**Supplementary Materials**

**Supplementary Materials 1. A directed acyclic graph illustrating the relationship between MPF at age 42 and obesity at age 46.**

DAGs are a graphical model that depict a set of hypotheses about the causal processes that generate a set of variables of interest. An arrow *X* → *Y* is drawn if there is a hypothesised direct causal effect of *X* on *Y*. An arrow *X* → *Y* only represents that part of the causal effect which is *not* mediated by any of the other variables in the diagram. For pathways where there is certainty that *X* does not have a direct causal influence on *Y*, then the arrow is omitted. A hypothesised causal pathway can also operate through mediators (*X*→*M* →*Y*) if these causal paths start at the exposure, contain only arrows pointing away from the exposure (i.e., to mediators recorded after the exposure), and end at the outcome

|  |  |  |
| --- | --- | --- |
|  | Fathers (n=3088) | Mothers (n=3532) |
|  | Obesity | Obesity |
| MPF | OR | Sig. | 95% CI | OR | Sig. | 95% CI |
| Unadjusted association  | 1.12 |  | (0.91, 1.38) | **1.31** | **\*\*** | **(1.10, 1.56)** |
| (+) Parental controls1 | 1.00 |  | (0.81, 1.25) | 1.17 |  | (0.98, 1.41) |
| (+) Child controls age 10 – including child BMI2 | 1.04  |  | (0.83, 1.31) | 1.10 |  | (0.91, 1.32)  |
| (+) Child controls age 163 | 1.06 |  | (0.84, 1.33) | 1.12 |  | (0.92, 1.36) |
| (+) Adult controls age 424 | 1.07 |  | (0.85, 1.35) | 1.04 |  | (0.86, 1.27) |

**Supplementary materials 2. Odds ratios of obesity according to whether or not the cohort member had experienced multi-partner fertility, where childhood BMI is included in analysis. Baseline outcome: no multi-partner fertility.**

*\* P ≤ 0.05, \*\* P ≤ 0.01, \*\*\* P ≤ 0.001*

*1Parental education, parental social class, maternal age, maternal smoking; 2child cognitive ability, illness or disability, overcrowding, benefits; 3self-esteem, locus of control, malaise, Rutter behaviour, parental separation, smoking status; 4age at first birth, education, smoking, AUDIT, housing tenure, malaise.*

|  |  |  |
| --- | --- | --- |
|  | Fathers (n=3088) | Mothers (n=3532) |
|  | Obesity | Obesity |
| MPF | OR | Sig. | 95% CI | OR | Sig. | 95% CI |
| Unadjusted association  | 1.12 |  | (0.91, 1.38) | **1.31** | **\*\*** | **(1.10, 1.56)** |
| (+) Parental controls1 | 1.00 |  | (0.81, 1.25) | 1.17 |  | (0.98, 1.41) |
| (+) Child controls age 10 – excluding child BMI2 | 0.95 |  | (0.76, 1.18) | 1.10 |  | (0.92, 1.33)  |
| (+) Child controls age 163 | 0.96 |  | (0.77, 1.20) | 1.11 |  | (0.93, 1.34) |
| (+) Adult controls age 424 | 0.98 |  | (0.78, 1.22) | 1.03 |  | (0.85, 1.24) |

**Supplementary materials 3. Odds ratios of obesity according to whether or not the cohort member had experienced multi-partner fertility and excluding childhood BMI. Baseline outcome: no multi-partner fertility.**

*\* P ≤ 0.05, \*\* P ≤ 0.01, \*\*\* P ≤ 0.001*

*1Parental education, parental social class, maternal age, maternal smoking; 2child cognitive ability, illness or disability, overcrowding, benefits; 3self-esteem, locus of control, malaise, Rutter behaviour, parental separation, smoking status; 4age at first birth, education, smoking, AUDIT, housing tenure, malaise.*