Supplementary Material

* Files for supplementary data must be accompanied by a summary of the file names and types.

# Supplementary information

## Directed Acyclic Graphs

dag {  
age\_child  
biomarker  
breastfeeding  
bw  
characteristics\_child  
chemical [exposure]  
child\_diet  
child\_smoking  
cohort  
creatinine  
envFactors\_visit  
ethnicity\_child  
ethnicity\_mother  
familySEP  
gestational\_age  
maternalAlcohol\_preg  
maternalDiet\_preg  
maternalSEP\_preg  
maternalSmoking\_preg  
neuropsychologicalDiagnosis\_child  
outcome [outcome]  
paternalSEP\_preg  
qualityTesting\_child  
season\_visit  
sex\_child  
time\_lastMeal  
type\_sample  
age\_child -> biomarker  
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age\_child -> type\_sample  
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time\_lastMeal -> chemical  
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dag {  
age\_child  
biomarker [outcome]  
breastfeeding  
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sex\_child -> type\_sample  
time\_lastMeal -> biomarker  
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type\_sample -> chemical  
type\_sample -> creatinine  
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# Supplementary tables

## Descriptive data

### Study populations

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| Supplementary Table 1: Codebook for covariates used in RQ1   |  | type | description | coding | labels | remarks | comments | included*1* | | --- | --- | --- | --- | --- | --- | --- | --- | | **age\_child** | | | | | | | | | hs\_age\_years | numerical | Age of the child at clinical assessment |  |  |  | years | TRUE | | **breastfeeding** | | | | | | | | | hs\_bf | categorical | Child breastfeeding | 0,1 | No, Yes |  |  | TRUE | | **characteristics\_child** | | | | | | | | | hs\_c\_height | numerical | Height of the child |  |  |  | m | TRUE | | hs\_c\_weight | numerical | Weight of the child |  |  |  | kg | TRUE | | hs\_head\_circ | numerical | Head circumference of the child |  |  |  | cm | TRUE | | **child\_diet** | | | | | | | | | hs\_fastfood | numerical | Visits a fast food restaurant/take away |  |  |  | Times / week | TRUE | | hs\_org\_food | numerical | Eats organic food |  |  |  | Times / week | TRUE | | hs\_total\_fish | numerical | Food group: fish and seafood (hs\_canfish+hs\_oilyfish+hs\_whfish+hs\_seafood) |  |  |  | Times / week | TRUE | | hs\_total\_fruits | numerical | Food group: fruits (hs\_canfruit+hs\_dryfruit+hs\_freshjuice+hs\_fruits) |  |  |  | Times / week | TRUE | | hs\_total\_veg | numerical | Food group: vegetables (hs\_cookveg+hs\_rawveg) |  |  |  | Times / week | TRUE | | **child\_smoking** | | | | | | | | | hs\_tob | categorical | Which of the following best describes your consumption of tobacco? | 1,2,3,4,5 | Non-smoker and has never smoked, Non-smoker but previously smoked although not daily, Non-smoker but previously smoked daily, Smoker but not daily, Daily smoker |  |  | TRUE | | **cohort** | | | | | | | | | cohort | character | Cohort name | SAB,EDEN,BIB,RHEA,KANC,MOBA | SAB, EDEN, BIB, RHEA, KANC, MOBA |  |  | TRUE | | **creatinine** | | | | | | | | | hs\_creatinine\_cg | numerical | Creatinine in child |  |  | Values below the limit of detection imputed | G / L | TRUE | | **envFactors\_visit** | | | | | | | | | hs\_healthc\_tday | categorical | Child health on the day of assessment | 1,2 | Normal, Health problem |  |  | TRUE | | hs\_mood | categorical | Mood of the child in the last few days before assessment | 1,2 | Usual, Not usual |  |  | TRUE | | hs\_noise | categorical | Noise on the day of assessment | 1,2,3 | No noise, Some noise, Noisy |  |  | TRUE | | hs\_rest\_nth | categorical | Child rested the night before assessment | 1,2 | Yes, Not as well as usual |  |  | TRUE | | **ethnicity\_child** | | | | | | | | | h\_ethnicity\_c | character | Which is the ethnicity of the child? | 1,2,3,4,5,6,7 | African, Asian, Caucasian, Native\_American, Other, Pakistani, White\_notEuropean |  |  | TRUE | | **ethnicity\_mother** | | | | | | | | | h\_ethnicity\_m | integer | Which is the ethnicity of the mother? | 1,2,3,4,5,6,7 | mother white European, mother Pakistani, mother Asian, mother African, mother other, mother native American, mother white but not European |  |  | FALSE | | **familySEP** | | | | | | | | | FAS\_score | numerical | Family Affluence Scale (FAS II) continuous |  |  |  |  | TRUE | | hs\_finance | categorical | How well would you say your family is managing financially these days? | 1,2,3,4,5,6 | Living comfortably, Doing alright, Getting by, Finding it quite difficult, Finding it very difficult, Does not wish to answer |  |  | TRUE | | **maternalAlcohol\_preg** | | | | | | | | | e3\_alcpreg\_g | numerical | Alcool during pregnancy |  |  |  | Glasses / week | FALSE | | **maternalDiet\_preg** | | | | | | | | | h\_cereal\_preg | numerical | Cereal consumption during pregnancy |  |  |  | Times / week | FALSE | | h\_dairy\_preg | numerical | Dairy consumption during pregnancy |  |  |  | Times / week | FALSE | | h\_fastfood\_preg | numerical | Fast food consumption during pregnancy |  |  |  | Times / week | FALSE | | h\_fish\_preg | numerical | Fish consumption during pregnancy |  |  |  | Times / week | FALSE | | h\_fruit\_preg | numerical | Fruit consumption during pregnancy |  |  |  | Times / week | FALSE | | h\_legume\_preg | numerical | Legume consumption during pregnancy |  |  |  | Times / week | FALSE | | h\_meat\_preg | numerical | Meat consumption during pregnancy |  |  |  | Times / week | FALSE | | h\_veg\_preg | numerical | Vegetables consumption during pregnancy |  |  |  | Times / week | FALSE | | **maternalSEP\_preg** | | | | | | | | | e3\_edum | categorical | Maternal education | 0,1,2 | Primary school, Secondary school, University degree or higher |  |  | FALSE | | e3\_marital | categorical | Marital status | 0,1,2 | living with the father, Living alone, Other situation |  |  | TRUE | | e3\_ses | categorical | Socioeconomic status of the parents | 1,2,3 | Low income, Medium income, High income |  |  | FALSE | | **maternalSmoking\_preg** | | | | | | | | | e3\_asmokyn\_p | categorical | Maternal active smoking during pregnancy | 0,1 | No, Yes |  |  | TRUE | | e3\_psmokanyt | categorical | Maternal passive smoking during pregnancy | 0,1 | No, Yes |  |  | TRUE | | **neuropsychologicalDiagnosis\_child** | | | | | | | | | hs\_neuro\_diag | categorical | Any previous child neuropsychological diagnosis? | 1,2 | No, Yes |  |  | TRUE | | **paternalSEP\_preg** | | | | | | | | | e3\_eduf | categorical | Paternal education | 0,1,2 | Primary school, Secondary school, University degree or higher |  |  | FALSE | | **season\_visit** | | | | | | | | | hs\_date\_neu | date | Date of test |  |  |  | dd/mm/yyyy | TRUE | | **sex\_child** | | | | | | | | | e3\_sex | categorical | Child’s sex | 0,1 | Male, Female |  |  | TRUE | | **time\_lastMeal** | | | | | | | | | hs\_dift\_mealblood\_imp | numerical | Imputed difference between blood time extraction and last meal time |  |  |  |  | TRUE | | *1*Percentage of confounders included in the models: 67.5%. | | | | | | | | |

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| Supplementary Table 2: Codebook for covariates used in RQ2   |  | type | description | coding | labels | remarks | comments | included*1* | | --- | --- | --- | --- | --- | --- | --- | --- | | **age\_child** | | | | | | | | | hs\_age\_years | numerical | Age of the child at clinical assessment |  |  |  | years | TRUE | | **characteristics\_child** | | | | | | | | | hs\_c\_height | numerical | Height of the child |  |  |  | m | TRUE | | hs\_c\_weight | numerical | Weight of the child |  |  |  | kg | TRUE | | hs\_head\_circ | numerical | Head circumference of the child |  |  |  | cm | TRUE | | **child\_diet** | | | | | | | | | hs\_fastfood | numerical | Visits a fast food restaurant/take away |  |  |  | Times / week | TRUE | | hs\_org\_food | numerical | Eats organic food |  |  |  | Times / week | TRUE | | hs\_total\_fish | numerical | Food group: fish and seafood (hs\_canfish+hs\_oilyfish+hs\_whfish+hs\_seafood) |  |  |  | Times / week | TRUE | | hs\_total\_fruits | numerical | Food group: fruits (hs\_canfruit+hs\_dryfruit+hs\_freshjuice+hs\_fruits) |  |  |  | Times / week | TRUE | | hs\_total\_veg | numerical | Food group: vegetables (hs\_cookveg+hs\_rawveg) |  |  |  | Times / week | TRUE | | **child\_smoking** | | | | | | | | | hs\_tob | categorical | Which of the following best describes your consumption of tobacco? | 1,2,3,4,5 | Non-smoker and has never smoked, Non-smoker but previously smoked although not daily, Non-smoker but previously smoked daily, Smoker but not daily, Daily smoker |  |  | TRUE | | **cohort** | | | | | | | | | cohort | character | Cohort name | SAB,EDEN,BIB,RHEA,KANC,MOBA | SAB, EDEN, BIB, RHEA, KANC, MOBA |  |  | TRUE | | **creatinine** | | | | | | | | | creatinine\_to\_helix | numerical | Creatinine in child |  |  |  | µmol / L | TRUE | | hs\_creatinine\_cg | numerical | Creatinine in child |  |  | Values below the limit of detection imputed | G / L | TRUE | | **ethnicity\_child** | | | | | | | | | h\_ethnicity\_c | character | Which is the ethnicity of the child? | 1,2,3,4,5,6,7 | African, Asian, Caucasian, Native\_American, Other, Pakistani, White\_notEuropean |  |  | TRUE | | **ethnicity\_mother** | | | | | | | | | h\_ethnicity\_m | integer | Which is the ethnicity of the mother? | 1,2,3,4,5,6,7 | mother white European, mother Pakistani, mother Asian, mother African, mother other, mother native American, mother white but not European |  |  | FALSE | | **familySEP** | | | | | | | | | FAS\_score | numerical | Family Affluence Scale (FAS II) continuous |  |  |  |  | TRUE | | hs\_finance | categorical | How well would you say your family is managing financially these days? | 1,2,3,4,5,6 | Living comfortably, Doing alright, Getting by, Finding it quite difficult, Finding it very difficult, Does not wish to answer |  |  | TRUE | | **season\_visit** | | | | | | | | | hs\_date\_neu | date | Date of test |  |  |  | dd/mm/yyyy | TRUE | | **sex\_child** | | | | | | | | | e3\_sex | categorical | Child’s sex | 0,1 | Male, Female |  |  | TRUE | | **time\_lastMeal** | | | | | | | | | hs\_dift\_mealblood\_imp | numerical | Imputed difference between blood time extraction and last meal time |  |  |  |  | TRUE | | *1*Percentage of confounders included in the models: 95%. | | | | | | | | |

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| Supplementary Table 3: Codebook for covariates used in RQ3   |  | type | description | coding | labels | remarks | comments | included*1* | | --- | --- | --- | --- | --- | --- | --- | --- | | **age\_child** | | | | | | | | | hs\_age\_years | numerical | Age of the child at clinical assessment |  |  |  | years | TRUE | | **breastfeeding** | | | | | | | | | hs\_bf | categorical | Child breastfeeding | 0,1 | No, Yes |  |  | TRUE | | **characteristics\_child** | | | | | | | | | hs\_c\_height | numerical | Height of the child |  |  |  | m | TRUE | | hs\_c\_weight | numerical | Weight of the child |  |  |  | kg | TRUE | | hs\_head\_circ | numerical | Head circumference of the child |  |  |  | cm | TRUE | | **chemical** | | | | | | | | | hs\_bpa\_c | numerical | Bisphenol A (BPA) |  |  | Values below the limit of detection imputed | microg / L | TRUE | | hs\_bupa\_c | numerical | N-Butyl paraben (BUPA) |  |  | Values below the limit of detection imputed | microg / L | TRUE | | hs\_dedtp\_cadj | numerical | Diethyl dithiophosphate (DEDTP) adjusted for creatinine |  |  | Values below the limit of detection imputed | microg / g | FALSE | | hs\_dep\_c | numerical | Diethyl phosphate (DEP) |  |  | Values below the limit of detection imputed | microg / L | TRUE | | hs\_detp\_c | numerical | Diethyl thiophosphate (DETP) |  |  | Values below the limit of detection imputed | microg / L | TRUE | | hs\_dmdtp\_craw | numerical | Dimethyl dithiophosphate (DMDTP) |  |  | Values below the limit of detection imputed | microg / L | FALSE | | hs\_dmp\_c | numerical | Dimethyl phosphate (DMP) |  |  | Values below the limit of detection imputed | microg / L | TRUE | | hs\_dmtp\_c | numerical | Dimethyl thiophosphate (DMTP) |  |  | Values below the limit of detection imputed | microg / L | TRUE | | hs\_etpa\_c | numerical | Ethyl paraben (ETPA) |  |  | Values below the limit of detection imputed | microg / L | TRUE | | hs\_mbzp\_c | numerical | Mono benzyl phthalate (MbzP) |  |  | Values below the limit of detection imputed | microg / L | TRUE | | hs\_mecpp\_c | numerical | Mono-2-ethyl 5-carboxypentyl phthalate (MECPP) |  |  | Values below the limit of detection imputed | microg / L | TRUE | | hs\_mehhp\_c | numerical | Mono-2-ethyl-5-hydroxyhexyl phthalate (MEHHP) |  |  | Values below the limit of detection imputed | microg / L | TRUE | | hs\_mehp\_c | numerical | Mono-2-ethylhexyl phthalate (MEHP) |  |  | Values below the limit of detection imputed | microg / L | TRUE | | hs\_meohp\_c | numerical | Mono-2-ethyl-5-oxohexyl phthalate (MEOHP) |  |  | Values below the limit of detection imputed | microg / L | TRUE | | hs\_mep\_c | numerical | Monoethyl phthalate (MEP) |  |  | Values below the limit of detection imputed | microg / L | TRUE | | hs\_mepa\_c | numerical | Methyl paraben (MEPA) |  |  | Values below the limit of detection imputed | microg / L | TRUE | | hs\_mibp\_c | numerical | Mono-iso-butyl phthalate (MiBP) |  |  | Values below the limit of detection imputed | microg / L | TRUE | | hs\_mnbp\_c | numerical | Mono-n-butyl phthalate (MnBP) |  |  | Values below the limit of detection imputed | microg / L | TRUE | | hs\_ohminp\_c | numerical | Mono-4-methyl-7-hydroxyoctyl phthalate (OHMiNP) |  |  | Values below the limit of detection imputed | microg / L | TRUE | | hs\_oxbe\_c | numerical | Oxybenzone (OXBE) |  |  | Values below the limit of detection imputed | microg / L | TRUE | | hs\_oxominp\_c | numerical | Mono-4-methyl-7-oxooctyl phthalate (OXOMiNP) |  |  | Values below the limit of detection imputed | microg / L | TRUE | | hs\_prpa\_c | numerical | Propyl paraben (PRPA) |  |  | Values below the limit of detection imputed | microg / L | TRUE | | hs\_trcs\_c | numerical | Triclosan (TRCS) |  |  | Values below the limit of detection imputed | microg / L | TRUE | | **child\_diet** | | | | | | | | | hs\_fastfood | numerical | Visits a fast food restaurant/take away |  |  |  | Times / week | TRUE | | hs\_org\_food | numerical | Eats organic food |  |  |  | Times / week | TRUE | | hs\_total\_fish | numerical | Food group: fish and seafood (hs\_canfish+hs\_oilyfish+hs\_whfish+hs\_seafood) |  |  |  | Times / week | TRUE | | hs\_total\_fruits | numerical | Food group: fruits (hs\_canfruit+hs\_dryfruit+hs\_freshjuice+hs\_fruits) |  |  |  | Times / week | TRUE | | hs\_total\_veg | numerical | Food group: vegetables (hs\_cookveg+hs\_rawveg) |  |  |  | Times / week | TRUE | | **child\_smoking** | | | | | | | | | hs\_tob | categorical | Which of the following best describes your consumption of tobacco? | 1,2,3,4,5 | Non-smoker and has never smoked, Non-smoker but previously smoked although not daily, Non-smoker but previously smoked daily, Smoker but not daily, Daily smoker |  |  | TRUE | | **cohort** | | | | | | | | | cohort | character | Cohort name | SAB,EDEN,BIB,RHEA,KANC,MOBA | SAB, EDEN, BIB, RHEA, KANC, MOBA |  |  | TRUE | | **creatinine** | | | | | | | | | creatinine\_to\_helix | numerical | Creatinine in child |  |  |  | µmol / L | TRUE | | **envFactors\_visit** | | | | | | | | | hs\_healthc\_tday | categorical | Child health on the day of assessment | 1,2 | Normal, Health problem |  |  | TRUE | | hs\_mood | categorical | Mood of the child in the last few days before assessment | 1,2 | Usual, Not usual |  |  | TRUE | | hs\_noise | categorical | Noise on the day of assessment | 1,2,3 | No noise, Some noise, Noisy |  |  | TRUE | | hs\_rest\_nth | categorical | Child rested the night before assessment | 1,2 | Yes, Not as well as usual |  |  | TRUE | | **ethnicity\_child** | | | | | | | | | h\_ethnicity\_c | character | Which is the ethnicity of the child? | 1,2,3,4,5,6,7 | African, Asian, Caucasian, Native\_American, Other, Pakistani, White\_notEuropean |  |  | TRUE | | **ethnicity\_mother** | | | | | | | | | h\_ethnicity\_m | integer | Which is the ethnicity of the mother? | 1,2,3,4,5,6,7 | mother white European, mother Pakistani, mother Asian, mother African, mother other, mother native American, mother white but not European |  |  | FALSE | | **familySEP** | | | | | | | | | FAS\_score | numerical | Family Affluence Scale (FAS II) continuous |  |  |  |  | TRUE | | hs\_finance | categorical | How well would you say your family is managing financially these days? | 1,2,3,4,5,6 | Living comfortably, Doing alright, Getting by, Finding it quite difficult, Finding it very difficult, Does not wish to answer |  |  | TRUE | | **maternalAlcohol\_preg** | | | | | | | | | e3\_alcpreg\_g | numerical | Alcool during pregnancy |  |  |  | Glasses / week | FALSE | | **maternalDiet\_preg** | | | | | | | | | h\_cereal\_preg | numerical | Cereal consumption during pregnancy |  |  |  | Times / week | FALSE | | h\_dairy\_preg | numerical | Dairy consumption during pregnancy |  |  |  | Times / week | FALSE | | h\_fastfood\_preg | numerical | Fast food consumption during pregnancy |  |  |  | Times / week | FALSE | | h\_fish\_preg | numerical | Fish consumption during pregnancy |  |  |  | Times / week | FALSE | | h\_fruit\_preg | numerical | Fruit consumption during pregnancy |  |  |  | Times / week | FALSE | | h\_legume\_preg | numerical | Legume consumption during pregnancy |  |  |  | Times / week | FALSE | | h\_meat\_preg | numerical | Meat consumption during pregnancy |  |  |  | Times / week | FALSE | | h\_veg\_preg | numerical | Vegetables consumption during pregnancy |  |  |  | Times / week | FALSE | | **maternalSEP\_preg** | | | | | | | | | e3\_edum | categorical | Maternal education | 0,1,2 | Primary school, Secondary school, University degree or higher |  |  | FALSE | | e3\_marital | categorical | Marital status | 0,1,2 | living with the father, Living alone, Other situation |  |  | TRUE | | e3\_ses | categorical | Socioeconomic status of the parents | 1,2,3 | Low income, Medium income, High income |  |  | FALSE | | **maternalSmoking\_preg** | | | | | | | | | e3\_asmokyn\_p | categorical | Maternal active smoking during pregnancy | 0,1 | No, Yes |  |  | TRUE | | e3\_psmokanyt | categorical | Maternal passive smoking during pregnancy | 0,1 | No, Yes |  |  | TRUE | | **neuropsychologicalDiagnosis\_child** | | | | | | | | | hs\_neuro\_diag | categorical | Any previous child neuropsychological diagnosis? | 1,2 | No, Yes |  |  | TRUE | | **paternalSEP\_preg** | | | | | | | | | e3\_eduf | categorical | Paternal education | 0,1,2 | Primary school, Secondary school, University degree or higher |  |  | FALSE | | **sex\_child** | | | | | | | | | e3\_sex | categorical | Child’s sex | 0,1 | Male, Female |  |  | TRUE | | *1*Percentage of confounders included in the models: 75.41%. | | | | | | | | |

### Description of chemicals

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| Supplementary Table 4: Information about non-persistent EDCs   | Compound | Symbol | Variable name | PubChem CID | Parental compound | | --- | --- | --- | --- | --- | | **OP pesticide metabolites** | | | | | | diethyl dithiophosphate | DEDTP | dedtp | 9274 |  | | diethyl phosphate | DEP | dep | 654 |  | | diethyl thiophosphate | DETP | detp | 3683036 |  | | dimethyl dithiophosphate | DMDTP | dmdtp |  |  | | dimethyl phosphate | DMP | dmp | 13134 |  | | dimethyl thiophosphate | DMTP | dmtp | 168140 |  | | **Phenols** | | | | | | bisphenol A | BPA | bpa | 6623 |  | | ethyl-paraben | ETPA | etpa | 8434 |  | | methyl-paraben | MEPA | mepa | 7456 |  | | n‑butyl‑paraben | BUPA | bupa | 7184 |  | | oxybenzone | OXBE | oxbe | 4632 |  | | propyl-paraben | PRPA | prpa | 7175 |  | | triclosan | TRCS | trcs | 5564 |  | | **Phthalate metabolites** | | | | | | mono benzyl phthalate | MBzP | mbzp | 31736 | BzBP | | mono‑2‑ethyl 5‑carboxypentyl phthalate | MECPP | mecpp | 148386 | DEHP | | mono‑2‑ethyl‑5‑hydroxyhexyl phthalate | MEHHP | mehhp | 170295 | DEHP | | mono‑2‑ethyl‑5‑oxohexyl phthalate | MEOHP | meohp | 119096 | DEHP | | mono‑2‑ethylhexyl phthalate | MEHP | mehp | 21924291 | DEHP | | mono‑4‑methyl‑7‑hydroxyoctyl phthalate | oh-MiNP | ohminp | 102401880 |  | | mono‑4‑methyl‑7‑oxooctyl phthalate | oxo-MiNP | oxominp | 102401881 |  | | mono‑iso‑butyl phthalate | MiBP | mibp | 92272 | DiBP | | mono‑n‑butyl phthalate | MnBP | mnbp | 8575 |  | | monoethyl phthalate | MEP | mep | 75318 | DEP | |

### Description of metabolites

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| Supplementary Table 5: Information about metabolites   | Metabolite | Symbol | HMDB ID*1* | CAS number*2* | | --- | --- | --- | --- | | **Glucocorticosteroid** | | | | | Cortisol | F | HMDB0000063 | 50-23-7 | | Cortisone | E | HMDB0002802 | 53-06-5 | | Corticosterone | B | HMDB0001547 | 50-22-6 | | 11-dehydrocorticosterone | A | HMDB0004029 | 72-23-1 | | **Glucocorticosteroid metabolite** | | | | | 20α-dihydrocortisol | 20aDHF | NA | NA | | 20β-dihydrocortisol | 20bDHF | NA | NA | | 5β-dihydrocortisol | 5bDHF | HMDB0003259 | 1482-50-4 | | 5α-tetrahydrocortisol | 5aTHF | HMDB0000526 | 302-91-0 | | 5β-tetrahydrocortisol | 5bTHF | HMDB0000949 | 1953-02-01 | | 5α,20α-cortol | 5a20acortol | HMDB0003180 | 516-38-1 | | 5α,20β-cortol | 5a20bcortol | HMDB0005821 | 667-65-2 | | 5β,20α-cortol | 5b20acortol | HMDB0003180 | 516-38-1 | | 5β,20β-cortol | 5b20bcortol | HMDB0005821 | 667-65-2 | | 6β-hydroxycortisol | 6OHF | HMDB0247074 |  | | 11β-hydroxyandrosterone | 11OHAndros | HMDB0002984 | 57-61-4 | | 20α-dihydrocortisone | 20aDHE | NA | NA | | 20β-dihydrocortisone | 20bDHE | NA | NA | | 5α-tetrahydrocortisone | 5aTHE | NA | NA | | 5β-tetrahydrocortisone | 5bTHE | NA | NA | | 5β,20α-cortolone | 5b20acortolone | HMDB0003128 | 516-42-7 | | 5β,20β-cortolone | 5b20bcortolone | NA | NA | | 6β-hydroxycortisone | 6OHE | NA | NA | | 5α-tetrahydrocorticosterone | 5aTHB | HMDB0000449 | 600-63-5 | | 5β-tetrahydrocorticosterone | 5bTHB | HMDB0000268 | 68-42-8 | | 17-deoxycortolone | 17-DO-cortolone | NA | NA | | **Glucocorticosteroid precursor** | | | | | Deoxycorticosterone | DOC | HMDB0000016 | 64-85-7 | | Cortexolone | S | HMDB0000015 | 152-58-9 | | 17-hydroxyprogesterone | 17OHP | HMDB0000374 | 68-96-2 | | **Glucocorticosteroid precursor metabolite** | | | | | Tetrahydrocortexolone | THS | HMDB0005972 | 68-60-0 | | Pregnantriol | PT | NA | 1098-45-9 | | 17-hydroxypregnanolone | 17HP | HMDB0000363 | 387-79-1 | | **Androgen** | | | | | Testosterone | T | HMDB0000234 | 58-22-0 | | Androsternedione | AED | HMDB0000053 | 63-05-8 | | **Androgen metabolite** | | | | | Androsterone | Andros | HMDB0000031 | 53-41-8 | | Etiocholanolone | Etio | HMDB0000490 | 53-42-9 | | *1*Human Metabolome Database | | | | | *2*Chemical Abstracts Service | | | | |

## Other results

### Balancing weights for effect modification

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| Supplementary Table 6: Weights   |  | Median (IQR) | | Range | | | --- | --- | --- | --- | --- | | **Characteristic***1* | **females**, N = 587*1* | **males**, N = 710*1* | **females**, N = 587*1* | **males**, N = 710*1* | | mep | 0.97 (0.68, 1.23) | 0.94 (0.62, 1.31) | 0.33, 1.68 | 0.33, 1.68 | | mibp | 0.91 (0.49, 1.40) | 0.96 (0.52, 1.39) | 0.17, 1.84 | 0.17, 1.84 | | mnbp | 1.00 (0.62, 1.33) | 0.99 (0.60, 1.36) | 0.29, 1.68 | 0.29, 1.68 | | mbzp | 1.00 (0.71, 1.27) | 0.99 (0.69, 1.28) | 0.38, 1.58 | 0.38, 1.58 | | mehp | 1.02 (0.69, 1.27) | 0.98 (0.64, 1.32) | 0.34, 1.61 | 0.34, 1.61 | | mehhp | 1.01 (0.62, 1.28) | 0.96 (0.54, 1.37) | 0.27, 1.72 | 0.27, 1.72 | | meohp | 1.00 (0.64, 1.29) | 0.96 (0.52, 1.39) | 0.25, 1.74 | 0.25, 1.74 | | mecpp | 1.00 (0.58, 1.33) | 0.95 (0.51, 1.37) | 0.23, 1.75 | 0.23, 1.75 | | ohminp | 1.02 (0.77, 1.22) | 1.01 (0.77, 1.23) | 0.51, 1.43 | 0.51, 1.43 | | oxominp | 1.02 (0.83, 1.17) | 1.02 (0.76, 1.21) | 0.58, 1.38 | 0.58, 1.38 | | mepa | 1.02 (0.90, 1.15) | 1.03 (0.93, 1.11) | 0.76, 1.23 | 0.76, 1.23 | | etpa | 1.02 (0.96, 1.08) | 1.01 (0.97, 1.05) | 0.91, 1.12 | 0.91, 1.12 | | prpa | 1.03 (0.92, 1.13) | 1.02 (0.95, 1.10) | 0.81, 1.22 | 0.81, 1.22 | | bpa | 1.00 (0.73, 1.29) | 1.02 (0.74, 1.24) | 0.44, 1.50 | 0.44, 1.50 | | bupa | 1.02 (0.95, 1.09) | 1.01 (0.80, 1.19) | 0.67, 1.30 | 0.67, 1.30 | | oxbe | 1.02 (0.92, 1.12) | 1.02 (0.94, 1.09) | 0.80, 1.19 | 0.80, 1.19 | | trcs | 1.03 (0.92, 1.14) | 1.02 (0.89, 1.12) | 0.72, 1.25 | 0.72, 1.25 | | dmp | 0.99 (0.75, 1.25) | 1.00 (0.73, 1.25) | 0.52, 1.47 | 0.52, 1.47 | | dmtp | 1.01 (0.79, 1.22) | 1.02 (0.83, 1.20) | 0.58, 1.37 | 0.58, 1.37 | | dep | 1.01 (0.83, 1.19) | 1.02 (0.84, 1.18) | 0.65, 1.34 | 0.65, 1.34 | | detp | 0.99 (0.77, 1.22) | 1.01 (0.82, 1.20) | 0.57, 1.40 | 0.57, 1.40 | | *1*Truncated weights. | | | | | |

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| Supplementary Table 7: Weights   |  | Median (IQR) | | Range | | | --- | --- | --- | --- | --- | | **Characteristic***1* | **females**, N = 434*1* | **males**, N = 542*1* | **females**, N = 434*1* | **males**, N = 542*1* | | mep | 0.99 (0.70, 1.24) | 0.95 (0.55, 1.30) | 0.32, 1.68 | 0.32, 1.68 | | mibp | 0.93 (0.46, 1.40) | 0.92 (0.54, 1.39) | 0.16, 1.85 | 0.16, 1.85 | | mnbp | 0.97 (0.51, 1.40) | 0.99 (0.57, 1.32) | 0.21, 1.78 | 0.21, 1.78 | | mbzp | 0.99 (0.70, 1.26) | 0.98 (0.66, 1.31) | 0.38, 1.58 | 0.38, 1.58 | | mehp | 1.02 (0.73, 1.28) | 0.99 (0.61, 1.34) | 0.36, 1.57 | 0.36, 1.57 | | mehhp | 1.02 (0.65, 1.31) | 0.99 (0.59, 1.34) | 0.30, 1.62 | 0.30, 1.62 | | meohp | 1.01 (0.62, 1.32) | 1.01 (0.51, 1.39) | 0.24, 1.68 | 0.24, 1.68 | | mecpp | 0.98 (0.62, 1.32) | 0.99 (0.54, 1.40) | 0.29, 1.67 | 0.29, 1.67 | | ohminp | 1.00 (0.73, 1.26) | 1.00 (0.77, 1.23) | 0.49, 1.45 | 0.49, 1.45 | | oxominp | 1.03 (0.73, 1.28) | 1.02 (0.77, 1.23) | 0.47, 1.45 | 0.47, 1.45 | | mepa | 1.01 (0.88, 1.16) | 1.03 (0.94, 1.11) | 0.73, 1.26 | 0.73, 1.26 | | etpa | 1.04 (0.92, 1.12) | 1.02 (0.92, 1.12) | 0.78, 1.22 | 0.78, 1.22 | | prpa | 1.03 (0.87, 1.16) | 1.02 (0.96, 1.10) | 0.74, 1.24 | 0.74, 1.24 | | bpa | 1.00 (0.71, 1.29) | 1.01 (0.75, 1.24) | 0.44, 1.52 | 0.44, 1.52 | | bupa | 1.02 (0.95, 1.11) | 1.01 (0.80, 1.19) | 0.64, 1.30 | 0.64, 1.30 | | oxbe | 1.03 (0.86, 1.16) | 1.02 (0.95, 1.09) | 0.76, 1.22 | 0.76, 1.22 | | trcs | 1.02 (0.92, 1.13) | 1.02 (0.88, 1.14) | 0.73, 1.25 | 0.73, 1.25 | | dmp | 0.98 (0.77, 1.23) | 1.02 (0.75, 1.22) | 0.57, 1.45 | 0.57, 1.45 | | dmtp | 1.03 (0.78, 1.22) | 1.01 (0.79, 1.23) | 0.56, 1.40 | 0.56, 1.40 | | dep | 1.01 (0.85, 1.16) | 1.00 (0.84, 1.19) | 0.67, 1.36 | 0.67, 1.36 | | detp | 1.00 (0.77, 1.22) | 1.01 (0.85, 1.17) | 0.57, 1.41 | 0.57, 1.41 | | *1*Truncated weights. | | | | | |

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| Supplementary Table 8: Weights   |  | Median (IQR) | | Range | | | --- | --- | --- | --- | --- | | **Characteristic***1* | **females**, N = 434*1* | **males**, N = 542*1* | **females**, N = 434*1* | **males**, N = 542*1* | | cortisol\_production | 0.96 (0.58, 1.40) | 1.02 (0.58, 1.35) | 0.23, 1.73 | 0.23, 1.73 | | cortisol\_metabolism | 1.01 (0.68, 1.28) | 1.00 (0.69, 1.27) | 0.45, 1.51 | 0.45, 1.51 | | cortisone\_production | 1.01 (0.61, 1.40) | 1.00 (0.59, 1.35) | 0.28, 1.68 | 0.28, 1.68 | | X11bHSD | 1.00 (0.65, 1.31) | 0.98 (0.70, 1.29) | 0.43, 1.57 | 0.43, 1.57 | | *1*Truncated weights. | | | | | |

# Supplementary figures

## Descriptive data

### Description of chemicals

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| Supplementary Figure 1: Description of chemicals |

### Description of metabolites

Loading dataset: corticosteroids\_unprocessed.csv...

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| Supplementary Figure 2: Description of metabolites |

## Main results

### Average dose-response functions for significant results

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| |  | | --- | | (a) Cortisol production | | |  | | --- | | (b) 11bHSD | |

Supplementary Figure 3: Average dose-response functions for RQ3

## Other results

### Marginal comparisons for effect modification

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| Supplementary Figure 4: Average comparisons for effect modification |

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| Supplementary Figure 5: Average comparisons for effect modification |

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| --- |
| Supplementary Figure 6: Average comparisons for effect modification |

# References