 1.63       | 1.02                 | 2.61                 |
|          | Child’s age             | −0.08    | 0.03 | 0.0415  | 0.92       | 0.86                 | 1.00                 |
| Blood lead | Intercept             | −0.22    | 0.75 | 0.7758  |            |                      |                      |
|          | ln(lead)                | 0.08     | 0.21 | 0.7208  | 1.08       | 0.68                 | 1.71                 |
|          | Gender (males)          | −0.40    | 0.18 | 0.0508  | 0.67       | 0.45                 | 1.00                 |
|          | Hours slept             | −0.19    | 0.08 | 0.0370  | 0.83       | 0.70                 | 0.99                 |
|          | Fasted (yes)            | 0.53     | 0.25 | 0.0553  | 1.70       | 0.99                 | 2.95                 |
|          | Education (secondary    | 0.57     | 0.23 | 0.0324  | 1.78       | 1.06                 | 2.97                 |
|          | school or less)         |          |      |         |            |                      |                      |
| MBP      | Intercept               | −0.99    | 0.63 | 0.1426  |            |                      |                      |
|          | ln(creatinine)          | 0.35     | 0.17 | 0.0614  | 1.42       | 0.98                 | 2.04                 |
|          | ln(MBP)                 | −0.14    | 0.16 | 0.4087  | 0.87       | 0.61                 | 1.24                 |
|          | Gender (males)          | −0.32    | 0.16 | 0.0631  | 0.72       | 0.51                 | 1.02                 |
| MBzP     | Intercept               | 1.92     | 1.06 | 0.0962  |            |                      |                      |
|          | ln(creatinine)          | 0.38     | 0.17 | 0.0431  | 1.47       | 1.01                 | 2.13                 |
|          | ln(MBzP)                | −0.11    | 0.08 | 0.2049  | 0.90       | 0.75                 | 1.07                 |
|          | Gender (males)          | −0.29    | 0.15 | 0.0792  | 0.75       | 0.53                 | 1.04                 |
|          | Hours slept             | −0.24    | 0.10 | 0.0386  | 0.79       | 0.63                 | 0.99                 |
|          | Child’s age             | −0.08    | 0.04 | 0.0503  | 0.92       | 0.84                 | 1.00                 |
| MCPP     | Intercept               | 1.56     | 1.11 | 0.1875  |            |                      |                      |
|          | ln(creatinine)          | 0.34     | 0.18 | 0.0833  | 1.41       | 0.95                 | 2.08                 |
|          | ln(MCPP)                | −0.06    | 0.08 | 0.4643  | 0.94       | 0.78                 | 1.13                 |
|          | Gender (males)          | −0.29    | 0.16 | 0.0890  | 0.75       | 0.53                 | 1.05                 |
|          | Hours slept             | −0.23    | 0.10 | 0.0447  | 0.79       | 0.63                 | 0.99                 |
|          | Child’s age             | −0.08    | 0.04 | 0.0637  | 0.92       | 0.85                 | 1.01                 |
| MEHHP    | Intercept               | −1.69    | 0.43 | 0.0023  |            |                      |                      |
|          | ln(creatinine)          | 0.20     | 0.10 | 0.0654  | 1.22       | 0.98                 | 1.52                 |
|          | ln(MEHHP)               | 0.05     | 0.11 | 0.6388  | 1.05       | 0.83                 | 1.33                 |
|          | Gender (males)          | −0.30    | 0.15 | 0.0764  | 0.74       | 0.53                 | 1.04                 |
| MEHP     | Intercept               | −1.49    | 0.16 | < 0.0001|            |                      |                      |
|          | ln(creatinine)          | 0.25     | 0.10 | 0.0336  | 1.28       | 1.02                 | 1.60                 |
|          | ln(MEHP)                | −0.02    | 0.09 | 0.8602  | 0.98       | 0.80                 | 1.21                 |
|          | Gender (males)          | −0.30    | 0.15 | 0.0755  | 0.74       | 0.53                 | 1.04                 |
| MEOHP    | Intercept               | −1.68    | 0.38 | 0.0011  |            |                      |                      |
Table B4 (continued)

| Exposure | Covariate  | Estimate | SE   | P-value | Odds ratio | 95% CI for odds ratio |
|----------|------------|----------|------|---------|------------|-----------------------|
| ln(creatinine) | 0.20 | 0.10 | 0.0750 | 1.22 | 0.98 | 1.53 |
| ln(MEOHP) | 0.06 | 0.11 | 0.6145 | 1.06 | 0.83 | 1.34 |
| Gender (males) | -0.30 | 0.16 | 0.0796 | 0.74 | 0.53 | 1.04 |
| MEP | Intercept | -1.56 | 0.27 | 0.0001 |  |  |
| ln(creatinine) | 0.22 | 0.12 | 0.0840 | 1.25 | 0.96 | 1.62 |
| ln(MEP) | 0.01 | 0.07 | 0.8631 | 1.01 | 0.87 | 1.18 |
| Gender (males) | -0.30 | 0.15 | 0.0716 | 0.74 | 0.53 | 1.03 |
| Exposure | Covariate                                            | Estimate | SE    | P-value      | Odds ratio | 95% CI for odds ratio |
|----------|------------------------------------------------------|----------|-------|--------------|------------|----------------------|
| BPA      | Intercept                                            | -1.96    | 0.14  | <0.0001      | 0.92       | 0.71 1.20            |
|          | ln(creatinine)                                       | -0.08    | 0.12  | 0.5184       | 0.92       | 0.69 1.26            |
|          | ln(BPA)                                              | 0.27     | 0.05  | 0.000003     | 0.92       | 0.71 1.20            |
|          | Smoking at home (yes)                                | 0.91     | 0.24  | 0.0031       | 0.92       | 0.67 1.28            |
|          | ln(lead)                                             | 0.94     | 0.16  | 0.0001       | 0.92       | 0.67 1.28            |
|          | ln(BPA)*smoking at home                              | -0.67    | 0.21  | 0.0079       | 0.92       | 0.67 1.28            |
|          | Smoking at home (yes vs. no)                         |          |       |              | 1.96       | 1.23 3.11            |
|          | ln(BPA): smoking at home                             |          |       |              | 0.67       | 0.46 1.00            |
|          | ln(BPA): no smoking at home                          |          |       |              | 1.31       | 1.18 1.46            |
| Blood lead | Intercept                                          | -2.06    | 0.20  | <0.0001      | 0.92       | 0.71 1.20            |
|          | ln(lead)                                             | 0.85     | 0.18  | 0.0005       | 0.92       | 0.71 1.20            |
|          | Gender (males)                                       | 0.36     | 0.18  | 0.0705       | 0.92       | 0.71 1.20            |
|          | Smoking at home (Yes)                                | 0.74     | 0.36  | 0.0620       | 0.92       | 0.71 1.20            |
| MBP      | Intercept                                            | -2.40    | 0.73  | 0.0070       | 0.92       | 0.71 1.20            |
|          | ln(creatinine)                                       | 0.05     | 0.20  | 0.7879       | 0.92       | 0.71 1.20            |
|          | ln(MBP)                                              | 0.16     | 0.21  | 0.4626       | 0.92       | 0.71 1.20            |
|          | ln(lead)                                             | 0.96     | 0.20  | 0.0006       | 0.92       | 0.71 1.20            |
|          | Smoking at home (yes)                                | 2.48     | 0.92  | 0.0204       | 0.92       | 0.71 1.20            |
|          | ln(MBP)*smoking at home                              | -0.58    | 0.28  | 0.0628       | 0.92       | 0.71 1.20            |
|          | Smoking at home (yes vs. no)                         |          |       |              | 1.96       | 1.23 3.11            |
|          | ln(MBP): smoking at home                             |          |       |              | 0.67       | 0.46 1.00            |
|          | ln(MBP): no smoking at home                          |          |       |              | 1.31       | 1.18 1.46            |
| MBzP     | Intercept                                            | -2.25    | 0.30  | <0.0001      | 0.92       | 0.71 1.20            |
|          | ln(creatinine)                                       | -0.02    | 0.11  | 0.8288       | 0.92       | 0.71 1.20            |
|          | ln(MBzP)                                             | 0.16     | 0.09  | 0.1047       | 0.92       | 0.71 1.20            |
|          | ln(lead)                                             | 0.97     | 0.19  | 0.0003       | 0.92       | 0.71 1.20            |
| MCPP     | Intercept                                            | -1.97    | 0.22  | <0.0001      | 0.92       | 0.71 1.20            |
|          | ln(creatinine)                                       | -0.05    | 0.13  | 0.7145       | 0.92       | 0.71 1.20            |
|          | ln(MCPP)                                             | 0.20     | 0.10  | 0.0821       | 0.92       | 0.71 1.20            |
|          | ln(lead)                                             | 0.95     | 0.20  | 0.0006       | 0.92       | 0.71 1.20            |
| MEHHP    | Intercept                                            | -1.89    | 0.32  | 0.0001       | 0.92       | 0.71 1.20            |
|          | ln(creatinine)                                       | 0.07     | 0.12  | 0.6030       | 0.92       | 0.71 1.20            |
|          | ln(MEHHP)                                            | 0.04     | 0.08  | 0.5976       | 0.92       | 0.71 1.20            |
|          | ln(lead)                                             | 0.98     | 0.20  | 0.0004       | 0.92       | 0.71 1.20            |
| MEHP     | Intercept                                            | -1.68    | 0.17  | <0.0001      | 0.92       | 0.71 1.20            |
|          | ln(creatinine)                                       | 0.12     | 0.12  | 0.3375       | 0.92       | 0.71 1.20            |
|          | ln(MEHHP)                                            | -0.05    | 0.11  | 0.6440       | 0.92       | 0.71 1.20            |
|          | ln(lead)                                             | 0.99     | 0.20  | 0.0004       | 0.92       | 0.71 1.20            |
| MEOHP    | Intercept                                            | -1.79    | 0.31  | 0.0001       | 0.92       | 0.71 1.20            |
|          | ln(creatinine)                                       | 0.08     | 0.12  | 0.5150       | 0.92       | 0.71 1.20            |
|          | ln(MEOHP)                                            | 0.02     | 0.08  | 0.8472       | 0.92       | 0.71 1.20            |
|          | ln(lead)                                             | 0.99     | 0.20  | 0.0004       | 0.92       | 0.71 1.20            |
| MEP      | Intercept                                            | -1.50    | 0.33  | 0.0008       | 0.92       | 0.71 1.20            |
|          | ln(creatinine)                                       | 0.15     | 0.12  | 0.2101       | 0.92       | 0.71 1.20            |
|          | ln(MEP)                                              | -0.07    | 0.06  | 0.3207       | 0.92       | 0.71 1.20            |
|          | ln(lead)                                             | 0.99     | 0.20  | 0.0005       | 0.92       | 0.71 1.20            |

a Odds ratio calculated at average value of ln(BPA)

b Odds ratio calculated at average value of ln(MBP)
### Weighted multiple logistic regression estimates from CHMS Cycle 1 with outcome SDQ Total Difficulties (ages 6–17 years).

| Exposure | Covariate        | Estimate | SE   | P-value | Odds ratio | 95% CI for odds ratio |
|----------|------------------|----------|------|---------|------------|-----------------------|
| BPA      | Intercept        | −2.36    | 0.18 | < 0.0001| 0.84       | 0.60 1.17             |
|          | ln(creatinine)   | −0.18    | 0.15 | 0.2686  | 1.14       | 0.96 1.36             |
|          | ln(BPA)          | 0.13     | 0.08 | 0.1118  | 1.76       | 0.95 3.27             |
|          | Sm smoking at home (yes) | 0.57 | 0.28 | 0.0680  | 2.24       | 1.29 3.87             |
|          | ln(lead)         | 0.81     | 0.25 | 0.0080  |            |                       |
| Blood lead | Intercept        | −2.25    | 0.16 | < 0.0001| 2.16       | 1.33 3.51             |
|          | ln(lead)         | 0.77     | 0.22 | 0.0049  |            |                       |
|          | Smoking at home (yes) | 0.74 | 0.38 | 0.0739  | 2.10       | 0.92 4.81             |
| MBP      | Intercept        | −2.45    | 0.95 | 0.0250  | 0.97       | 0.54 1.72             |
|          | ln(creatinine)   | −0.04    | 0.26 | 0.8961  | 1.09       | 0.62 1.91             |
|          | ln(MBP)          | 0.09     | 0.25 | 0.0189  | 2.32       | 1.43 3.76             |
|          | ln(lead)         | 0.84     | 0.22 | 0.0029  |            |                       |
| MBzP     | Intercept        | −3.15    | 0.39 | < 0.0001| 2.26       | 1.34 3.82             |
|          | ln(creatinine)   | −0.20    | 0.19 | 0.3213  | 1.37       | 1.06 1.76             |
|          | ln(MBzP)         | 0.31     | 0.11 | 0.0189  | 2.32       | 1.43 3.76             |
|          | ln(lead)         | 0.82     | 0.24 | 0.0056  |            |                       |
| MCPP     | Intercept        | −2.19    | 0.29 | < 0.0001| 0.98       | 0.57 1.69             |
|          | ln(creatinine)   | −0.02    | 0.25 | 0.9427  | 1.06       | 0.68 1.66             |
|          | ln(MCPP)         | 0.06     | 0.20 | 0.7691  | 2.33       | 1.41 3.84             |
|          | ln(lead)         | 0.85     | 0.23 | 0.0034  |            |                       |
| MEHHP    | Intercept        | −1.72    | 0.77 | 0.0457  | 1.11       | 0.60 2.05             |
|          | ln(creatinine)   | −0.11    | 0.28 | 0.7079  | 0.89       | 0.60 1.33             |
|          | ln(MEHHP)        | 0.06     | 0.18 | 0.5451  | 2.38       | 1.38 4.10             |
|          | ln(lead)         | 0.87     | 0.25 | 0.0051  |            |                       |
| MEHP     | Intercept        | −1.92    | 0.31 | 0.0001  | 1.13       | 0.66 1.93             |
|          | ln(creatinine)   | 0.12     | 0.24 | 0.6314  | 0.86       | 0.58 1.26             |
|          | ln(MEHHP)        | −0.16    | 0.18 | 0.3910  | 2.41       | 1.43 4.07             |
|          | ln(lead)         | 0.88     | 0.24 | 0.0035  |            |                       |
| MEOHP    | Intercept        | −1.69    | 0.70 | 0.0347  | 1.13       | 0.61 2.10             |
|          | ln(creatinine)   | −0.14    | 0.28 | 0.6654  | 0.87       | 0.57 1.32             |
|          | ln(MEOHP)        | 0.03     | 0.19 | 0.4678  | 2.39       | 1.38 4.12             |
|          | ln(lead)         | 0.86     | 0.25 | 0.0061  |            |                       |
| MEP      | Intercept        | −2.25    | 0.48 | 0.0007  | 1.00       | 0.64 1.55             |
|          | ln(creatinine)   | 0.03     | 0.20 | 0.9975  | 1.03       | 0.83 1.29             |
|          | ln(MEP)          | 0.03     | 0.10 | 0.7580  | 2.36       | 1.35 4.11             |

**C. Summary of multiple logistic regression results – weighted for all children**

See Tables C1 and C2
Table C1
Summary of Multiple Logistic Regression Results for Parent or Self-Reported Outcomes from the Canadian Health Measures Survey Cycle 1 (Weighted) for All Children.

| Contaminant | Ages 6–19 yrs OR (95% CI) | Contaminant | Ages 6–19 yrs OR (95% CI) | Contaminant | Ages 6–19 yrs OR (95% CI) |
|-------------|---------------------------|-------------|---------------------------|-------------|---------------------------|
| BPA         | 1.29 (0.86–1.94)          | BPA         | 1.09 (0.76–1.57)          | BPA         | M: 1.87 (1.24–2.83) F: 0.97 (0.72–1.31)* |
| MBP         | 0.81 (0.55–1.20)          | MBP         | 0.79 (0.56–1.13)          | MBP         | 0.98 (0.60–1.60)          |
| MBzP        | 1.48 (0.93–2.36)          | MBzP        | 1.24 (0.87–1.77)          | MBzP        | M: 1.54 (1.07–2.23) F: 0.78 (0.54–1.13)* |
| MCPP        | 0.98 (0.72–1.34)          | MCPP        | M: 0.89 (0.65–1.21) F: 1.18 (0.86–1.62)* | MCPP        | FS: 1.00 (0.69–1.44) NFS: 1.66 (1.15–2.40)* |
| MEHHP       | 0.71 (0.42–1.20)          | MEHHP       | 0.76 (0.44–1.31)          | MEHHP       | 1.09 (0.56–2.10)          |
| MEHP        | 0.85 (0.62–1.17)          | MEHP        | 0.85 (0.59–1.21)          | MEHP        | 1.01 (0.50–2.05)          |
| MEHOP       | 0.71 (0.41–1.22)          | MEHOP       | 0.76 (0.43–1.35)          | MEHOP       | 1.09 (0.56–2.13)          |
| MEP         | 0.75 (0.45–1.24)          | MEP         | 0.79 (0.54–1.15)          | MEP         | 1.17 (0.88–1.54)          |
| Blood lead  | 2.39 (1.32–4.32)          | Blood lead  | Li: 0.81 (0.37–1.81) Hi: 2.78 (1.40–5.51)* | Blood lead  | FS: 0.83 (0.34–2.02) NFS: 4.20 (1.92–9.17)* |

* Interaction terms significant at 5% level between contaminant and other covariates. M: males; F: females; LI: low income; HI: higher income; FS: fasting sample; NFS: non-fasting sample; Models adjusted for covariates as determined by a stepwise multiple regression procedure.

Table C2
Summary of multiple regression results for SDQ outcomes from the Canadian health measures survey cycle 1 (weighted) for all children 6–17 years.

| Contaminant | Ages 6–17 yrs OR (95% CI) | Contaminant | Ages 6–17 yrs OR (95% CI) | Contaminant | Ages 6–17 yrs OR (95% CI) |
|-------------|---------------------------|-------------|---------------------------|-------------|---------------------------|
| BPA         | 1.14 (0.96–1.36)          | BPA         | 1.07 (0.97–1.19)          | BPA         | ETS: 0.67 (0.46–1.00) NETS: 1.31 (1.18–1.46)* |
| MBP         | 1.09 (0.62–1.91)          | MBP         | 0.87 (0.61–1.24)          | MBP         | 1.59 (0.94–2.71)          |
| MBzP        | 1.37 (1.06–1.76)          | MBzP        | 0.90 (0.75–1.07)          | MBzP        | 1.17 (0.96–1.43)          |
| MCPP        | 1.06 (0.68–1.66)          | MCPP        | 0.94 (0.78–1.13)          | MCPP        | 1.22 (0.97–1.53)          |
| MEHHP       | 0.89 (0.60–1.33)          | MEHHP       | 1.05 (0.83–1.33)          | MEHHP       | 1.04 (0.88–1.23)          |
| MEHP        | 0.86 (0.58–1.26)          | MEHP        | 0.98 (0.80–1.21)          | MEHP        | 0.95 (0.75–1.20)          |
| MEHOP       | 0.87 (0.57–1.32)          | MEHOP       | 1.06 (0.83–1.34)          | MEHOP       | 1.02 (0.85–1.21)          |
| MEP         | 1.03 (0.83–1.29)          | MEP         | 1.01 (0.87–1.18)          | MEP         | 0.94 (0.82–1.08)          |
| Blood lead  | 2.16 (1.33–3.51)          | Blood lead  | 1.08 (0.68–1.71)          | Blood lead  | 2.33 (1.59–3.43)          |

* Interaction terms significant at 5% level between contaminant and other covariates. ETS: smoking in home; NETS: no smoking in home; Models adjusted for covariates as determined by a stepwise multiple regression procedure.

Transparency document. Supplementary material

Transparency data associated with this article can be found in the online version at http://dx.doi.org/10.1016/j.dib.2016.06.017.
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