S1 Fig. Overview of the study design, cohorts and statistical analyses. IPD= individual participant data; analysis 1 is our main analysis.

- **NFBC66**
  - Data collected from Finland in 1997, n=6007.
  - 5714 children with NMR metabolomics at 31 year old from serum samples.
  - Exclusions: 123 non-singleton and 717 with missing data.

- **NFBC86**
  - Data collected from Finland in 2001-2002, n=6621.
  - 5500 children with NMR metabolomics at 16 years old from serum samples.
  - Exclusions: 121 non-singleton, 1 analytical outlier and 2441 with missing data.

- **ALSPAC**
  - 4139 children with NMR metabolomics at 15 or 17 years old from plasma samples.
  - Exclusions: 207 partner not biological father, 1 analytical outlier and 1491 with missing data.

**Analysis 1**
- One-stage IPD meta-analysis (ALSPAC + NFBC86)
  - N= 5327-5377

**Analysis 2**
- One-stage IPD meta-analysis (ALSPAC + NFBC86 + NFBC66)
  - N= 10181-10251

**Analysis 3**
- Two-stage IPD meta-analysis (ALSPAC + NFBC86 + NFBC66)

**Analysis 4**
- One-stage IPD meta-analysis (ALSPAC + NFBC86)
  - N=5266-5316

Maternal exposure models
Paternal exposures models
Offspring exposures models