Birth weight and perfluorooctanesulfonic acid (PFOS): A random-effects meta-regression analysis

Michael W. Dzierlenga, Lori Crawford, Matthew P. Longnecker

**Supplemental Digital Content**

Contents Page

1. Rationale for protocol amendments 2
2. Search algorithm 3
3. Method of re-expression of β coefficients 4
4. Method of estimating the study-specific distribution of PFOS 5
5. Primer for statistics in meta-analysis 6
6. eFigure 1: Flowchart showing fate of studies identified by PubMed search 10
7. eFigure 2: Funnel plot of standard error by point estimate 11
8. eTable 1: List of studies included in previous meta-analyses and newer 12

studies identified by the literature search

1. eTable 2: Screened studies that were excluded and reason they were 13

irrelevant or excluded

1. eTable 3: Results of fitting random-effects meta-regression models

evaluating modification of birth weight-PFOS association by 6 factors 49

**Rationale for protocol amendments**

In two studies (Lauritzen et al., 2017; Meng et al., 2018) a range of gestational weeks at blood draw was presented, without a mean or median.1,2 In these cases, we took the midpoint and treated it as the median in the meta-regression analyses. For Ashley-Martin et al. (2017), the authors said the specimens were from <14 weeks of gestation (Arbuckle et al., 2013), so we imputed a range of 6-13 weeks and took the midpoint.3,4

The search algorithm registered with PROSPERO used quotation marks around all phrases, acronyms, or words in the search string. When we did the search, however, no quotation marks were used, which resulted in the identification of one additional study.

The protocol said we would abstract the most-adjusted coefficient presented for the birth weight-PFOS association. In two instances we took adjusted coefficients that were adjusted like those in nearly all other studies, rather than ones that were further adjusted for glomerular filtration rate (Manzano-Salgado et al., 2017; Sagiv et al., 2018) or serum albumin (Sagiv et al., 2018).5,6 In the case of Manzano-Salgado et al., the less-adjusted coefficients were based on a larger number of subjects, and this was a study with blood drawn early in pregnancy with a fairly narrow range of gestational weeks at blood draw (mean 12, SD 6), we did not expect the adjustment to substantially affect the results (and it did not).5 In the case of Sagiv et al., the further adjusted models had the same number of subjects as those not adjusted for glomerular filtration rate or albumin, and the further adjustment had little effect on the regression coefficients.6 We used the more standard-adjusted results in the analysis for consistency. The median gestational weeks at blood draw in Sagiv et al. was 9, at which point we did not expect the adjustment to substantially affect the results.6

The original protocol said the algorithmic optimization would be over the range of the 5th – 95th percentiles of the estimated PFOS distribution, at 10 percentile intervals (10 points). Based on the results of the validation substudy described in the main manuscript, we instead performed the algorithmic optimization over the 25th – 75th percentiles of the estimated PFOS distribution, at 10 percentile intervals (6 points).

The original protocol did not specify whether we were going to use a fixed effects or random effects meta-regression. Based on Borenstein et al.’s recommendations, we decided to use a random effects meta-regression.7

The original protocol included sensitivity analyses (analyses performed after excluding certain groups of studies), but it did not call for analyses after excluding studies that used cord blood for measurement of PFOS or studies from Asia. Neither did it call for sensitivity analyses where we added 1.26 g/ng/ml to β coefficients from studies using cord serum or plasma, because Verner et al. calculated that use of cord serum or plasma would bias βs by -1.26 g/ng/ml compared with maternal serum measurements at 40 weeks of gestation. Nor did we plan to do a subgroup analysis by continent. It was only after we had analyzed the data that we realized the value of such analyses.

The original protocol did not include a plan to impute null results for the large study of Buck Louis et al.8 It said we would use the trim and fill method if no heterogeneity was present. However, heterogeneity was present, and it appeared that some small studies with positive associations were missing. Because of that, we felt the imputation of null results for Buck Louis would be a useful adjunct analysis.

**Search algorithm**

Searches were conducted using the keywords (birth-weight or birth weight or birthweight or reproduction) and (PFOS or PFAS or PFC or fluoroalkyl or fluorocarbon) and were limited to studies published from November 20, 2015 through July 1, 2019. Searches were conducted using the PubMed filters for studies of human subjects published in the English language. Because very recently added publications may not have completed the MEDLINE indexing process in PubMed, they may be inadvertently excluded from searches using filters. To avoid missing these studies, we repeated our searches for January 1, 2019 through July 1, 2019 without the “Humans” and “English” filters.

**Method of re-expression of β coefficients**

Our method for re-expression of β coefficients (to obtain a coefficient for change in g birthweight per ng/ml PFOS given a coefficient in terms of log-transformed ng/ml PFOS) was a variation on the method described in Steenland et al. (2018).9 The primary motivation for altering their approach was that the distributions of PFOS across studies were much more variable than the distributions of PFOA. While Steenland et al. (2018) were able to choose a range of concentration that was appropriate for all PFOA studies, there was no single range that could be used for all the studies for PFOS, and the range of concentration over which the re-expression was performed had a large effect on the re-expressed β.9 Thus, we needed a method of determining a range of values over which to perform the re-expression that depended on the study-specific distributions of PFOS. The method we used relied on a quantitative estimation of the study-specific distributions of PFOS which is described in a subsequent section (see below). Once the estimated distribution was determined from said procedure, the re-expression was performed within the range of the 25th – 75th percentiles of the PFOS distribution. The re-expressed β coefficient was determined by minimizing the sum of squared differences between the curves generated by the re-expressed β and the log-transformed β at 10 percentile intervals using the optim function in the statistical software package R. While the slope and intercept of the linear association were both optimized in this approach, only the slope (i.e., the β coefficient) was relevant for comparison of the study results.

In several cases, a log-transformed β coefficient was presented in units that were scaled by measures of variance, for example change in g birthweight per standard deviation log-transformed ng/ml PFOS or z-score change in birthweight per log-transformed ng/ml PFOS. In these cases, the unscaled log-transformed β coefficient was retrieved by multiplying or dividing by the measure of variance that was used in the scaling and then the unscaled log-transformed β coefficient was then re-expressed as an untransformed β coefficient.

The validity of the method was evaluated using studies in which the authors presented associations of birthweight with both untransformed and log-transformed PFOS concentration (see Table 2 in the main report).

**Method of estimating the study-specific distribution of PFOS**

We assumed that a log-normal distribution was appropriate to describe the study-specific distributions of PFOS. A log-normal distribution is described by two parameters, μ and σ, and these parameters were determined in a standardized fashion.

When a median and interquartile range (IQR) were presented, we used ln(median) to estimate μ and the ln(75th percentile/25th percentile)/1.349 to estimate σ.55 A variant of this procedure was used when 5th and 95th percentiles rather than quartiles were presented.

When the geometric mean (GM) and geometric standard deviation (GSD) were presented, we estimated the parameters as μ = ln(GM) and σ = ln(GSD).

In the case where the arithmetic mean (AM) and standard deviation (ASD) were presented, we first estimated the geometric mean and geometric standard using the equations, and , where (Limpert et al. 2001).

In those instances where a median was presented without usable data on variance (e.g., range), we predicted σ based on μ, using a regression of σ on μ from studies where the median PFOS concentration was > 1 ng/ml. For studies with a median value > 1 ng/ml, the scatterplot clearly showed a linear relation of the two variables (not shown).

**Primer for statistics in meta-analysis**

In general, the goal of a meta-analysis is to calculate a quantitative summary of data about the variable under study, which is our case is a slope (β) relating birth weight to serum concentration of PFOS. The summary “effect” estimate is a weighted average of study results. The summary effect estimate can be either a fixed-effects summary or a random-effects summary. The fixed- and random-effects summaries differ in how the weighted average is calculated.7 Technical details are described in the next paragraph.

Assume we have reported regression coefficients yi from n studies, where i = 1, …, n, the number of studies. With each reported regression coefficient yi we have the reported standard error of yi, or SE(yi), the within-study sampling error. In a fixed-effects meta-analysis, we assume that each of the studies included are estimating the same underlying parameter y. In some settings this assumption might be plausible -- for example if the studies have all been conducted in the same population, they have used the same inclusion criteria, the treatments have been given in the same way, and outcomes have been measured consistently. The fixed-effects meta-analytic summary of the regression coefficients across studies can be written as a model:

yi=β0+*e*,

where β0=Σ yi∙SE(yi)2/Σ SE(yi)2, the summation is across studies, and *e*∼*N*(0,*v*), with *v* = 1/ Σ SE(yi)2. In the fixed-effects approach, the different effect estimates are attributed purely to random sampling error.

In contrast, in a random-effects meta-analysis, we assume that each study is estimating a study-specific true effect *u*i + β0, where β0 is an overall weighted mean of regression coefficients across studies and *u*i is the study-specific difference from the overall mean. Interest then lies in estimating the mean β0 = E(y) and variance Var(*u*i) = τ2 of these true effect sizes across the population of potential studies. In a random-effects meta-analysis, the observed heterogeneity in the estimates yi is attributed to two sources: 1) between-study heterogeneity in true effects, and 2) within-study sampling error. The mixed-effects meta-analysis model can be written as:

yi=β0+*u*i+*e*i,

where i indexes the study result, *u*i∼*N*(0,*τ*2) and *e*i∼*N*(0,*v*i), and *v*i are the (approximately) known sampling variances of the observed effect size estimates (squared values of standard errors of regression coefficients). The formula and weights used in calculating a random-effects summary estimate are different than in a fixed effects estimate, and are presented in Borenstein et al.7

Inclusion of covariates in a random-effect models yields is a meta-regression model, which can be written as:

yi=β0+β1xi1+β2xi2+…+βpxip+*u*i+*e*i,

where 1 … p index the number of covariates in the meta-regression model. The covariates can be fixed effect or random effects terms; in our application they are fixed-effects. In the models above, the β coefficients have a Z distribution and the standard errors of the coefficients for the covariates are used as in a standard regression model to evaluate whether the coefficients are statistically precise. After fitting a meta-regression model, the coefficients can be interpreted as follows. β0 is the overall summary slope when all the covariates have a value of zero. If, e.g., the only covariate in the model is weeks of gestation at blood draw, then the interpretation of β0 is the average slope of the birth weight-PFOS association at the beginning of pregnancy; β1 is the amount that the average slope increases per week of gestation. Thus, the average slope after 40 weeks of gestation is β0+40∙β1. β1 … βp are effect modification terms in meta-regression – they indicate how much the outcome-exposure association (slope in our case) changes according to level of the covariate.

Tau is calculated as ((Q – df)/C)0.5, where Q = ΣWi∙(Yi-M)2, W is the study weight, Yi is the study effect size, M is the summary random effect, df = the number of studies - 1, and C = ΣWi – ΣWi2/ΣWi.



Unique records identified through PubMed

n=191

Records excluded n=164

Animal/cell/genetic (n=21)

Not a study (letter to the editor, case report) (n=5)

Wrong exposure (not PFOS or measured after birth) (n=24)

Wrong outcome (not birthweight) (n=108)

Meta/review (otherwise relevant) (n=6)



Records screened

n=191

Full-text articles excluded n=7

Same cohort included in another study (n=4)

PFOS results not reported because not statistically significant; include in sensitivity analyses (n=2)

Unable to re-express coefficient in g/ng/mL (n=1)



Full-text articles assessed for eligibility

n=27

Reports identified by search that were already being included because they had been in previous meta-analyses (n=10)

Reports identified by search (n=20)



eFigure 1. Flowchart showing how the studies identified by the PubMed search were classified according to inclusion, exclusion, and whether they had been included in previous meta-analyses of birth weight and PFOS.

New reports identified by search (n=10)



eFigure 2. Funnel plot for meta-analysis of birth weight in relation to serum concentration of PFAS

eTable 1. List of studies included in previous meta-analyses and newer studies identified by the literature searcha

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
|  |  | Previous meta-analyses | | | | Not in Previous meta-analysesb |
|  |  | Johnson  et al 2014 | Verner  et al 2014 | Negri  et al 2014 | Steenland  et al 2014 |
| **Included Studies** | **Year** |  |  |  |  |  |
| Apelberg10 | 2007 | x | x | x | x |  |
| Monroy11 | 2008 |  |  | x |  |  |
| Washino12 | 2009 | x | x | x | x |  |
| Hamm13 | 2010 | x | x | x | x |  |
| Chen14 | 2012 | x | x | x | x |  |
| Maisonet15 | 2012 | x | x | x | x |  |
| Whitworth16 | 2012 | x | x | x | x |  |
| Darrow17 | 2013 |  |  | x | x |  |
| Robledo18 | 2015 |  |  | x | x |  |
| Bach19 | 2016 |  |  | x | x |  |
| Callan20 | 2016 |  |  |  | x |  |
| Govarts21 | 2016 |  |  |  |  | x |
| Kwon22 | 2016 |  |  |  |  | x |
| Lee23 | 2016 |  |  | x | x |  |
| Lenters24 | 2016 |  |  | x | x |  |
| Ashley-Martin3 | 2017 |  |  |  |  | x |
| Chen14 | 2017 |  |  |  | x |  |
| Lauritzen1 | 2017 |  |  |  |  | x |
| Li25 | 2017 |  |  |  | x |  |
| Lind26 | 2017 |  |  |  |  | x |
| Manzano-Salgado5 | 2017 |  |  |  | x |  |
| Shi27 | 2017 |  |  |  | x |  |
| Starling28 | 2017 |  |  |  | x |  |
| Valvi29 | 2017 |  |  |  |  | x |
| Cao30 | 2018 |  |  |  |  | x |
| Meng2 | 2018 |  |  |  |  | x |
| Sagiv6 | 2018 |  |  |  | x |  |
| Marks31 | 2019 |  |  |  |  | x |
| Wang32 | 2019 |  |  |  |  | x |

a Johnson et al. also include Fromme et al. 2010, Kim et al. 2011, and Fei et al. 2007.33–36 Johnson et al. likely contacted the original authors to get results for PFOA from Fromme et al. 2010 and Kim et al. 2011. Fei et al. 2007 was superceded by Meng et al. 2018.2,36 Verner et al. and Negri et al. also included Fei et al. 2007.36–38 Steenland et al. also included Fei et al. 2007, Fromme et al. 2010, Kim et al. 2011, Wu et al. 2012, Wang et al. 2016, and Minatoya et al. 2017.9,34–36,39–41 See manuscript for an explanation for why we did not include these studies.

b These were studies identified as eligible by our literature search.

eTable 2. Screened studies that were excluded and reason they were irrelevant or excluded

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Reference | If not a relevant study, why? -> Animal/cell | If not a relevant study, why? -> Not a study (letter to the editor, case report, opinion/commentary) | If not a relevant study, why? -> Wrong exposure (not PFOS) | If not a relevant study, why? -> Wrong outcome (not birthweight) | If not a relevant study, why? -> Not health (studies of attitudes, beliefs, other non-health outcomes) | If not a relevant study, why? -> Meta/Review (only potentially relevant reviews related to exposure and endpoint of interest) |
| **Abuzeid,​ OM.,​ Hebert,​ J.,​ Ashraf,​ M.,​ Mitwally,​ M.,​ Diamond,​ MP.,​ Abuzeid,​ MI.** (2018). Pediatric Foley Catheter Placement After Operative Hysteroscopy Does Not Cause Ascending Infection. *Journal of minimally invasive gynecology*,​ 25(1). |  |  | Wrong exposure (not PFOS) |  |  |  |
| **Agrawal,​ J.,​ Ludwig,​ B.,​ Roy,​ B.,​ Dwivedi,​ Y.** (2019). Chronic Testosterone Increases Impulsivity and Influences the Transcriptional Activity of the Alpha-2A Adrenergic Receptor Signaling Pathway in Rat Brain. *Molecular neurobiology*,​ 56(6). | Animal/cell |  |  |  |  |  |
| **Ashley-Martin,​ J.,​ Dodds,​ L.,​ Arbuckle,​ TE.,​ Morisset,​ AS.,​ Fisher,​ M.,​ Bouchard,​ MF.,​ Shapiro,​ GD.,​ Ettinger,​ AS.,​ Monnier,​ P.,​ Dallaire,​ R.,​ Taback,​ S.,​ Fraser,​ W.** (2016). Maternal and Neonatal Levels of Perfluoroalkyl Substances in Relation to Gestational Weight Gain. *International journal of environmental research and public health*,​ 13(1). |  |  |  | Wrong outcome (not birthweight) |  |  |
| **Avanasi,​ R.,​ Shin,​ HM.,​ Vieira,​ VM.,​ Bartell,​ SM.** (2016). Variability and epistemic uncertainty in water ingestion rates and pharmacokinetic parameters,​ and impact on the association between perfluorooctanoate and preeclampsia in the C8 Health Project population. *Environmental research*,​ 146. |  |  |  | Wrong outcome (not birthweight) |  |  |
| **Avanasi,​ R.,​ Shin,​ HM.,​ Vieira,​ VM.,​ Bartell,​ SM.** (2016). Impacts of geocoding uncertainty on reconstructed PFOA exposures and their epidemiological association with preeclampsia. *Environmental research*,​ 151. |  |  |  | Wrong outcome (not birthweight) |  |  |
| **Avanasi,​ R.,​ Shin,​ HM.,​ Vieira,​ VM.,​ Savitz,​ DA.,​ Bartell,​ SM.** (2016). Impact of Exposure Uncertainty on the Association between Perfluorooctanoate and Preeclampsia in the C8 Health Project Population. *Environmental health perspectives*,​ 124(1). |  |  |  | Wrong outcome (not birthweight) |  |  |
| **Bach,​ C.,​ Matthiesen,​ B.,​ Olsen,​ .,​ Henriksen,​ B.** (2018). Conditioning on Parity in Studies of Perfluoroalkyl Acids and Time to Pregnancy: An Example from the Danish National Birth Cohort. *Environmental health perspectives*,​ 126(11). |  |  |  | Wrong outcome (not birthweight) |  |  |
| **Bach,​ CC.,​ Bech,​ BH.,​ Nohr,​ EA.,​ Olsen,​ J.,​ Matthiesen,​ NB.,​ Bossi,​ R.,​ Uldbjerg,​ N.,​ Bonefeld-Jørgensen,​ EC.,​ Henriksen,​ TB.** (2016). Response to letter to the editor regarding "Serum perfluoroalkyl acids and time to pregnancy in nulliparous women". *Environmental research*,​ 147. |  | Not a study (letter to the editor, case report, opinion/commentary) |  |  |  |  |
| **Bach,​ CC.,​ Vested,​ A.,​ Jørgensen,​ KT.,​ Bonde,​ JP.,​ Henriksen,​ TB.,​ Toft,​ G.** (2016). Perfluoroalkyl and polyfluoroalkyl substances and measures of human fertility: a systematic review. *Critical reviews in toxicology*,​ 46(9). |  |  |  | Wrong outcome (not birthweight) |  |  |
| **Bakhireva,​ LN.,​ Garrison,​ L.,​ Shrestha,​ S.,​ Sharkis,​ J.,​ Miranda,​ R.,​ Rogers,​ K.** (2018). Challenges of diagnosing fetal alcohol spectrum disorders in foster and adopted children. *Alcohol (Fayetteville,​ N.Y.)*,​ 67. |  |  |  | Wrong outcome (not birthweight) |  |  |
| **Ballesteros,​ V.,​ Costa,​ O.,​ Iñiguez,​ C.,​ Fletcher,​ T.,​ Ballester,​ F.,​ Lopez-Espinosa,​ MJ.** (2017). Exposure to perfluoroalkyl substances and thyroid function in pregnant women and children: A systematic review of epidemiologic studies. *Environment international*,​ 99. |  |  |  | Wrong outcome (not birthweight) |  |  |
| **Barrett,​ CE.,​ Kable,​ JA.,​ Madsen,​ TE.,​ Hsu,​ CC.,​ Coles,​ CD.** . The Use of Functional Near-Infrared Spectroscopy to Differentiate Alcohol-Related Neurodevelopmental Impairment. *Developmental neuropsychology*,​ 44(2). |  |  | Wrong exposure (not PFOS) |  |  |  |
| **Bell,​ EM.,​ Yeung,​ EH.,​ Ma,​ W.,​ Kannan,​ K.,​ Sundaram,​ R.,​ Smarr,​ MM.,​ Buck Louis,​ GM.** (2018). Concentrations of endocrine disrupting chemicals in newborn blood spots and infant outcomes in the upstate KIDS study. *Environment international*,​ 121(Pt 1). |  |  | Wrong exposure (not PFOS) |  |  |  |
| **Berg,​ V.,​ Nøst,​ TH.,​ Pettersen,​ RD.,​ Hansen,​ S.,​ Veyhe,​ AS.,​ Jorde,​ R.,​ Odland,​ JØ.,​ Sandanger,​ TM.** (2017). Persistent Organic Pollutants and the Association with Maternal and Infant Thyroid Homeostasis: A Multipollutant Assessment. *Environmental health perspectives*,​ 125(1). |  |  |  | Wrong outcome (not birthweight) |  |  |
| **Bjerregaard-Olesen,​ C.,​ Bach,​ CC.,​ Long,​ M.,​ Ghisari,​ M.,​ Bech,​ BH.,​ Nohr,​ EA.,​ Henriksen,​ TB.,​ Olsen,​ J.,​ Bonefeld-Jørgensen,​ EC.** (2016). Determinants of serum levels of perfluorinated alkyl acids in Danish pregnant women. *International journal of hygiene and environmental health*,​ 219(8). |  |  |  | Wrong outcome (not birthweight) |  |  |
| **Bjerregaard-Olesen,​ C.,​ Bach,​ CC.,​ Long,​ M.,​ Ghisari,​ M.,​ Bossi,​ R.,​ Bech,​ BH.,​ Nohr,​ EA.,​ Henriksen,​ TB.,​ Olsen,​ J.,​ Bonefeld-Jørgensen,​ EC.** (2016). Time trends of perfluorinated alkyl acids in serum from Danish pregnant women 2008-2013. *Environment international*,​ 91. |  |  |  | Wrong outcome (not birthweight) |  |  |
| **Bjerregaard-Olesen,​ C.,​ Bossi,​ R.,​ Liew,​ Z.,​ Long,​ M.,​ Bech,​ BH.,​ Olsen,​ J.,​ Henriksen,​ TB.,​ Berg,​ V.,​ Nøst,​ TH.,​ Zhang,​ JJ.,​ Odland,​ JØ.,​ Bonefeld-Jørgensen,​ EC.** (2017). Maternal serum concentrations of perfluoroalkyl acids in five international birth cohorts. *International journal of hygiene and environmental health*,​ 220(2 Pt A). |  |  |  | Wrong outcome (not birthweight) |  |  |
| **Bjerregaard-Olesen,​ C.,​ Ghisari,​ M.,​ Bonefeld-Jørgensen,​ EC.** (2016). Activation of the estrogen receptor by human serum extracts containing mixtures of perfluorinated alkyl acids from pregnant women. *Environmental research*,​ 151. |  |  |  | Wrong outcome (not birthweight) |  |  |
| **Boronat,​ S.,​ Sánchez-Montañez,​ A.,​ Gómez-Barros,​ N.,​ Jacas,​ C.,​ Martínez-Ribot,​ L.,​ Vázquez,​ E.,​ Del Campo,​ M.** (2017). Correlation between morphological MRI findings and specific diagnostic categories in fetal alcohol spectrum disorders. *European journal of medical genetics*,​ 60(1). |  |  | Wrong exposure (not PFOS) |  |  |  |
| **Braun,​ JM.,​ Chen,​ A.,​ Romano,​ ME.,​ Calafat,​ AM.,​ Webster,​ GM.,​ Yolton,​ K.,​ Lanphear,​ BP.** (2016). Prenatal perfluoroalkyl substance exposure and child adiposity at 8 years of age: The HOME study. *Obesity (Silver Spring,​ Md.)*,​ 24(1). |  |  |  | Wrong outcome (not birthweight) |  |  |
| **Caserta,​ D.,​ Pegoraro,​ S.,​ Mallozzi,​ M.,​ Di Benedetto,​ L.,​ Colicino,​ E.,​ Lionetto,​ L.,​ Simmaco,​ M.** (2018). Maternal exposure to endocrine disruptors and placental transmission: a pilot study. *Gynecological endocrinology : the official journal of the International Society of Gynecological Endocrinology*,​ 34(11). |  |  |  | Wrong outcome (not birthweight) |  |  |
| **Chalkiadaki,​ K.,​ Velli,​ A.,​ Kyriazidis,​ E.,​ Stavroulaki,​ V.,​ Vouvoutsis,​ V.,​ Chatzaki,​ E.,​ Aivaliotis,​ M.,​ Sidiropoulou,​ K.** (2019). Development of the MAM model of schizophrenia in mice: Sex similarities and differences of hippocampal and prefrontal cortical function. *Neuropharmacology*,​ 144. | Animal/cell |  |  |  |  |  |
| **Chen,​ F.,​ Yin,​ S.,​ Kelly,​ BC.,​ Liu,​ W.** (2017). Chlorinated Polyfluoroalkyl Ether Sulfonic Acids in Matched Maternal,​ Cord,​ and Placenta Samples: A Study of Transplacental Transfer. *Environmental science & technology*,​ 51(11). |  |  |  | Wrong outcome (not birthweight) |  |  |
| **Chen,​ F.,​ Yin,​ S.,​ Kelly,​ BC.,​ Liu,​ W.** (2017). Isomer-Specific Transplacental Transfer of Perfluoroalkyl Acids: Results from a Survey of Paired Maternal,​ Cord Sera,​ and Placentas. *Environmental science & technology*,​ 51(10). |  |  |  | Wrong outcome (not birthweight) |  |  |
| **Chen,​ G.,​ Xu,​ LL.,​ Huang,​ YF.,​ Wang,​ Q.,​ Wang,​ BH.,​ Yu,​ ZH.,​ Shi,​ QM.,​ Hong,​ JW.,​ Li,​ J.,​ Xu,​ LC.** (2018). Prenatal Exposure to Perfluorooctane Sulfonate impairs Placental Angiogenesis and Induces Aberrant Expression of LncRNA Xist. *Biomedical and environmental sciences : BES*,​ 31(11). |  |  |  | Wrong outcome (not birthweight) |  |  |
| **Chen,​ J.,​ Wang,​ X.,​ Ge,​ X.,​ Wang,​ D.,​ Wang,​ T.,​ Zhang,​ L.,​ Tanguay,​ RL.,​ Simonich,​ M.,​ Huang,​ C.,​ Dong,​ Q.** (2016). Chronic perfluorooctanesulphonic acid (PFOS) exposure produces estrogenic effects in zebrafish. *Environmental pollution (Barking,​ Essex : 1987)*,​ 218. | Animal/cell |  |  |  |  |  |
| **Chen,​ L.,​ Deng,​ W.,​ Palacios,​ I.,​ Inglessis-Azuaje,​ I.,​ McMullin,​ D.,​ Zhou,​ D.,​ Lo,​ EH.,​ Buonanno,​ F.,​ Ning,​ M.** (2016). Patent foramen ovale (PFO),​ stroke and pregnancy. *Journal of investigative medicine : the official publication of the American Federation for Clinical Research*,​ 64(5). |  |  |  | Wrong outcome (not birthweight) |  |  |
| **Chen,​ Q.,​ Huang,​ R.,​ Hua,​ L.,​ Guo,​ Y.,​ Huang,​ L.,​ Zhao,​ Y.,​ Wang,​ X.,​ Zhang,​ J.** (2018). Prenatal exposure to perfluoroalkyl and polyfluoroalkyl substances and childhood atopic dermatitis: a prospective birth cohort study. *Environmental health : a global access science source*,​ 17(1). |  |  |  | Wrong outcome (not birthweight) |  |  |
| **Chen,​ Q.,​ Zhang,​ X.,​ Zhao,​ Y.,​ Lu,​ W.,​ Wu,​ J.,​ Zhao,​ S.,​ Zhang,​ J.,​ Huang,​ L.** (2019). Prenatal exposure to perfluorobutanesulfonic acid and childhood adiposity: A prospective birth cohort study in Shanghai,​ China. *Chemosphere*,​ 226. |  |  |  | Wrong outcome (not birthweight) |  |  |
| **Cheng,​ DT.,​ Meintjes,​ EM.,​ Stanton,​ ME.,​ Dodge,​ NC.,​ Pienaar,​ M.,​ Warton,​ CMR.,​ Desmond,​ JE.,​ Molteno,​ CD.,​ Peterson,​ BS.,​ Jacobson,​ JL.,​ Jacobson,​ SW.** (2017). Functional MRI of Human Eyeblink Classical Conditioning in Children with Fetal Alcohol Spectrum Disorders. *Cerebral cortex (New York,​ N.Y. : 1991)*,​ 27(7). |  |  | Wrong exposure (not PFOS) |  |  |  |
| **Conley,​ JM.,​ Lambright,​ CS.,​ Evans,​ N.,​ Strynar,​ MJ.,​ McCord,​ J.,​ McIntyre,​ BS.,​ Travlos,​ GS.,​ Cardon,​ MC.,​ Medlock-Kakaley,​ E.,​ Hartig,​ PC.,​ Wilson,​ VS.,​ Gray,​ LE.** (2019). Adverse Maternal,​ Fetal,​ and Postnatal Effects of Hexafluoropropylene Oxide Dimer Acid (GenX) from Oral Gestational Exposure in Sprague-Dawley Rats. *Environmental health perspectives*,​ 127(3). | Animal/cell |  |  |  |  |  |
| **Coperchini,​ F.,​ Awwad,​ O.,​ Rotondi,​ M.,​ Santini,​ F.,​ Imbriani,​ M.,​ Chiovato,​ L.** (2017). Thyroid disruption by perfluorooctane sulfonate (PFOS) and perfluorooctanoate (PFOA). *Journal of endocrinological investigation*,​ 40(2). |  |  |  | Wrong outcome (not birthweight) |  |  |
| **Costa,​ O.,​ Iñiguez,​ C.,​ Manzano-Salgado,​ CB.,​ Amiano,​ P.,​ Murcia,​ M.,​ Casas,​ M.,​ Irizar,​ A.,​ Basterrechea,​ M.,​ Beneito,​ A.,​ Schettgen,​ T.,​ Sunyer,​ J.,​ Vrijheid,​ M.,​ Ballester,​ F.,​ Lopez-Espinosa,​ MJ.** (2019). First-trimester maternal concentrations of polyfluoroalkyl substances and fetal growth throughout pregnancy. *Environment international*,​ 130. |  |  |  | Wrong outcome (not birthweight) |  |  |
| **Costantini,​ D.,​ Blévin,​ P.,​ Herzke,​ D.,​ Moe,​ B.,​ Gabrielsen,​ GW.,​ Bustnes,​ JO.,​ Chastel,​ O.** (2019). Higher plasma oxidative damage and lower plasma antioxidant defences in an Arctic seabird exposed to longer perfluoroalkyl acids. *Environmental research*,​ 168. | Animal/cell |  |  |  |  |  |
| **Custer,​ CM.,​ Custer,​ TW.,​ Delaney,​ R.,​ Dummer,​ PM.,​ Schultz,​ S.,​ Karouna-Renier,​ N.** (2019). Perfluoroalkyl Contaminant Exposure and Effects in Tree Swallows Nesting at Clarks Marsh,​ Oscoda,​ Michigan,​ USA. *Archives of environmental contamination and toxicology*,​ 77(1). | Animal/cell |  |  |  |  |  |
| **Dalsager,​ L.,​ Christensen,​ N.,​ Husby,​ S.,​ Kyhl,​ H.,​ Nielsen,​ F.,​ Høst,​ A.,​ Grandjean,​ P.,​ Jensen,​ TK.** (2016). Association between prenatal exposure to perfluorinated compounds and symptoms of infections at age 1-4years among 359 children in the Odense Child Cohort. *Environment international*,​ 96. |  |  |  | Wrong outcome (not birthweight) |  |  |
| **Del Campo,​ M.,​ Jones,​ KL.** (2017). A review of the physical features of the fetal alcohol spectrum disorders. *European journal of medical genetics*,​ 60(1). |  |  | Wrong exposure (not PFOS) |  |  |  |
| **Di Nisio,​ A.,​ Sabovic,​ I.,​ Valente,​ U.,​ Tescari,​ S.,​ Rocca,​ MS.,​ Guidolin,​ D.,​ Dall'Acqua,​ S.,​ Acquasaliente,​ L.,​ Pozzi,​ N.,​ Plebani,​ M.,​ Garolla,​ A.,​ Foresta,​ C.** (2019). Endocrine Disruption of Androgenic Activity by Perfluoroalkyl Substances: Clinical and Experimental Evidence. *The Journal of clinical endocrinology and metabolism*,​ 104(4). |  |  |  | Wrong outcome (not birthweight) |  |  |
| **Ernst,​ A.,​ Brix,​ N.,​ Lauridsen,​ LLB.,​ Olsen,​ J.,​ Parner,​ ET.,​ Liew,​ Z.,​ Olsen,​ LH.,​ Ramlau-Hansen,​ CH.** (2019). Exposure to Perfluoroalkyl Substances during Fetal Life and Pubertal Development in Boys and Girls from the Danish National Birth Cohort. *Environmental health perspectives*,​ 127(1). |  |  |  | Wrong outcome (not birthweight) |  |  |
| **Fan,​ J.,​ Jacobson,​ SW.,​ Taylor,​ PA.,​ Molteno,​ CD.,​ Dodge,​ NC.,​ Stanton,​ ME.,​ Jacobson,​ JL.,​ Meintjes,​ EM.** (2016). White matter deficits mediate effects of prenatal alcohol exposure on cognitive development in childhood. *Human brain mapping*,​ 37(8). |  |  | Wrong exposure (not PFOS) |  |  |  |
| **Fisher,​ M.,​ Arbuckle,​ TE.,​ Liang,​ CL.,​ LeBlanc,​ A.,​ Gaudreau,​ E.,​ Foster,​ WG.,​ Haines,​ D.,​ Davis,​ K.,​ Fraser,​ WD.** (2016). Concentrations of persistent organic pollutants in maternal and cord blood from the maternal-infant research on environmental chemicals (MIREC) cohort study. *Environmental health : a global access science source*,​ 15(1). |  |  |  | Wrong outcome (not birthweight) |  |  |
| **Gao,​ K.,​ Zhuang,​ T.,​ Liu,​ X.,​ Fu,​ J.,​ Zhang,​ J.,​ Fu,​ J.,​ Wang,​ L.,​ Zhang,​ A.,​ Liang,​ Y.,​ Song,​ M.,​ Jiang,​ G.** (2019). Prenatal Exposure to Per- and Polyfluoroalkyl Substances (PFASs) and Association between the Placental Transfer Efficiencies and Dissociation Constant of Serum Proteins-PFAS Complexes. *Environmental science & technology*,​ 53(11). |  |  |  | Wrong outcome (not birthweight) |  |  |
| **Ghassabian,​ A.,​ Bell,​ EM.,​ Ma,​ WL.,​ Sundaram,​ R.,​ Kannan,​ K.,​ Buck Louis,​ GM.,​ Yeung,​ E.** (2018). Concentrations of perfluoroalkyl substances and bisphenol A in newborn dried blood spots and the association with child behavior. *Environmental pollution (Barking,​ Essex : 1987)*,​ 243(Pt B). |  |  |  | Wrong outcome (not birthweight) |  |  |
| **Gogola,​ J.,​ Hoffmann,​ M.,​ Ptak,​ A.** (2019). Persistent endocrine-disrupting chemicals found in human follicular fluid stimulate the proliferation of granulosa tumor spheroids via GPR30 and IGF1R but not via the classic estrogen receptors. *Chemosphere*,​ 217. |  |  |  | Wrong outcome (not birthweight) |  |  |
| **Goudarzi,​ H.,​ Araki,​ A.,​ Itoh,​ S.,​ Sasaki,​ S.,​ Miyashita,​ C.,​ Mitsui,​ T.,​ Nakazawa,​ H.,​ Nonomura,​ K.,​ Kishi,​ R.** (2017). The Association of Prenatal Exposure to Perfluorinated Chemicals with Glucocorticoid and Androgenic Hormones in Cord Blood Samples: The Hokkaido Study. *Environmental health perspectives*,​ 125(1). |  |  |  | Wrong outcome (not birthweight) |  |  |
| **Goudarzi,​ H.,​ Miyashita,​ C.,​ Okada,​ E.,​ Kashino,​ I.,​ Chen,​ CJ.,​ Ito,​ S.,​ Araki,​ A.,​ Kobayashi,​ S.,​ Matsuura,​ H.,​ Kishi,​ R.** (2017). Prenatal exposure to perfluoroalkyl acids and prevalence of infectious diseases up to 4years of age. *Environment international*,​ 104. |  |  |  | Wrong outcome (not birthweight) |  |  |
| **Goudarzi,​ H.,​ Miyashita,​ C.,​ Okada,​ E.,​ Kashino,​ I.,​ Kobayashi,​ S.,​ Chen,​ CJ.,​ Ito,​ S.,​ Araki,​ A.,​ Matsuura,​ H.,​ Ito,​ YM.,​ Kishi,​ R.** (2016). Effects of prenatal exposure to perfluoroalkyl acids on prevalence ofallergic diseases among 4-year-old children. *Environment international*,​ 94. |  |  |  | Wrong outcome (not birthweight) |  |  |
| **Goudarzi,​ H.,​ Nakajima,​ S.,​ Ikeno,​ T.,​ Sasaki,​ S.,​ Kobayashi,​ S.,​ Miyashita,​ C.,​ Ito,​ S.,​ Araki,​ A.,​ Nakazawa,​ H.,​ Kishi,​ R.** (2016). Prenatal exposure to perfluorinated chemicals and neurodevelopment in early infancy: The Hokkaido Study. *The Science of the total environment*,​ 541. |  |  |  | Wrong outcome (not birthweight) |  |  |
| **Govarts,​ E.,​ Iszatt,​ N.,​ Trnovec,​ T.,​ de Cock,​ M.,​ Eggesbø,​ M.,​ Palkovicova Murinova,​ L.,​ van de Bor,​ M.,​ Guxens,​ M.,​ Chevrier,​ C.,​ Koppen,​ G.,​ Lamoree,​ M.,​ Hertz-Picciotto,​ I.,​ Lopez-Espinosa,​ MJ.,​ Lertxundi,​ A.,​ Grimalt,​ JO.,​ Torrent,​ M.,​ Goñi-Irigoyen,​ F.,​ Vermeulen,​ R.,​ Legler,​ J.,​ Schoeters,​ G.** (2018). Prenatal exposure to endocrine disrupting chemicals and risk of being born small for gestational age: Pooled analysis of seven European birth cohorts. *Environment international*,​ 115. |  |  |  | Wrong outcome (not birthweight) |  |  |
| **Groffen,​ T.,​ Lasters,​ R.,​ Lopez-Antia,​ A.,​ Prinsen,​ E.,​ Bervoets,​ L.,​ Eens,​ M.** (2019). Limited reproductive impairment in a passerine bird species exposed along a perfluoroalkyl acid (PFAA) pollution gradient. *The Science of the total environment*,​ 652 | Animal/cell |  |  |  |  |  |
| **Gyllenhammar,​ I.,​ Diderholm,​ B.,​ Gustafsson,​ J.,​ Berger,​ U.,​ Ridefelt,​ P.,​ Benskin,​ JP.,​ Lignell,​ S.,​ Lampa,​ E.,​ Glynn,​ A.** (2018). Perfluoroalkyl acid levels in first-time mothers in relation to offspring weight gain and growth. *Environment international*,​ 111 |  |  | Wrong exposure (not PFOS) |  |  |  |
| **Hallberg,​ I.,​ Kjellgren,​ J.,​ Persson,​ S.,​ Örn,​ S.,​ Sjunnesson,​ Y.** (2019). Perfluorononanoic acid (PFNA) alters lipid accumulation in bovine blastocysts after oocyte exposure during in vitro maturation. *Reproductive toxicology (Elmsford,​ N.Y.)*,​ 84. | Animal/cell |  |  |  |  |  |
| **Harris,​ MH.,​ Oken,​ E.,​ Rifas-Shiman,​ SL.,​ Calafat,​ AM.,​ Ye,​ X.,​ Bellinger,​ DC.,​ Webster,​ TF.,​ White,​ RF.,​ Sagiv,​ SK.** (2018). Prenatal and childhood exposure to per- and polyfluoroalkyl substances (PFASs) and child cognition. *Environment international*,​ 115. |  |  |  | Wrong outcome (not birthweight) |  |  |
| **Hartman,​ TJ.,​ Calafat,​ AM.,​ Holmes,​ AK.,​ Marcus,​ M.,​ Northstone,​ K.,​ Flanders,​ WD.,​ Kato,​ K.,​ Taylor,​ EV.** (2017). Prenatal Exposure to Perfluoroalkyl Substances and Body Fatness in Girls. *Childhood obesity (Print)*,​ 13(3). |  |  |  | Wrong outcome (not birthweight) |  |  |
| **Hass,​ J.,​ Hertäg,​ L.,​ Durstewitz,​ D.** (2016). A Detailed Data-Driven Network Model of Prefrontal Cortex Reproduces Key Features of In Vivo Activity. *PLoS computational biology*,​ 12(5). |  |  | Wrong exposure (not PFOS) |  |  |  |
| **Hassan,​ AMA.,​ Kotb,​ MMM.,​ AwadAllah,​ AMA.,​ Shehata,​ NAA.,​ Wahba,​ A.** (2017). Follicular sensitivity index (FSI): a novel tool to predict clinical pregnancy rate in IVF/ICSI cycles. *Journal of assisted reproduction and genetics*,​ 34(10). |  |  | Wrong exposure (not PFOS) |  |  |  |
| **Haug,​ LS.,​ Sakhi,​ AK.,​ Cequier,​ E.,​ Casas,​ M.,​ Maitre,​ L.,​ Basagana,​ X.,​ Andrusaityte,​ S.,​ Chalkiadaki,​ G.,​ Chatzi,​ L.,​ Coen,​ M.,​ de Bont,​ J.,​ Dedele,​ A.,​ Ferrand,​ J.,​ Grazuleviciene,​ R.,​ Gonzalez,​ JR.,​ Gutzkow,​ KB.,​ Keun,​ H.,​ McEachan,​ R.,​ Meltzer,​ HM.,​ Petraviciene,​ I.,​ Robinson,​ O.,​ Saulnier,​ PJ.,​ Slama,​ R.,​ Sunyer,​ J.,​ Urquiza,​ J.,​ Vafeiadi,​ M.,​ Wright,​ J.,​ Vrijheid,​ M.,​ Thomsen,​ C.** (2018). In-utero and childhood chemical exposome in six European mother-child cohorts. *Environment international*,​ 121(Pt 1). |  |  |  | Wrong outcome (not birthweight) |  |  |
| **Helgesson,​ G.,​ Bertilsson,​ G.,​ Domeij,​ H.,​ Fahlström,​ G.,​ Heintz,​ E.,​ Hjern,​ A.,​ Nehlin Gordh,​ C.,​ Nordin,​ V.,​ Rangmar,​ J.,​ Rydell,​ AM.,​ Wahlsten,​ VS.,​ Hultcrantz,​ M.** (2018). Ethical aspects of diagnosis and interventions for children with fetal alcohol Spectrum disorder (FASD) and their families. *BMC medical ethics*,​ 19(1). |  |  | Wrong exposure (not PFOS) |  |  |  |
| **Hong,​ Q.,​ Cai,​ R.,​ Chen,​ Q.,​ Zhang,​ S.,​ Ai,​ A.,​ Fu,​ Y.,​ Kuang,​ Y.** (2017). Three-Dimensional HyCoSy With Perfluoropropane-Albumin Microspheres as Contrast Agents and Normal Saline Injections Into the Pelvic Cavity for Morphological Assessment of the Fallopian Tube in Infertile Women. *Journal of ultrasound in medicine : official journal of the American Institute of Ultrasound in Medicine*,​ 36(4). |  |  | Wrong exposure (not PFOS) |  |  |  |
| **Huang,​ R.,​ Chen,​ Q.,​ Zhang,​ L.,​ Luo,​ K.,​ Chen,​ L.,​ Zhao,​ S.,​ Feng,​ L.,​ Zhang,​ J.** (2019). Prenatal exposure to perfluoroalkyl and polyfluoroalkyl substances and the risk of hypertensive disorders of pregnancy. *Environmental health : a global access science source*,​ 18(1). |  |  |  | Wrong outcome (not birthweight) |  |  |
| **Høyer,​ BB.,​ Bonde,​ JP.,​ Tøttenborg,​ SS.,​ Ramlau-Hansen,​ CH.,​ Lindh,​ C.,​ Pedersen,​ HS.,​ Toft,​ G.** (2018). Exposure to perfluoroalkyl substances during pregnancy and child behaviour at 5 to 9years of age. *Hormones and behavior*,​ 101. |  |  |  | Wrong outcome (not birthweight) |  |  |
| **Impinen,​ A.,​ Nygaard,​ UC.,​ Lødrup Carlsen,​ KC.,​ Mowinckel,​ P.,​ Carlsen,​ KH.,​ Haug,​ LS.,​ Granum,​ B.** (2018). Prenatal exposure to perfluoralkyl substances (PFASs) associated with respiratory tract infections but not allergy- and asthma-related health outcomes in childhood. *Environmental research*,​ 160. |  |  |  | Wrong outcome (not birthweight) |  |  |
| **Itoh,​ S.,​ Araki,​ A.,​ Mitsui,​ T.,​ Miyashita,​ C.,​ Goudarzi,​ H.,​ Sasaki,​ S.,​ Cho,​ K.,​ Nakazawa,​ H.,​ Iwasaki,​ Y.,​ Shinohara,​ N.,​ Nonomura,​ K.,​ Kishi,​ R.** (2016). Association of perfluoroalkyl substances exposure in utero with reproductive hormone levels in cord blood in the Hokkaido Study on Environment and Children's Health. *Environment international*,​ 94. |  |  |  | Wrong outcome (not birthweight) |  |  |
| **Jaacks,​ LM.,​ Boyd Barr,​ D.,​ Sundaram,​ R.,​ Grewal,​ J.,​ Zhang,​ C.,​ Buck Louis,​ GM.** (2016). Pre-Pregnancy Maternal Exposure to Persistent Organic Pollutants and Gestational Weight Gain: A Prospective Cohort Study. *International journal of environmental research and public health*,​ 13(9). |  |  |  | Wrong outcome (not birthweight) |  |  |
| **Jeddy,​ Z.,​ Hartman,​ TJ.,​ Taylor,​ EV.,​ Poteete,​ C.,​ Kordas,​ K.** (2017). Prenatal concentrations of Perfluoroalkyl substances and early communication development in British girls. *Early human development*,​ 109. |  |  |  | Wrong outcome (not birthweight) |  |  |
| **Jensen,​ RC.,​ Glintborg,​ D.,​ Timmermann,​ CAG.,​ Nielsen,​ F.,​ Kyhl,​ HB.,​ Andersen,​ HR.,​ Grandjean,​ P.,​ Jensen,​ TK.,​ Andersen,​ M.** (2018). Perfluoroalkyl substances and glycemic status in pregnant Danish women: The Odense Child Cohort. *Environment international*,​ 116. |  |  |  | Wrong outcome (not birthweight) |  |  |
| **Kable,​ JA.,​ Coles,​ CD.,​ ,​ .** (2017). Prefrontal cortical responses in children with prenatal alcohol-related neurodevelopmental impairment: A functional near-infrared spectroscopy study. *Clinical neurophysiology : official journal of the International Federation of Clinical Neurophysiology*,​ 128(11). |  |  | Wrong exposure (not PFOS) |  |  |  |
| **Kang,​ JS.,​ Ahn,​ TG.,​ Park,​ JW.** (2019). Perfluorooctanoic acid (PFOA) and perfluooctane sulfonate (PFOS) induce different modes of action in reproduction to Japanese medaka (Oryzias latipes). *Journal of hazardous materials*,​ 368. | Animal/cell |  |  |  |  |  |
| **Karlsen,​ M.,​ Grandjean,​ P.,​ Weihe,​ P.,​ Steuerwald,​ U.,​ Oulhote,​ Y.,​ Valvi,​ D.** (2017). Early-life exposures to persistent organic pollutants in relation to overweight in preschool children. *Reproductive toxicology (Elmsford,​ N.Y.)*,​ 68. |  |  |  | Wrong outcome (not birthweight) |  |  |
| **Kieskamp,​ KK.,​ Worley,​ RR.,​ McLanahan,​ ED.,​ Verner,​ MA.** (2018). Incorporation of fetal and child PFOA dosimetry in the derivation of health-based toxicity values. *Environment international*,​ 111. |  |  |  | Wrong outcome (not birthweight) |  |  |
| **Kingsley,​ SL.,​ Walker,​ DI.,​ Calafat,​ AM.,​ Chen,​ A.,​ Papandonatos,​ GD.,​ Xu,​ Y.,​ Jones,​ DP.,​ Lanphear,​ BP.,​ Pennell,​ KD.,​ Braun,​ JM.** (2019). Metabolomics of childhood exposure to perfluoroalkyl substances: a cross-sectional study. *Metabolomics : Official journal of the Metabolomic Society*,​ 15(7). |  |  |  | Wrong outcome (not birthweight) |  |  |
| **Knudsen,​ AS.,​ Long,​ M.,​ Pedersen,​ HS.,​ Bonefeld-Jørgensen,​ EC.** (2018). Persistent organic pollutants and haematological markers in Greenlandic pregnant women: the ACCEPT sub-study. *International journal of circumpolar health*,​ 77(1). |  |  |  | Wrong outcome (not birthweight) |  |  |
| **Kodali,​ VN.,​ Jacobson,​ JL.,​ Lindinger,​ NM.,​ Dodge,​ NC.,​ Molteno,​ CD.,​ Meintjes,​ EM.,​ Jacobson,​ SW.** (2017). Differential Recruitment of Brain Regions During Response Inhibition in Children Prenatally Exposed to Alcohol. *Alcoholism,​ clinical and experimental research*,​ 41(2). |  |  | Wrong exposure (not PFOS) |  |  |  |
| **Lauritzen,​ HB.,​ Larose,​ TL.,​ Øien,​ T.,​ Odland,​ JØ.,​ van de Bor,​ M.,​ Jacobsen,​ GW.,​ Sandanger,​ TM.** (2016). Factors Associated with Maternal Serum Levels of Perfluoroalkyl Substances and Organochlorines: A Descriptive Study of Parous Women in Norway and Sweden. *PloS one*,​ 11(11). |  |  |  | Wrong outcome (not birthweight) |  |  |
| **Lauritzen,​ HB.,​ Larose,​ TL.,​ Øien,​ T.,​ Sandanger,​ TM.,​ Odland,​ JØ.,​ van de Bor,​ M.,​ Jacobsen,​ GW.** (2018). Prenatal exposure to persistent organic pollutants and child overweight/obesity at 5-year follow-up: a prospective cohort study. *Environmental health : a global access science source*,​ 17(1). |  |  |  | Wrong outcome (not birthweight) |  |  |
| **Lee,​ S.,​ Kim,​ S.,​ Park,​ J.,​ Kim,​ HJ.,​ Choi,​ G.,​ Choi,​ S.,​ Kim,​ S.,​ Kim,​ SY.,​ Kim,​ S.,​ Choi,​ K.,​ Moon,​ HB.** (2018). Perfluoroalkyl substances (PFASs) in breast milk from Korea: Time-course trends,​ influencing factors,​ and infant exposure. *The Science of the total environment*,​ 612. |  |  |  | Wrong outcome (not birthweight) |  |  |
| **Lei,​ T.,​ Feng,​ JL.,​ Xie,​ YJ.,​ Xie,​ HN.,​ Zheng,​ J.,​ Lin,​ MF.** (2017). Chromosomal aneuploidies and copy number variations in posterior fossa abnormalities diagnosed by prenatal ultrasonography. *Prenatal diagnosis*,​ 37(11). |  |  | Wrong exposure (not PFOS) |  |  |  |
| **Leung,​ YK.,​ Ouyang,​ B.,​ Niu,​ L.,​ Xie,​ C.,​ Ying,​ J.,​ Medvedovic,​ M.,​ Chen,​ A.,​ Weihe,​ P.,​ Valvi,​ D.,​ Grandjean,​ P.,​ Ho,​ SM.** (2018). Identification of sex-specific DNA methylation changes driven by specific chemicals in cord blood in a Faroese birth cohort. *Epigenetics*,​ 13(3). |  |  |  | Wrong outcome (not birthweight) |  |  |
| **Lewis,​ CE.,​ Thomas,​ KG.,​ Molteno,​ CD.,​ Kliegel,​ M.,​ Meintjes,​ EM.,​ Jacobson,​ JL.,​ Jacobson,​ SW.** (2016). Prospective Memory Impairment in Children with Prenatal Alcohol Exposure. *Alcoholism,​ clinical and experimental research*,​ 40(5). |  |  | Wrong exposure (not PFOS) |  |  |  |
| **Li,​ N.,​ Mruk,​ DD.,​ Lee,​ WM.,​ Wong,​ CK.,​ Cheng,​ CY.** (2016). Is toxicant-induced Sertoli cell injury in vitro a useful model to study molecular mechanisms in spermatogenesis? *Seminars in cell & developmental biology*,​ 59. | Animal/cell |  |  |  |  |  |
| **Lien,​ GW.,​ Huang,​ CC.,​ Shiu,​ JS.,​ Chen,​ MH.,​ Hsieh,​ WS.,​ Guo,​ YL.,​ Chen,​ PC.** (2016). Perfluoroalkyl substances in cord blood and attention deficit/hyperactivity disorder symptoms in seven-year-old children. *Chemosphere*,​ 156. |  |  |  | Wrong outcome (not birthweight) |  |  |
| **Liew,​ Z.,​ Goudarzi,​ H.,​ Oulhote,​ Y.** (2018). Developmental Exposures to Perfluoroalkyl Substances (PFASs): An Update of Associated Health Outcomes. *Current environmental health reports*,​ 5(1). |  |  |  |  |  | Meta/Review (only potentially relevant reviews related to exposure and endpoint of interest) |
| **Liew,​ Z.,​ Ritz,​ B.,​ Bach,​ CC.,​ Asarnow,​ RF.,​ Bech,​ BH.,​ Nohr,​ EA.,​ Bossi,​ R.,​ Henriksen,​ TB.,​ Bonefeld-Jørgensen,​ EC.,​ Olsen,​ J.** (2018). Prenatal Exposure to Perfluoroalkyl Substances and IQ Scores at Age 5; a Study in the Danish National Birth Cohort. *Environmental health perspectives*,​ 126(6). |  |  |  | Wrong outcome (not birthweight) |  |  |
| **Lindinger,​ NM.,​ Malcolm-Smith,​ S.,​ Dodge,​ NC.,​ Molteno,​ CD.,​ Thomas,​ KG.,​ Meintjes,​ EM.,​ Jacobson,​ JL.,​ Jacobson,​ SW.** (2016). Theory of Mind in Children with Fetal Alcohol Spectrum Disorders. *Alcoholism,​ clinical and experimental research*,​ 40(2). |  |  | Wrong exposure (not PFOS) |  |  |  |
| **Liu,​ CY.,​ Chen,​ PC.,​ Lien,​ PC.,​ Liao,​ YP.** (2018). Prenatal Perfluorooctyl Sulfonate Exposure and Alu DNA Hypomethylation in Cord Blood. *International journal of environmental research and public health*,​ 15(6). |  |  |  | Wrong outcome (not birthweight) |  |  |
| **Liu,​ H.,​ Chen,​ Q.,​ Lei,​ L.,​ Zhou,​ W.,​ Huang,​ L.,​ Zhang,​ J.,​ Chen,​ D.** (2018). Prenatal exposure to perfluoroalkyl and polyfluoroalkyl substances affects leukocyte telomere length in female newborns. *Environmental pollution (Barking,​ Essex : 1987)*,​ 235. |  |  |  | Wrong outcome (not birthweight) |  |  |
| **Louis,​ GM.,​ Sapra,​ KJ.,​ Barr,​ DB.,​ Lu,​ Z.,​ Sundaram,​ R.** (2016). Preconception perfluoroalkyl and polyfluoroalkyl substances and incident pregnancy loss,​ LIFE Study. *Reproductive toxicology (Elmsford,​ N.Y.)*,​ 65. |  |  |  | Wrong outcome (not birthweight) |  |  |
| **Lum,​ KJ.,​ Sundaram,​ R.,​ Barr,​ DB.,​ Louis,​ TA.,​ Buck Louis,​ GM.** (2017). Perfluoroalkyl Chemicals,​ Menstrual Cycle Length,​ and Fecundity: Findings from a Prospective Pregnancy Study. *Epidemiology (Cambridge,​ Mass.)*,​ 28(1). |  |  |  | Wrong outcome (not birthweight) |  |  |
| **Lyall,​ K.,​ Yau,​ VM.,​ Hansen,​ R.,​ Kharrazi,​ M.,​ Yoshida,​ CK.,​ Calafat,​ AM.,​ Windham,​ G.,​ Croen,​ LA.** (2018). Prenatal Maternal Serum Concentrations of Per- and Polyfluoroalkyl Substances in Association with Autism Spectrum Disorder and Intellectual Disability. *Environmental health perspectives*,​ 126(1) |  |  |  | Wrong outcome (not birthweight) |  |  |
| **Ma,​ M.,​ Ren,​ Q.,​ Yang,​ J.,​ Zhang,​ K.,​ Xiong,​ Z.,​ Ishima,​ T.,​ Pu,​ Y.,​ Hwang,​ SH.,​ Toyoshima,​ M.,​ Iwayama,​ Y.,​ Hisano,​ Y.,​ Yoshikawa,​ T.,​ Hammock,​ BD.,​ Hashimoto,​ K.** (2019). Key role of soluble epoxide hydrolase in the neurodevelopmental disorders of offspring after maternal immune activation. *Proceedings of the National Academy of Sciences of the United States of America*,​ 116(14) | Animal/cell |  |  |  |  |  |
| **Maisonet,​ M.,​ Calafat,​ AM.,​ Marcus,​ M.,​ Jaakkola,​ JJ.,​ Lashen,​ H.** (2015). Prenatal Exposure to Perfluoroalkyl Acids and Serum Testosterone Concentrations at 15 Years of Age in Female ALSPAC Study Participants. *Environmental health perspectives*,​ 123(12). |  |  |  | Wrong outcome (not birthweight) |  |  |
| **Makey,​ CM.,​ Webster,​ TF.,​ Martin,​ JW.,​ Shoeib,​ M.,​ Harner,​ T.,​ Dix-Cooper,​ L.,​ Webster,​ GM.** (2017). Airborne Precursors Predict Maternal Serum Perfluoroalkyl Acid Concentrations. *Environmental science & technology*,​ 51(13). |  |  |  | Wrong outcome (not birthweight) |  |  |
| **Malits,​ J.,​ Blustein,​ J.,​ Trasande,​ L.,​ Attina,​ TM.** (2018). Perfluorooctanoic acid and low birth weight: Estimates of US attributable burden and economic costs from 2003 through 2014. *International journal of hygiene and environmental health*,​ 221(2). |  |  |  |  | Not health (studies of attitudes, beliefs, other non-health outcomes) |  |
| **Mamsen,​ LS.,​ Björvang,​ RD.,​ Mucs,​ D.,​ Vinnars,​ MT.,​ Papadogiannakis,​ N.,​ Lindh,​ CH.,​ Andersen,​ CY.,​ Damdimopoulou,​ P.** (2019). Concentrations of perfluoroalkyl substances (PFASs) in human embryonic and fetal organs from first,​ second,​ and third trimester pregnancies. *Environment international*,​ 124. |  |  |  | Wrong outcome (not birthweight) |  |  |
| **Mamsen,​ LS.,​ Jönsson,​ BAG.,​ Lindh,​ CH.,​ Olesen,​ RH.,​ Larsen,​ A.,​ Ernst,​ E.,​ Kelsey,​ TW.,​ Andersen,​ CY.** (2017). Concentration of perfluorinated compounds and cotinine in human foetal organs,​ placenta,​ and maternal plasma. *The Science of the total environment*,​ 596-597. |  |  |  | Wrong outcome (not birthweight) |  |  |
| **Manzano-Salgado,​ CB.,​ Casas,​ M.,​ Lopez-Espinosa,​ MJ.,​ Ballester,​ F.,​ Iñiguez,​ C.,​ Martinez,​ D.,​ Romaguera,​ D.,​ Fernández-Barrés,​ S.,​ Santa-Marina,​ L.,​ Basterretxea,​ M.,​ Schettgen,​ T.,​ Valvi,​ D.,​ Vioque,​ J.,​ Sunyer,​ J.,​ Vrijheid,​ M.** (2017). Prenatal Exposure to Perfluoroalkyl Substances and Cardiometabolic Risk in Children from the Spanish INMA Birth Cohort Study. *Environmental health perspectives*,​ 125(9). |  |  |  | Wrong outcome (not birthweight) |  |  |
| **Manzano-Salgado,​ CB.,​ Casas,​ M.,​ Lopez-Espinosa,​ MJ.,​ Ballester,​ F.,​ Martinez,​ D.,​ Ibarluzea,​ J.,​ Santa-Marina,​ L.,​ Schettgen,​ T.,​ Vioque,​ J.,​ Sunyer,​ J.,​ Vrijheid,​ M.** . Variability of perfluoroalkyl substance concentrations in pregnant women by socio-demographic and dietary factors in a Spanish birth cohort. *Environment international*,​ 92-93. |  |  |  | Wrong outcome (not birthweight) |  |  |
| **Martín,​ J.,​ Rodríguez-Gómez,​ R.,​ Zafra-Gómez,​ A.,​ Alonso,​ E.,​ Vílchez,​ JL.,​ Navalón,​ A.** (2016). Validated method for the determination of perfluorinated compounds in placental tissue samples based on a simple extraction procedure followed by ultra-high performance liquid chromatography-tandem mass spectrometry analysis. *Talanta*,​ 150. | Animal/cell |  |  |  |  |  |
| **Marziali,​ L.,​ Rosignoli,​ F.,​ Valsecchi,​ S.,​ Polesello,​ S.,​ Stefani,​ F.** (2019). Effects of Perfluoralkyl Substances on a Multigenerational Scale: A Case Study with Chironomus riparius (Diptera,​ Chironomidae). *Environmental toxicology and chemistry*,​ 38(5). | Animal/cell |  |  |  |  |  |
| **Matilla-Santander,​ N.,​ Valvi,​ D.,​ Lopez-Espinosa,​ MJ.,​ Manzano-Salgado,​ CB.,​ Ballester,​ F.,​ Ibarluzea,​ J.,​ Santa-Marina,​ L.,​ Schettgen,​ T.,​ Guxens,​ M.,​ Sunyer,​ J.,​ Vrijheid,​ M.** (2017). Exposure to Perfluoroalkyl Substances and Metabolic Outcomes in Pregnant Women: Evidence from the Spanish INMA Birth Cohorts. *Environmental health perspectives*,​ 125(11). |  |  |  | Wrong outcome (not birthweight) |  |  |
| **Matsuura,​ A.,​ Ishima,​ T.,​ Fujita,​ Y.,​ Iwayama,​ Y.,​ Hasegawa,​ S.,​ Kawahara-Miki,​ R.,​ Maekawa,​ M.,​ Toyoshima,​ M.,​ Ushida,​ Y.,​ Suganuma,​ H.,​ Kida,​ S.,​ Yoshikawa,​ T.,​ Iyo,​ M.,​ Hashimoto,​ K.** (2018). Dietary glucoraphanin prevents the onset of psychosis in the adult offspring after maternal immune activation. *Scientific reports*,​ 8(1). |  |  | Wrong exposure (not PFOS) |  |  |  |
| **May,​ PA.,​ de Vries,​ MM.,​ Marais,​ AS.,​ Kalberg,​ WO.,​ Adnams,​ CM.,​ Hasken,​ JM.,​ Tabachnick,​ B.,​ Robinson,​ LK.,​ Manning,​ MA.,​ Jones,​ KL.,​ Hoyme,​ D.,​ Seedat,​ S.,​ Parry,​ CD.,​ Hoyme,​ HE.** (2016). The continuum of fetal alcohol spectrum disorders in four rural communities in South Africa: Prevalence and characteristics. *Drug and alcohol dependence*,​ 159. |  |  | Wrong exposure (not PFOS) |  |  |  |
| **Mitro,​ SD.,​ Johnson,​ T.,​ Zota,​ AR.** (2015). Cumulative Chemical Exposures During Pregnancy and Early Development. *Current environmental health reports*,​ 2(4). |  |  |  |  |  | Meta/Review (only potentially relevant reviews related to exposure and endpoint of interest) |
| **Miura,​ R.,​ Araki,​ A.,​ Miyashita,​ C.,​ Kobayashi,​ S.,​ Kobayashi,​ S.,​ Wang,​ SL.,​ Chen,​ CH.,​ Miyake,​ K.,​ Ishizuka,​ M.,​ Iwasaki,​ Y.,​ Ito,​ YM.,​ Kubota,​ T.,​ Kishi,​ R.** (2018). An epigenome-wide study of cord blood DNA methylations in relation to prenatal perfluoroalkyl substance exposure: The Hokkaido study. *Environment international*,​ 115. |  |  |  | Wrong outcome (not birthweight) |  |  |
| **Mora,​ AM.,​ Fleisch,​ AF.,​ Rifas-Shiman,​ SL.,​ Woo Baidal,​ JA.,​ Pardo,​ L.,​ Webster,​ TF.,​ Calafat,​ AM.,​ Ye,​ X.,​ Oken,​ E.,​ Sagiv,​ SK.** (2018). Early life exposure to per- and polyfluoroalkyl substances and mid-childhood lipid and alanine aminotransferase levels. *Environment international*,​ 111. |  |  |  | Wrong outcome (not birthweight) |  |  |
| **Murano,​ T.,​ Koshimizu,​ H.,​ Hagihara,​ H.,​ Miyakawa,​ T.** (2017). Transcriptomic immaturity of the hippocampus and prefrontal cortex in patients with alcoholism. *Scientific reports*,​ 7. |  |  | Wrong exposure (not PFOS) |  |  |  |
| **Negri,​ E.,​ Metruccio,​ F.,​ Guercio,​ V.,​ Tosti,​ L.,​ Benfenati,​ E.,​ Bonzi,​ R.,​ La Vecchia,​ C.,​ Moretto,​ A.** (2017). Exposure to PFOA and PFOS and fetal growth: a critical merging of toxicological and epidemiological data. *Critical reviews in toxicology*,​ 47(6). |  |  |  |  |  | Meta/Review (only potentially relevant reviews related to exposure and endpoint of interest) |
| **Niu,​ J.,​ Liang,​ H.,​ Tian,​ Y.,​ Yuan,​ W.,​ Xiao,​ H.,​ Hu,​ H.,​ Sun,​ X.,​ Song,​ X.,​ Wen,​ S.,​ Yang,​ L.,​ Ren,​ Y.,​ Miao,​ M.** (2019). Prenatal plasma concentrations of Perfluoroalkyl and polyfluoroalkyl substances and neuropsychological development in children at four years of age. *Environmental health : a global access science source*,​ 18(1). |  |  |  | Wrong outcome (not birthweight) |  |  |
| **Oulhote,​ Y.,​ Steuerwald,​ U.,​ Debes,​ F.,​ Weihe,​ P.,​ Grandjean,​ P.** (2016). Behavioral difficulties in 7-year old children in relation to developmental exposure to perfluorinated alkyl substances. *Environment international*,​ 97. |  |  |  | Wrong outcome (not birthweight) |  |  |
| **Pan,​ Y.,​ Zhu,​ Y.,​ Zheng,​ T.,​ Cui,​ Q.,​ Buka,​ SL.,​ Zhang,​ B.,​ Guo,​ Y.,​ Xia,​ W.,​ Yeung,​ LW.,​ Li,​ Y.,​ Zhou,​ A.,​ Qiu,​ L.,​ Liu,​ H.,​ Jiang,​ M.,​ Wu,​ C.,​ Xu,​ S.,​ Dai,​ J.** (2017). Novel Chlorinated Polyfluorinated Ether Sulfonates and Legacy Per-/Polyfluoroalkyl Substances: Placental Transfer and Relationship with Serum Albumin and Glomerular Filtration Rate. *Environmental science & technology*,​ 51(1). |  |  |  | Wrong outcome (not birthweight) |  |  |
| **Pandya,​ CD.,​ Hoda,​ N.,​ Crider,​ A.,​ Peter,​ D.,​ Kutiyanawalla,​ A.,​ Kumar,​ S.,​ Ahmed,​ AO.,​ Turecki,​ G.,​ Hernandez,​ CM.,​ Terry,​ AV.,​ Pillai,​ A.** (2017). Transglutaminase 2 overexpression induces depressive-like behavior and impaired TrkB signaling in mice. *Molecular psychiatry*,​ 22(5). | Animal/cell |  |  |  |  |  |
| **Papadopoulou,​ E.,​ Sabaredzovic,​ A.,​ Namork,​ E.,​ Nygaard,​ UC.,​ Granum,​ B.,​ Haug,​ LS.** (2016). Exposure of Norwegian toddlers to perfluoroalkyl substances (PFAS): The association with breastfeeding and maternal PFAS concentrations. *Environment international*,​ 94. |  |  |  | Wrong outcome (not birthweight) |  |  |
| **Pennings,​ JL.,​ Jennen,​ DG.,​ Nygaard,​ UC.,​ Namork,​ E.,​ Haug,​ LS.,​ van Loveren,​ H.,​ Granum,​ B.** (2016). Cord blood gene expression supports that prenatal exposure to perfluoroalkyl substances causes depressed immune functionality in early childhood. *Journal of immunotoxicology*,​ 13(2). |  |  |  | Wrong outcome (not birthweight) |  |  |
| **Petersen,​ MS.,​ Halling,​ J.,​ Jørgensen,​ N.,​ Nielsen,​ F.,​ Grandjean,​ P.,​ Jensen,​ TK.,​ Weihe,​ P.** (2018). Reproductive Function in a Population of Young Faroese Men with Elevated Exposure to Polychlorinated Biphenyls (PCBs) and Perfluorinated Alkylate Substances (PFAS). *International journal of environmental research and public health*,​ 15(9). |  |  |  | Wrong outcome (not birthweight) |  |  |
| **Plucińska,​ K.,​ Barger,​ SW.** (2018). Maternal obesity reprograms offspring's executive brain centers in a sex-specific manner?: An Editorial for 'Perinatal high fat diet and early life methyl donor supplementation alter one carbon metabolism and DNA methylation in the brain' on page 362. *Journal of neurochemistry*,​ 145(5). |  | Not a study (letter to the editor, case report, opinion/commentary) |  |  |  |  |
| **Posner,​ J.,​ Cha,​ J.,​ Roy,​ AK.,​ Peterson,​ BS.,​ Bansal,​ R.,​ Gustafsson,​ HC.,​ Raffanello,​ E.,​ Gingrich,​ J.,​ Monk,​ C.** (2016). Alterations in amygdala-prefrontal circuits in infants exposed to prenatal maternal depression. *Translational psychiatry*,​ 6(11). |  |  | Wrong exposure (not PFOS) |  |  |  |
| **Post,​ GB.,​ Gleason,​ JA.,​ Cooper,​ KR.** (2017). Key scientific issues in developing drinking water guidelines for perfluoroalkyl acids: Contaminants of emerging concern. *PLoS biology*,​ 15(12),​ #Pages# |  | Not a study (letter to the editor, case report, opinion/commentary) |  |  |  |  |
| **Prato,​ M.,​ Khadjavi,​ A.,​ Magnetto,​ C.,​ Gulino,​ GR.,​ Rolfo,​ A.,​ Todros,​ T.,​ Cavalli,​ R.,​ Guiot,​ C.** (2016). Effects of oxygen tension and dextran-shelled/2H,​3H-decafluoropentane-cored oxygen-loaded nanodroplets on secretion of gelatinases and their inhibitors in term human placenta. *Bioscience,​ biotechnology,​ and biochemistry*,​ 80(3). | Animal/cell |  |  |  |  |  |
| **Preston,​ EV.,​ Webster,​ TF.,​ Oken,​ E.,​ Claus Henn,​ B.,​ McClean,​ MD.,​ Rifas-Shiman,​ SL.,​ Pearce,​ EN.,​ Braverman,​ LE.,​ Calafat,​ AM.,​ Ye,​ X.,​ Sagiv,​ SK.** (2018). Maternal Plasma per- and Polyfluoroalkyl Substance Concentrations in Early Pregnancy and Maternal and Neonatal Thyroid Function in a Prospective Birth Cohort: Project Viva (USA). *Environmental health perspectives*,​ 126(2). |  |  |  | Wrong outcome (not birthweight) |  |  |
| **Quaak,​ I.,​ de Cock,​ M.,​ de Boer,​ M.,​ Lamoree,​ M.,​ Leonards,​ P.,​ van de Bor,​ M.** (2016). Prenatal Exposure to Perfluoroalkyl Substances and Behavioral Development in Children. *International journal of environmental research and public health*,​ 13(5). |  |  |  | Wrong outcome (not birthweight) |  |  |
| **Rashtian,​ J.,​ Chavkin,​ DE.,​ Merhi,​ Z.** (2019). Water and soil pollution as determinant of water and food quality/contamination and its impact on female fertility. *Reproductive biology and endocrinology : RB&E*,​ 17(1). |  | Not a study (letter to the editor, case report, opinion/commentary) |  |  |  |  |
| **Remy,​ S.,​ Govarts,​ E.,​ Wens,​ B.,​ De Boever,​ P.,​ Den Hond,​ E.,​ Croes,​ K.,​ Sioen,​ I.,​ Baeyens,​ W.,​ van Larebeke,​ N.,​ Koppe,​ J.,​ Covaci,​ A.,​ Schettgen,​ T.,​ Nelen,​ V.,​ Legler,​ J.,​ Schoeters,​ G.** (2016). Metabolic targets of endocrine disrupting chemicals assessed by cord blood transcriptome profiling. *Reproductive toxicology (Elmsford,​ N.Y.)*,​ 65. | Animal/cell |  |  |  |  |  |
| **Romano,​ ME.,​ Xu,​ Y.,​ Calafat,​ AM.,​ Yolton,​ K.,​ Chen,​ A.,​ Webster,​ GM.,​ Eliot,​ MN.,​ Howard,​ CR.,​ Lanphear,​ BP.,​ Braun,​ JM.** (2016). Maternal serum perfluoroalkyl substances during pregnancy and duration of breastfeeding. *Environmental research*,​ 149. |  |  |  | Wrong outcome (not birthweight) |  |  |
| **Savitz,​ DA.,​ Wellenius,​ GA.** (2018). Invited Commentary: Exposure Biomarkers Indicate More Than Just Exposure. *American journal of epidemiology*,​ 187(4). |  | Not a study (letter to the editor, case report, opinion/commentary) |  |  |  |  |
| **Shah-Kulkarni,​ S.,​ Kim,​ BM.,​ Hong,​ YC.,​ Kim,​ HS.,​ Kwon,​ EJ.,​ Park,​ H.,​ Kim,​ YJ.,​ Ha,​ EH.** (2016). Prenatal exposure to perfluorinated compounds affects thyroid hormone levels in newborn girls. *Environment international*,​ 94. |  |  |  | Wrong outcome (not birthweight) |  |  |
| **Shapiro,​ GD.,​ Dodds,​ L.,​ Arbuckle,​ TE.,​ Ashley-Martin,​ J.,​ Ettinger,​ AS.,​ Fisher,​ M.,​ Taback,​ S.,​ Bouchard,​ MF.,​ Monnier,​ P.,​ Dallaire,​ R.,​ Morisset,​ AS.,​ Fraser,​ W.** (2016). Exposure to organophosphorus and organochlorine pesticides,​ perfluoroalkyl substances,​ and polychlorinated biphenyls in pregnancy and the association with impaired glucose tolerance and gestational diabetes mellitus: The MIREC Study. *Environmental research*,​ 147. |  |  |  | Wrong outcome (not birthweight) |  |  |
| **Shi,​ G.,​ Guo,​ H.,​ Sheng,​ N.,​ Cui,​ Q.,​ Pan,​ Y.,​ Wang,​ J.,​ Guo,​ Y.,​ Dai,​ J.** (2018). Two-generational reproductive toxicity assessment of 6:2 chlorinated polyfluorinated ether sulfonate (F-53B,​ a novel alternative to perfluorooctane sulfonate) in zebrafish. *Environmental pollution (Barking,​ Essex : 1987)*,​ 243(Pt B). | Animal/cell |  |  |  |  |  |
| **Shi,​ G.,​ Wang,​ J.,​ Guo,​ H.,​ Sheng,​ N.,​ Cui,​ Q.,​ Pan,​ Y.,​ Guo,​ Y.,​ Sun,​ Y.,​ Dai,​ J.** (2019). Parental exposure to 6:2 chlorinated polyfluorinated ether sulfonate (F-53B) induced transgenerational thyroid hormone disruption in zebrafish. *The Science of the total environment*,​ 665. | Animal/cell |  |  |  |  |  |
| **Shu,​ H.,​ Lindh,​ CH.,​ Wikström,​ S.,​ Bornehag,​ CG.** (2018). Temporal trends and predictors of perfluoroalkyl substances serum levels in Swedish pregnant women in the SELMA study. *PloS one*,​ 13(12). |  |  |  | Wrong outcome (not birthweight) |  |  |
| **Singh,​ S.,​ Singh,​ SK.** (2019). Prepubertal exposure to perfluorononanoic acid interferes with spermatogenesis and steroidogenesis in male mice. *Ecotoxicology and environmental safety*,​ 170. | Animal/cell |  |  |  |  |  |
| **Spratlen,​ MJ.,​ Perera,​ FP.,​ Lederman,​ SA.,​ Robinson,​ M.,​ Kannan,​ K.,​ Trasande,​ L.,​ Herbstman,​ J.** (2019). Cord blood perfluoroalkyl substances in mothers exposed to the World Trade Center disaster during pregnancy. *Environmental pollution (Barking,​ Essex : 1987)*,​ 246. |  |  |  | Wrong outcome (not birthweight) |  |  |
| **Steenland,​ K.,​ Barry,​ V.,​ Savitz,​ D.** (2018). Serum Perfluorooctanoic Acid and Birthweight: An Updated Meta-analysis With Bias Analysis. *Epidemiology (Cambridge,​ Mass.)*,​ 29(6). |  |  |  |  |  | Meta/Review (only potentially relevant reviews related to exposure and endpoint of interest) |
| **Steves,​ AN.,​ Turry,​ A.,​ Gill,​ B.,​ Clarkson-Townsend,​ D.,​ Bradner,​ JM.,​ Bachli,​ I.,​ Caudle,​ WM.,​ Miller,​ GW.,​ Chan,​ AWS.,​ Easley,​ CA.** (2018). Per- and polyfluoroalkyl substances impact human spermatogenesis in a stem-cell-derived model. *Systems biology in reproductive medicine*,​ 64(4). |  |  |  | Wrong outcome (not birthweight) |  |  |
| **Swart,​ PC.,​ Russell,​ VA.,​ Dimatelis,​ JJ.** (2019). Maternal separation stress reduced prenatal-ethanol-induced increase in exploratory behaviour and extracellular signal-regulated kinase activity. *Behavioural brain research*,​ 356. | Animal/cell |  |  |  |  |  |
| **Tian,​ Y.,​ Liang,​ H.,​ Miao,​ M.,​ Yang,​ F.,​ Ji,​ H.,​ Cao,​ W.,​ Liu,​ X.,​ Zhang,​ X.,​ Chen,​ A.,​ Xiao,​ H.,​ Hu,​ H.,​ Yuan,​ W.** (2019). Maternal plasma concentrations of perfluoroalkyl and polyfluoroalkyl substances during pregnancy and anogenital distance in male infants. *Human reproduction (Oxford,​ England)*,​ 34(7). |  |  |  | Wrong outcome (not birthweight) |  |  |
| **Tian,​ Y.,​ Zhou,​ Y.,​ Miao,​ M.,​ Wang,​ Z.,​ Yuan,​ W.,​ Liu,​ X.,​ Wang,​ X.,​ Wang,​ Z.,​ Wen,​ S.,​ Liang,​ H.** (2018). Determinants of plasma concentrations of perfluoroalkyl and polyfluoroalkyl substances in pregnant women from a birth cohort in Shanghai,​ China. *Environment international*,​ 119. |  |  |  | Wrong outcome (not birthweight) |  |  |
| **Timmermann,​ CA.,​ Budtz-Jørgensen,​ E.,​ Jensen,​ TK.,​ Osuna,​ CE.,​ Petersen,​ MS.,​ Steuerwald,​ U.,​ Nielsen,​ F.,​ Poulsen,​ LK.,​ Weihe,​ P.,​ Grandjean,​ P.** (2017). Association between perfluoroalkyl substance exposure and asthma and allergic disease in children as modified by MMR vaccination. *Journal of immunotoxicology*,​ 14(1). |  |  |  | Wrong outcome (not birthweight) |  |  |
| **Tsai,​ MS.,​ Chen,​ MH.,​ Lin,​ CC.,​ Ng,​ S.,​ Hsieh,​ CJ.,​ Liu,​ CY.,​ Hsieh,​ WS.,​ Chen,​ PC.** (2017). Children's environmental health based on birth cohort studies of Asia. *The Science of the total environment*,​ 609. |  |  |  |  |  | Meta/Review (only potentially relevant reviews related to exposure and endpoint of interest) |
| **Tsai,​ MS.,​ Miyashita,​ C.,​ Araki,​ A.,​ Itoh,​ S.,​ Bamai,​ YA.,​ Goudarzi,​ H.,​ Okada,​ E.,​ Kashino,​ I.,​ Matsuura,​ H.,​ Kishi,​ R.** (2018). Determinants and Temporal Trends of Perfluoroalkyl Substances in Pregnant Women: The Hokkaido Study on Environment and Children's Health. *International journal of environmental research and public health*,​ 15(5). |  |  |  | Wrong outcome (not birthweight) |  |  |
| **Uppal,​ JS.,​ Zheng,​ Q.,​ Le,​ XC.** (2018). Maternal exposure to specific perfluoroalkyl substances is associated with increasing blood glucose in pregnant women. *Journal of environmental sciences (China)*,​ 69. |  |  |  | Wrong outcome (not birthweight) |  |  |
| **VanNoy,​ BN.,​ Lam,​ J.,​ Zota,​ AR.** (2018). Breastfeeding as a Predictor of Serum Concentrations of Per- and Polyfluorinated Alkyl Substances in Reproductive-Aged Women and Young Children: A Rapid Systematic Review. *Current environmental health reports*,​ 5(2). |  |  |  | Wrong outcome (not birthweight) |  |  |
| **Vélez,​ MP.,​ Arbuckle,​ TE.,​ Fraser,​ WD.,​ Mumford,​ SL.** (2016). Perfluoroalkyl acids and Time-to-Pregnancy: The issue of "parity-conditioning bias". *Environmental research*,​ 147. |  |  |  | Wrong outcome (not birthweight) |  |  |
| **Verner,​ MA.,​ Loccisano,​ AE.,​ Morken,​ NH.,​ Yoon,​ M.,​ Wu,​ H.,​ McDougall,​ R.,​ Maisonet,​ M.,​ Marcus,​ M.,​ Kishi,​ R.,​ Miyashita,​ C.,​ Chen,​ MH.,​ Hsieh,​ WS.,​ Andersen,​ ME.,​ Clewell,​ HJ.,​ Longnecker,​ MP.** (2015). Associations of Perfluoroalkyl Substances (PFAS) with Lower Birth Weight: An Evaluation of Potential Confounding by Glomerular Filtration Rate Using a Physiologically Based Pharmacokinetic Model (PBPK). *Environmental health perspectives*,​ 123(12). |  |  |  |  |  | Meta/Review (only potentially relevant reviews related to exposure and endpoint of interest) |
| **Verner,​ MA.,​ Ngueta,​ G.,​ Jensen,​ ET.,​ Fromme,​ H.,​ Völkel,​ W.,​ Nygaard,​ UC.,​ Granum,​ B.,​ Longnecker,​ MP.** (2016). A Simple Pharmacokinetic Model of Prenatal and Postnatal Exposure to Perfluoroalkyl Substances (PFASs). *Environmental science & technology*,​ 50(2). |  |  |  | Wrong outcome (not birthweight) |  |  |
| **Vriens,​ A.,​ Nawrot,​ TS.,​ Baeyens,​ W.,​ Den Hond,​ E.,​ Bruckers,​ L.,​ Covaci,​ A.,​ Croes,​ K.,​ De Craemer,​ S.,​ Govarts,​ E.,​ Lambrechts,​ N.,​ Loots,​ I.,​ Nelen,​ V.,​ Peusens,​ M.,​ De Henauw,​ S.,​ Schoeters,​ G.,​ Plusquin,​ M.** (2017). Neonatal exposure to environmental pollutants and placental mitochondrial DNA content: A multi-pollutant approach. *Environment international*,​ 106. |  |  |  | Wrong outcome (not birthweight) |  |  |
| **Vuong,​ AM.,​ Braun,​ JM.,​ Yolton,​ K.,​ Wang,​ Z.,​ Xie,​ C.,​ Webster,​ GM.,​ Ye,​ X.,​ Calafat,​ AM.,​ Dietrich,​ KN.,​ Lanphear,​ BP.,​ Chen,​ A.** (2018). Prenatal and childhood exposure to perfluoroalkyl substances (PFAS) and measures of attention,​ impulse control,​ and visual spatial abilities. *Environment international*,​ 119. |  |  |  | Wrong outcome (not birthweight) |  |  |
| **Vuong,​ AM.,​ Yolton,​ K.,​ Webster,​ GM.,​ Sjödin,​ A.,​ Calafat,​ AM.,​ Braun,​ JM.,​ Dietrich,​ KN.,​ Lanphear,​ BP.,​ Chen,​ A.** (2016). Prenatal polybrominated diphenyl ether and perfluoroalkyl substance exposures and executive function in school-age children. *Environmental research*,​ 147. |  |  |  | Wrong outcome (not birthweight) |  |  |
| **Wang,​ B.,​ Chen,​ Q.,​ Shen,​ L.,​ Zhao,​ S.,​ Pang,​ W.,​ Zhang,​ J.** (2016). Perfluoroalkyl and polyfluoroalkyl substances in cord blood of newborns in Shanghai,​ China: Implications for risk assessment. *Environment international*,​ 97. |  |  |  | Wrong outcome (not birthweight) |  |  |
| **Wang,​ H.,​ Yang,​ J.,​ Du,​ H.,​ Xu,​ L.,​ Liu,​ S.,​ Yi,​ J.,​ Qian,​ X.,​ Chen,​ Y.,​ Jiang,​ Q.,​ He,​ G.** (2018). Perfluoroalkyl substances,​ glucose homeostasis,​ and gestational diabetes mellitus in Chinese pregnant women: A repeat measurement-based prospective study. *Environment international*,​ 114. |  |  |  | Wrong outcome (not birthweight) |  |  |
| **Wang,​ W.,​ Zhou,​ W.,​ Wu,​ S.,​ Liang,​ F.,​ Li,​ Y.,​ Zhang,​ J.,​ Cui,​ L.,​ Feng,​ Y.,​ Wang,​ Y.** (2019). Perfluoroalkyl substances exposure and risk of polycystic ovarian syndrome related infertility in Chinese women. *Environmental pollution (Barking,​ Essex : 1987)*,​ 247. |  |  |  | Wrong outcome (not birthweight) |  |  |
| **Wang,​ Y.,​ Adgent,​ M.,​ Su,​ PH.,​ Chen,​ HY.,​ Chen,​ PC.,​ Hsiung,​ CA.,​ Wang,​ SL.** (2016). Prenatal Exposure to Perfluorocarboxylic Acids (PFCAs) and Fetal and Postnatal Growth in the Taiwan Maternal and Infant Cohort Study. *Environmental health perspectives*,​ 124(11). |  |  | Wrong exposure (not PFOS) |  |  |  |
| **Wang,​ Y.,​ Han,​ W.,​ Wang,​ C.,​ Zhou,​ Y.,​ Shi,​ R.,​ Bonefeld-Jørgensen,​ EC.,​ Yao,​ Q.,​ Yuan,​ T.,​ Gao,​ Y.,​ Zhang,​ J.,​ Tian,​ Y.** (2019). Efficiency of maternal-fetal transfer of perfluoroalkyl and polyfluoroalkyl substances. *Environmental science and pollution research international*,​ 26(3). |  |  |  | Wrong outcome (not birthweight) |  |  |
| **Wang,​ Y.,​ Zhang,​ L.,​ Teng,​ Y.,​ Zhang,​ J.,​ Yang,​ L.,​ Li,​ J.,​ Lai,​ J.,​ Zhao,​ Y.,​ Wu,​ Y.** (2018). Association of serum levels of perfluoroalkyl substances with gestational diabetes mellitus and postpartum blood glucose. *Journal of environmental sciences (China)*,​ 69. |  |  |  | Wrong outcome (not birthweight) |  |  |
| **Whitworth,​ KW.,​ Haug,​ LS.,​ Sabaredzovic,​ A.,​ Eggesbo,​ M.,​ Longnecker,​ MP.** (2016). Brief Report: Plasma Concentrations of Perfluorooctane Sulfonamide and Time-to-pregnancy Among Primiparous Women. *Epidemiology (Cambridge,​ Mass.)*,​ 27(5). |  |  |  | Wrong outcome (not birthweight) |  |  |
| **Woods,​ MM.,​ Lanphear,​ BP.,​ Braun,​ JM.,​ McCandless,​ LC.** (2017). Gestational exposure to endocrine disrupting chemicals in relation to infant birth weight: a Bayesian analysis of the HOME Study. *Environmental health : a global access science source*,​ 16(1). |  |  | Wrong exposure (not PFOS) |  |  |  |
| **Yang,​ J.,​ Wang,​ H.,​ Du,​ H.,​ Xu,​ L.,​ Liu,​ S.,​ Yi,​ J.,​ Qian,​ X.,​ Chen,​ Y.,​ Jiang,​ Q.,​ He,​ G.** (2019). Factors associated with exposure of pregnant women to perfluoroalkyl acids in North China and health risk assessment. *The Science of the total environment*,​ 655. |  |  |  | Wrong outcome (not birthweight) |  |  |
| **Yang,​ L.,​ Li,​ J.,​ Lai,​ J.,​ Luan,​ H.,​ Cai,​ Z.,​ Wang,​ Y.,​ Zhao,​ Y.,​ Wu,​ Y.** (2016). Placental Transfer of Perfluoroalkyl Substances and Associations with Thyroid Hormones: Beijing Prenatal Exposure Study. *Scientific reports*,​ 6. |  |  |  | Wrong outcome (not birthweight) |  |  |
| **Yang,​ L.,​ Wang,​ Z.,​ Shi,​ Y.,​ Li,​ J.,​ Wang,​ Y.,​ Zhao,​ Y.,​ Wu,​ Y.,​ Cai,​ Z.** (2016). Human placental transfer of perfluoroalkyl acid precursors: Levels and profiles in paired maternal and cord serum. *Chemosphere*,​ 144. |  |  |  | Wrong outcome (not birthweight) |  |  |
| **Yang,​ Q.,​ Wang,​ W.,​ Liu,​ C.,​ Wang,​ Y.,​ Sun,​ K.** (2016). Effect of PFOS on glucocorticoid-induced changes in human decidual stromal cells in the first trimester of pregnancy. *Reproductive toxicology (Elmsford,​ N.Y.)*,​ 63. |  |  |  | Wrong outcome (not birthweight) |  |  |
| **Yeung,​ EH.,​ Bell,​ EM.,​ Sundaram,​ R.,​ Ghassabian,​ A.,​ Ma,​ W.,​ Kannan,​ K.,​ Louis,​ GM.** (2019). Examining Endocrine Disruptors Measured in Newborn Dried Blood Spots and Early Childhood Growth in a Prospective Cohort. *Obesity (Silver Spring,​ Md.)*,​ 27(1). |  |  |  | Wrong outcome (not birthweight) |  |  |
| **Zeng,​ XW.,​ Bloom,​ MS.,​ Dharmage,​ SC.,​ Lodge,​ CJ.,​ Chen,​ D.,​ Li,​ S.,​ Guo,​ Y.,​ Roponen,​ M.,​ Jalava,​ P.,​ Hirvonen,​ MR.,​ Ma,​ H.,​ Hao,​ YT.,​ Chen,​ W.,​ Yang,​ M.,​ Chu,​ C.,​ Li,​ QQ.,​ Hu,​ LW.,​ Liu,​ KK.,​ Yang,​ BY.,​ Liu,​ S.,​ Fu,​ C.,​ Dong,​ GH.** (2019). Prenatal exposure to perfluoroalkyl substances is associated with lower hand,​ foot and mouth disease viruses antibody response in infancy: Findings from the Guangzhou Birth Cohort Study. *The Science of the total environment*,​ 663. |  |  |  | Wrong outcome (not birthweight) |  |  |
| **Zhang,​ H.,​ Yolton,​ K.,​ Webster,​ GM.,​ Ye,​ X.,​ Calafat,​ AM.,​ Dietrich,​ KN.,​ Xu,​ Y.,​ Xie,​ C.,​ Braun,​ JM.,​ Lanphear,​ BP.,​ Chen,​ A.** (2018). Prenatal and childhood perfluoroalkyl substances exposures and children's reading skills at ages 5 and 8years. *Environment international*,​ 111. |  |  |  | Wrong outcome (not birthweight) |  |  |
| **Zhang,​ Q.,​ Liu,​ W.,​ Zhao,​ H.,​ Zhang,​ Z.,​ Qin,​ H.,​ Luo,​ F.,​ Niu,​ Q.** (2019). Developmental perfluorooctane sulfonate exposure inhibits long-term potentiation by affecting AMPA receptor trafficking. *Toxicology*,​ 412. | Animal/cell |  |  |  |  |  |
| **Zou,​ Z.,​ Huang,​ L.,​ Lin,​ S.,​ He,​ Z.,​ Zhu,​ H.,​ Zhang,​ Y.,​ Fang,​ Q.,​ Luo,​ Y.** (2018). Prenatal diagnosis of posterior fossa anomalies: Additional value of chromosomal microarray analysis in fetuses with cerebellar hypoplasia. *Prenatal diagnosis*,​ 38(2). |  |  | Wrong exposure (not PFOS) |  |  |  |

eTable 3. Results of fitting random-effects meta-regression models evaluating modification of birth weight-PFOS association by 6 factors

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
|  |  |  | 95% CI | |  |
| Model | Covariate | Coefficient | Lower bound | Upper bound | p |
| 1 | Intercept | 1.38 | -1.38 | 4.14 | 0.33 |
|  | Blood draw (w) | -0.23 | -0.36 | -0.11 | 0.0003 |
|  | Adj. for gest age | -2.30 | -5.64 | 1.03 | 0.18 |
| 2 | Intercept | 1.79 | -1.95 | 5.52 | 0.35 |
|  | Blood draw (w) | -0.23 | -0.36 | -0.10 | 0.0005 |
|  | Adj. for parity | -1.72 | -5.70 | 2.26 | 0.40 |
| 3 | Intercept | 0.55 | -3.99 | 5.08 | 0.81 |
|  | Blood draw (w) | -0.24 | -0.38 | -0.11 | 0.0004 |
|  | Median PFOS | 0.01 | -0.20 | 0.22 | 0.94 |
| 4 | Intercept | 1.36 | -1.82 | 4.53 | 0.40 |
|  | Blood draw (w) | -0.24 | -0.38 | -0.11 | 0.0002 |
|  | Spread in Timing | -0.09 | -0.32 | 0.14 | 0.44 |
| 5 | Intercept | 0.62 | -2.97 | 4.20 | 0.73 |
|  | Blood draw (w) | -0.25 | -0.39 | -0.10 | 0.0009 |
|  | Mean birthweight | 0.00 | -0.00 | 0.00 | 0.96 |
| 6 | Intercept | 1.52 | -1.96 | 5.00 | 0.39 |
|  | Blood draw (w) | -0.27 | -0.42 | -0.12 | 0.0004 |
|  | Term Only | -1.73 | -6.49 | 3.04 | 0.48 |
| 7 | Intercept | 0.20 | -3.26 | 3.66 | 0.91 |
|  | Blood draw (w) | -0.24 | -0.38 | -0.11 | 0.0006 |
|  | Re-expressed β | 1.05 | -2.61 | 4.72 | 0.57 |

**Model 1 – Gestational Age:**

**Test of the model: Simultaneous test that all coefficients (excluding intercept) are zero -** Q = 15.82, df = 2, p = 0.0004

**Goodness of fit: Test that unexplained variance is zero - T**au² = 5.5717, Tau = 2.3604, I² = 42.36%, Q = 50.31, df = 29, p = 0.0084

**Comparison of Model 1 with the null model**

**Total between-study variance (intercept only) -** Tau² = 9.5795, Tau = 3.0951, I² = 58.39%, Q = 74.50, df = 31, p = 0.0000

**Proportion of total between-study variance explained by Model 1 -** R² analog = 0.42

**Model 2 – Parity:**

**Test of the model: Simultaneous test that all coefficients (excluding intercept) are zero -** Q = 14.38, df = 2, p = 0.0008

**Goodness of fit: Test that unexplained variance is zero -** Tau² = 6.1860, Tau = 2.4872, I² = 46.26%, Q = 53.97, df = 29, p = 0.0033

**Comparison of Model 1 with the null model**

**Total between-study variance (intercept only) -** Tau² = 9.5795, Tau = 3.0951, I² = 58.39%, Q = 74.50, df = 31, p = 0.0000

**Proportion of total between-study variance explained by Model 1 -** R² analog = 0.35

**Model 3 – Median PFOS Concentration:**

**Test of the model: Simultaneous test that all coefficients (excluding intercept) are zero -** Q = 13.25, df = 2, p = 0.0013

**Goodness of fit: Test that unexplained variance is zero -** Tau² = 7.0729, Tau = 2.6595, I² = 47.28%, Q = 55.00, df = 29, p = 0.0025

**Comparison of Model 1 with the null model**

**Total between-study variance (intercept only) -** Tau² = 9.5795, Tau = 3.0951, I² = 58.39%, Q = 74.50, df = 31, p = 0.0000

**Proportion of total between-study variance explained by Model 1 –** R² analog = 0.26

**Model 4 – Spread in Timing of Blood Draw Used for PFOS Measurement:**

**Test of the model: Simultaneous test that all coefficients (excluding intercept) are zero -** Q = 13.95, df = 2, p = 0.0009

**Goodness of fit: Test that unexplained variance is zero -** Tau² = 6.8273, Tau = 2.6129, I² = 47.46%, Q = 55.20, df = 29, p = 0.0024

**Comparison of Model 1 with the null model**

**Total between-study variance (intercept only) -** Tau² = 9.5795, Tau = 3.0951, I² = 58.39%, Q = 74.50, df = 31, p = 0.0000

**Proportion of total between-study variance explained by Model 1 -** R² analog = 0.29

**Model 5 – Mean Birth Weight in Study Population:**

**Test of the model: Simultaneous test that all coefficients (excluding intercept) are zero** Q = 13.37, df = 2, p = 0.0012

**Goodness of fit: Test that unexplained variance is zero -** Tau² = 6.8020, Tau = 2.6081, I² = 46.93%, Q = 54.64, df = 29, p = 0.0027

**Comparison of Model 1 with the null model**

**Total between-study variance (intercept only) -** Tau² = 9.5795, Tau = 3.0951, I² = 58.39%, Q = 74.50, df = 31, p = 0.0000

**Proportion of total between-study variance explained by Model 1 -** R² analog = 0.29

**Model 6 – Results of Variation in Analysis Term:**

**Test of the model: Simultaneous test that all coefficients (excluding intercept) are zero -** Q = 13.04, df = 2, p = 0.0015

**Goodness of fit: Test that unexplained variance is zero -** Tau² = 8.8058, Tau = 2.9675, I² = 47.46%, Q = 55.19, df = 29, p = 0.0024

**Comparison of Model 1 with the null model**

**Total between-study variance (intercept only) -** Tau² = 9.5795, Tau = 3.0951, I² = 58.39%, Q = 74.50, df = 31, p = 0.0000

**Proportion of total between-study variance explained by Model 1 -** R² analog = 0.08

**Model 7 – Re-expression Needed for Coefficient Relating Birth Weight to log PFOS Concentration:**

**Test of the model: Simultaneous test that all coefficients (excluding intercept) are zero -** Q = 13.07, df = 2, p = 0.0015

**Goodness of fit: Test that unexplained variance is zero -** Tau² = 8.2538, Tau = 2.8729, I² = 47.27%, Q = 54.99, df = 29, p = 0.0025

**Comparison of Model 1 with the null model**

**Total between-study variance (intercept only) -** Tau² = 9.5795, Tau = 3.0951, I² = 58.39%, Q = 74.50, df = 31, p = 0.0000

**Proportion of total between-study variance explained by Model 1 -** R² analog = 0.14

References

1. Lauritzen HB, Larose TL, Øien T, et al. Maternal serum levels of perfluoroalkyl substances and organochlorines and indices of fetal growth: a Scandinavian case–cohort study. *Pediatr Res*. 2017;81(1):33–42.

2. Meng Q, Inoue K, Ritz B, Olsen J, Liew Z. Prenatal exposure to perfluoroalkyl substances and birth outcomes; an updated analysis from the Danish National Birth Cohort. *Int J Environ Res Public Health*. 2018;15(9):1832.

3. Ashley-Martin J, Dodds L, Arbuckle TE, et al. Maternal Concentrations of Perfluoroalkyl Substances and Fetal Markers of Metabolic Function and Birth WeightThe Maternal-Infant Research on Environmental Chemicals (MIREC) Study. *Am J Epidemiol*. 2017;185(3):185-193.

4. Arbuckle TE, Fraser WD, Fisher M, et al. Cohort profile: the maternal‐infant research on environmental chemicals research platform. *Paediatr Perinat Epidemiol*. 2013;27(4):415-425.

5. Manzano-Salgado CB, Casas M, Lopez-Espinosa M-J, et al. Prenatal exposure to perfluoroalkyl substances and birth outcomes in a Spanish birth cohort. *Environ Int*. 2017;108:278–284.

6. Sagiv SK, Rifas-Shiman SL, Fleisch AF, et al. Early-pregnancy plasma concentrations of perfluoroalkyl substances and birth outcomes in Project Viva: confounded by pregnancy hemodynamics? *Am J Epidemiol*. 2018;187(4):793–802.

7. Borenstein M, Hedges LV, Higgins JP, Rothstein HR. Meta-regression. In: *Introduction to Meta-Analysis*. Chichester, UK: John Wiley and Sons; 2009:187–203.

8. Buck Louis GM, Zhai S, Smarr MM, et al. Endocrine disruptors and neonatal anthropometry, NICHD Fetal Growth Studies - Singletons. *Environ Int*. 2018.

9. Steenland K, Barry V, Savitz D. Serum perfluorooctanoic acid and birthweight: an updated meta-analysis with bias analysis. *Epidemiology*. 2018;29(6):765-776.

10. Apelberg BJ, Witter FR, Herbstman JB, et al. Cord serum concentrations of perfluorooctane sulfonate (PFOS) and perfluorooctanoate (PFOA) in relation to weight and size at birth. *Environ Health Perspect*. 2007;115(11):1670–1676.

11. Monroy R, Morrison K, Teo K, et al. Serum levels of perfluoroalkyl compounds in human maternal and umbilical cord blood samples. *Environ Res*. 2008;108(1):56–62.

12. Washino N, Saijo Y, Sasaki S, et al. Correlations between prenatal exposure to perfluorinated chemicals and reduced fetal growth. *Environ Health Perspect*. 2009;117(4):660–667.

13. Hamm MP, Cherry NM, Chan E, Martin JW, Burstyn I. Maternal exposure to perfluorinated acids and fetal growth. *J Expo Sci Env Epid*. 2010;20(7):589–597.

14. Chen M-H, Ha E-H, Wen T-W, et al. Perfluorinated compounds in umbilical cord blood and adverse birth outcomes. *PloS One*. 2012;7(8).

15. Maisonet M, Terrell ML, McGeehin MA, et al. Maternal concentrations of polyfluoroalkyl compounds during pregnancy and fetal and postnatal growth in British girls. *Environ Health Perspect*. 2012;120(10):1432-1437.

16. Whitworth KW, Haug LS, Baird DD, et al. Perfluorinated compounds in relation to birth weight in the Norwegian Mother and Child Cohort Study. *Am J Epidemiol*. 2012;175(12):1209-1216.

17. Darrow LA, Stein CR, Steenland K. Serum perfluorooctanoic acid and perfluorooctane sulfonate concentrations in relation to birth outcomes in the Mid-Ohio Valley, 2005–2010. *Environ Health Perspect*. 2013;121(10):1207-1213.

18. Robledo CA, Yeung E, Mendola P, et al. Preconception maternal and paternal exposure to persistent organic pollutants and birth size: the LIFE study. *Environ Health Perspect*. 2015;123(1):88–94.

19. Bach CC, Bech BH, Nohr EA, et al. Perfluoroalkyl Acids in Maternal Serum and Indices of Fetal Growth: The Aarhus Birth Cohort. *Environ Health Perspect*. 2016;(6).

20. Callan AC, Rotander A, Thompson K, et al. Maternal exposure to perfluoroalkyl acids measured in whole blood and birth outcomes in offspring. *Sci Total Environ*. 2016;569:1107-1113.

21. Govarts E, Remy S, Bruckers L, et al. Combined effects of prenatal exposures to environmental chemicals on birth weight. *Int J Environ Res Public Health*. 2016;13(5):495.

22. Kwon EJ, Shin JS, Kim BM, et al. Prenatal exposure to perfluorinated compounds affects birth weight through GSTM1 polymorphism. *J Occup Environ Med*. 2016;58(6):e198-e205.

23. Lee E-S, Han S, Oh J-E. Association between perfluorinated compound concentrations in cord serum and birth weight using multiple regression models. *Reprod Toxicol*. 2016;59:53-59.

24. Lenters V, Portengen L, Rignell-Hydbom A, et al. Prenatal phthalate, perfluoroalkyl acid, and organochlorine exposures and term birth weight in three birth cohorts: multi-pollutant models based on elastic net regression. *Environ Health Perspect*. 2016;124(3):365-372.

25. Li M, Zeng X-W, Qian ZM, et al. Isomers of perfluorooctanesulfonate (PFOS) in cord serum and birth outcomes in China: Guangzhou Birth Cohort Study. *Environ Int*. 2017;102:1-8.

26. Lind DV, Priskorn L, Lassen TH, et al. Prenatal exposure to perfluoroalkyl substances and anogenital distance at 3 months of age in a Danish mother-child cohort. *Reprod Toxicol*. 2017;68:200–206.

27. Shi Y, Yang L, Li J, et al. Occurrence of perfluoroalkyl substances in cord serum and association with growth indicators in newborns from Beijing. *Chemosphere*. 2017;169:396-402.

28. Starling AP, Adgate JL, Hamman RF, et al. Perfluoroalkyl substances during pregnancy and offspring weight and adiposity at birth: examining mediation by maternal fasting glucose in the healthy start study. *Environ Health Perspect*. 2017;125(6):067016.

29. Valvi D, Oulhote Y, Weihe P, et al. Gestational diabetes and offspring birth size at elevated environmental pollutant exposures. *Environ Int*. 2017;107:205-215.

30. Cao W, Liu X, Liu X, et al. Perfluoroalkyl substances in umbilical cord serum and gestational and postnatal growth in a Chinese birth cohort. *Environ Int*. 2018;116:197-205.

31. Marks KJ, Cutler AJ, Jeddy Z, Northstone K, Kato K, Hartman TJ. Maternal serum concentrations of perfluoroalkyl substances and birth size in British boys. *Int J Hyg Environ Health*. 2019;222(5):889-895.

32. Wang H, Du H, Yang J, et al. PFOS, PFOA, estrogen homeostasis, and birth size in Chinese infants. *Chemosphere*. 2019;221:349-355.

33. Johnson PI, Sutton P, Atchley DS, et al. The Navigation Guide—evidence-based medicine meets environmental health: systematic review of human evidence for PFOA effects on fetal growth. *Environ Health Perspect*. 2014;122(10):1028–1039.

34. Fromme H, Mosch C, Morovitz M, et al. Pre-and postnatal exposure to perfluorinated compounds (PFCs). *Environ Sci Technol*. 2010;44(18):7123-7129.

35. Kim S, Choi K, Ji K, et al. Trans-placental transfer of thirteen perfluorinated compounds and relations with fetal thyroid hormones. *Environ Sci Technol*. 2011;45(17):7465-7472.

36. Fei C, McLaughlin JK, Tarone RE, Olsen J. Perfluorinated chemicals and fetal growth: a study within the Danish National Birth Cohort. *Environ Health Perspect*. 2007;115(11):1677-1682.

37. Verner M-A, Loccisano AE, Morken N-H, et al. Associations of perfluoroalkyl substances (PFAS) with lower birth weight: an evaluation of potential confounding by glomerular filtration rate using a physiologically based pharmacokinetic model (PBPK). *Environ Health Perspect*. 2015;123(12):1317–1324.

38. Negri E, Metruccio F, Guercio V, et al. Exposure to PFOA and PFOS and fetal growth: a critical merging of toxicological and epidemiological data. *Crit Rev Toxicol*. 2017;47(6):489–515.

39. Wu K, Xu X, Peng L, Liu J, Guo Y, Huo X. Association between maternal exposure to perfluorooctanoic acid (PFOA) from electronic waste recycling and neonatal health outcomes. *Environ Int*. 2012;48:1-8.

40. Wang Y, Adgent M, Su P-H, et al. Prenatal exposure to perfluorocarboxylic acids (PFCAs) and fetal and postnatal growth in the Taiwan Maternal and Infant Cohort Study. *Environ Health Perspect*. 2016;124(11):1794-1800.

41. Minatoya M, Itoh S, Miyashita C, et al. Association of prenatal exposure to perfluoroalkyl substances with cord blood adipokines and birth size: The Hokkaido Study on environment and children’s health. *Environ Res*. 2017;156:175-182.