

## Supplementary Appendix

### Methods

**Assessment** All children assessed at 11 years in the EPICure2 study were evaluated by a trained clinical assessor and a psychologist who travelled to the child's school or home and conducted comprehensive physical and neuropsychological evaluations. Height was measured using a portable height measure. Weight was measured using a calibrated scale (SECA 803). HC was measured using a non-distensible Lasso-o tape. The tape was placed above the ears and midway between the eyebrows and the hairline to the occipital prominence at the back of the head. The aim was to always measure the largest circumference possible. The tape was pulled so that any hair was compressed. Three readings were taken for weight, height and HC, and overall means were calculated for each. Body mass index (BMI) was calculated as weight in kilograms divided by height in metres squared.

## Supplementary Tables

**Table S1 Variables used for multiple imputations, type of variable, model used to predict missing data, and percentages of values missing for each variable included in the imputation model. Missing data were imputed by chained equations using the STATA “MI” procedure. Imputation models were based on the missing at random assumption. We created twenty imputed datasets.**

| Cohort      | Variable  | Type of variable | Model used to predict missing data | Percentages of values missing |
|-------------|---|------------------|------------------------------------|-------------------------------|
| <b>2006</b> |   |                  |                                    |                               |
|             | Birth weight                                    | Continuous       | No missing data                    | 0%                            |
|             | Gestational age                                 | Continuous       | No missing data                    | 0%                            |
|             | Sex   | Binary           | No missing data                    | 0%                            |
|             | Multiple birth                                  | Binary           | No missing data                    | 0%                            |
|             | Maternal age at delivery                        | Continuous       | Linear regression                  | 0.1% (1/1031)                 |
|             | Breast milk at discharge                        | Binary           | Binary logistic regression         | 0.3% (3/1031)                 |
|             | Any antenatal steroids                          | Binary           | Binary logistic regression         | 1.2% (12/1031)                |
|             | Enteral feeding before day 7                    | Binary           | Binary logistic regression         | 0.1% (1/1031)                 |
|             | Maternal smoking during pregnancy               | Binary           | Binary logistic regression         | 5.5% (57/1031)                |
|             | Worst cerebral ultrasound scan                  | Binary           | Binary logistic regression         | 0.5% (5/1031)                 |
|             | IMD at birth                                    | Continuous       | Linear regression                  | 0.9% (9/1031)                 |
|             | Maternal height                                 | Continuous       | Linear regression                  | 19.4% (200/1031)              |
|             | Maternal weight                                 | Continuous       | Linear regression                  | 21.2% (219/1031)              |
|             | Severe neurodevelopment disability at 3y        | Binary           | Binary logistic regression         | 44.1% (455/1031)              |
|             | IMD at 11y                                      | Continuous       | Linear regression                  | 81.1% (836/1031)              |
|             | Weight at expected date of delivery             | Continuous       | Linear regression                  | 1.6% (16/1031)                |
|             | Head circumference at birth                     | Continuous       | Linear regression                  | 51.8% (534/1031)              |
|             | Head circumference at expected date of delivery | Continuous       | Linear regression                  | 7.2% (74/1031)                |
|             | Height at 3y                                    | Continuous       | Linear regression                  | 47.2% (487/1031)              |
|             | Weight at 3y                                    | Continuous       | Linear regression                  | 45.3% (467/1031)              |
|             | BMI at 3y                                       | Continuous       | Linear regression                  | 47.8% (493/1031)              |
|             | Head circumference at 3y                        | Continuous       | Linear regression                  | 45.0% (464/1031)              |
|             | Height at 11y                                   | Continuous       | Linear regression                  | 80.8% (833/1031)              |
|             | Weight at 11y                                   | Continuous       | Linear regression                  | 80.7% (832/1031)              |
|             | BMI at 11y                                      | Continuous       | Linear regression                  | 80.8% (833/1031)              |
|             | Head circumference at 11y                       | Continuous       | Linear regression                  | 81.2% (837/1031)              |
| <b>1995</b> |   |                  |                                    |                               |
|             | Birth weight                                    | Continuous       | No missing data                    | 0%                            |
|             | Gestational age                                 | Continuous       | No missing data                    | 0%                            |
|             | White ethnicity                                 | Binary           | No missing data                    | 0%                            |
|             | Sex   | Binary           | No missing data                    | 0%                            |
|             | Severe changes of respiratory distress syndrome | Binary           | No missing data                    | 0%                            |
|             | Necrotising enterocolitis                       | Binary           | No missing data                    | 0%                            |
|             | Breast milk at any time                         | Binary           | No missing data                    | 0%                            |
|             | Bronchopulmonary dysplasia                      | Binary           | No missing data                    | 0%                            |
|             | Enteral feeding before day 7                    | Binary           | Binary logistic regression         | 2.6% (8/309)                  |
|             | Any antenatal steroids                          | Binary           | Binary logistic regression         | 0.6% (2/309)                  |
|             | Severe neurodevelopment disability at 2.5y      | Binary           | Binary logistic regression         | 8.4% (26/309)                 |
|             | Socioeconomic status at 2.5y                    | Three-category   | Ordinal logistic regression        | 12.3% (38/309)                |
|             | IMD at 11y                                      | Continuous       | Linear regression                  | 43.4% (134/309)               |
|             | Weight at expected date of delivery             | Continuous       | Linear regression                  | 2.6% (8/309)                  |
|             | Head circumference at birth                     | Continuous       | Linear regression                  | 33.0% (102/309)               |
|             | Head circumference at expected date of delivery | Continuous       | Linear regression                  | 6.8% (21/309)                 |
|             | Height at 2.5y                                  | Continuous       | Linear regression                  | 16.5% (51/309)                |
|             | Weight at 2.5y                                  | Continuous       | Linear regression                  | 12.3% (38/309)                |
|             | BMI at 2.5y                                     | Continuous       | Linear regression                  | 18.1% (56/309)                |
|             | Head circumference at 2.5y                      | Continuous       | Linear regression                  | 10.0% (31/309)                |
|             | Height at 6y                                    | Continuous       | Linear regression                  | 23.3% (72/309)                |
|             | Weight at 6y                                    | Continuous       | Linear regression                  | 22.0% (68/309)                |
|             | BMI at 6y                                       | Continuous       | Linear regression                  | 23.3% (72/309)                |
|             | Head circumference at 6y                        | Continuous       | Linear regression                  | 22.7% (70/309)                |
|             | Height at 11y                                   | Continuous       | Linear regression                  | 29.4% (91/309)                |
|             | Weight at 11y                                   | Continuous       | Linear regression                  | 29.8% (92/309)                |
|             | BMI at 11y                                      | Continuous       | Linear regression                  | 29.8% (92/309)                |
|             | Head circumference at 11y                       | Continuous       | Linear regression                  | 29.8% (92/309)                |

All variables were included in the linear predictor of all imputation models. N=1031 survivors at 3 years for EPICure 2006; N=309 survivors at 2.5 years for EPICure 1995.

**Table S2 Original and imputed growth measures for births between 22 and 25 weeks of gestation in England in the 1995 and 2006 cohorts**

| (a)                      | 1995 Original                |                              |                              |                                 |                                 | 1995 Imputed: 20 imputed datasets (N=260) |                   |                   |                        |                     |
|--------------------------|------------------------------|------------------------------|------------------------------|---------------------------------|---------------------------------|---|-------------------|-------------------|------------------------|---------------------|
|                          | Birth                        | EDD                          | 2.5y                         | 6y                              | 11y                             | Birth                                     | EDD               | 2.5y              | 6y                     | 11y                 |
| Height (cm)              | -                            | -                            | 88.7 (88.1, 89.2)<br>[n=216] | 112.7 (111.9, 113.6)<br>[n=194] | 139.6 (138.6, 140.7)<br>[n=175] | -   | -                 | 88.7 (88.1, 89.3) | 113.1<br>(112.3,114.0) | 140.2 (139.1,141.4) |
| Weight (kg)              | 0.75 (0.73, 0.76)<br>[n=266] | 2.55 (2.49, 2.61)<br>[n=258] | 11.8 (11.6, 12.1)<br>[n=225] | 18.7 (18.2, 19.3)<br>[n=198]    | 33.4 (32.3, 34.5)<br>[n=174]    | 0.75 (0.73, 0.76)                         | 2.56 (2.50, 2.62) | 11.9 (11.7, 12.1) | 18.9 (18.3, 19.4)      | 34.4 (33.1, 35.7)   |
| BMI (kg/m <sup>2</sup> ) | -                            | -                            | 15.1 (14.9, 15.3)<br>[n=211] | 14.5 (14.3, 14.8)<br>[n=194]    | 17.0 (16.6, 17.4)<br>[n=174]    | -   | -                 | 15.1 (14.9, 15.3) | 14.7 (14.4, 15.0)      | 17.3 (16.9, 17.8)   |
| Head circumference (cm)  | 23.3 (23.0, 23.5)<br>[n=172] | 33.2 (32.9, 33.5)<br>[n=250] | 48.2 (48.0, 48.5)<br>[n=231] | 50.4 (50.2, 50.7)<br>[n=196]    | 52.4 (52.1, 52.7)<br>[n=174]    | 23.2 (23.0, 23.5)                         | 33.2 (33.0, 33.5) | 48.2 (48.0, 48.5) | 50.5 (50.2, 50.7)      | 52.5 (52.2, 52.7)   |

| (b)                      | 2006 Original                |                              |                              |                                 | 2006 Imputed: 20 imputed datasets (N=584) |                   |                   |                     |
|--------------------------|------------------------------|------------------------------|------------------------------|---------------------------------|---|-------------------|-------------------|---------------------|
|                          | Birth                        | EDD                          | 3y                           | 11y                             | Birth                                     | EDD               | 3y                | 11y                 |
| Height (cm)              | -                            | -                            | 92.9 (92.2, 93.6)<br>[n=304] | 149.1 (147.4, 150.8)<br>[n=111] | -   | -                 | 92.6 (92.0, 93.3) | 148.7 (147.2,150.2) |
| Weight (kg)              | 0.73 (0.72, 0.74)<br>[n=593] | 2.54 (2.49, 2.60)<br>[n=582] | 13.4 (13.2, 13.7)<br>[n=318] | 42.6 (40.5, 44.8)<br>[n=112]    | 0.74 (0.73, 0.75)                         | 2.55 (2.50, 2.60) | 13.4 (13.1, 13.7) | 43.4 (41.4, 45.4)   |
| BMI (kg/m <sup>2</sup> ) | -                            | -                            | 15.6 (15.3, 15.8)<br>[n=301] | 19.0 (18.3, 19.8)<br>[n=111]    | -   | -                 | 15.6 (15.3, 15.8) | 19.4 (18.8, 20.0)   |
| Head circumference (cm)  | 23.1 (22.9, 23.2)<br>[n=292] | 32.9 (32.7, 33.1)<br>[n=553] | 48.5 (48.3, 48.7)<br>[n=320] | 52.5 (52.1, 52.9)<br>[n=107]    | 23.0 (22.8, 23.1)                         | 33.0 (32.8, 33.2) | 48.3 (48.1, 48.5) | 52.6 (52.2, 53.1)   |

**Table S3 Growth measures at 11 years for births between 22 and 25 weeks of gestation and term-born controls in England in the 1995 and 2006 cohorts**

|                            | EP 1995 at 11y         |                              | EP 2006 at 11y         |                              | 1995 EP vs Controls            |          | 2006 EP vs Controls            |          | Controls 2006 vs 1995          |          |
|----------------------------|------------------------|------------------------------|------------------------|------------------------------|--------------------------------|----------|--------------------------------|----------|--------------------------------|----------|
|                            | EP<br>Mean (SD)<br>[n] | Controls<br>Mean (SD)<br>[n] | EP<br>Mean (SD)<br>[n] | Controls<br>Mean (SD)<br>[n] | Difference in<br>means (95%CI) | <i>p</i> | Difference in<br>means (95%CI) | <i>p</i> | Difference in<br>means (95%CI) | <i>p</i> |
| Height (cm)                | 139.6 (7.0)<br>[n=175] | 144.5 (7.8)<br>[n=153]       | 149.1 (9.1)<br>[n=111] | 151.6 (7.6)<br>[n=143]       | -4.91 (-6.52, -3.31)           | <0.001   | -2.47 (-4.53, -0.41)           | 0.019    | 7.04 (5.28, 8.79)              | <0.001   |
| Weight (kg)                | 33.4 (7.3)<br>[n=174]  | 38.4 (9.9)<br>[n=152]        | 42.6 (11.5)<br>[n=112] | 44.8 (11.0)<br>[n=142]       | -5.01 (-6.89, -3.12)           | <0.001   | -2.17 (-4.96, 0.62)            | 0.128    | 6.41 (4.01, 8.81)              | <0.001   |
| BMI (kg/m <sup>2</sup> )   | 17.0 (2.7)<br>[n=174]  | 18.2 (3.4)<br>[n=152]        | 19.0 (3.9)<br>[n=111]  | 19.4 (3.8)<br>[n=142]        | -1.22 (-1.89, -0.54)           | <0.001   | -0.33 (-1.29, 0.63)            | 0.494    | 1.18 (0.35, 2.01)              | 0.005    |
| Head circumference (cm)    | 52.4 (1.7)<br>[n=174]  | 54.3 (1.5)<br>[n=152]        | 52.5 (2.2)<br>[n=107]  | 54.1 (1.8)<br>[n=142]        | -1.92 (-2.27, -1.56)           | <0.001   | -1.61 (-2.12, -1.10)           | <0.001   | -0.19 (-0.57, 0.19)            | 0.320    |
| Height z-score             | -0.5 (1.0)<br>[n=175]  | 0.2 (1.0)<br>[n=153]         | 0.1 (1.2)<br>[n=111]   | 0.5 (0.9)<br>[n=143]         | -0.67 (-0.89, -0.45)           | <0.001   | -0.42 (-0.69, -0.16)           | 0.002    | 0.37 (0.15, 0.60)              | 0.001    |
| weight z-score             | -0.5 (1.2)<br>[n=174]  | 0.2 (1.2)<br>[n=152]         | 0.2 (1.3)<br>[n=112]   | 0.6 (1.0)<br>[n=142]         | -0.68 (-0.94, -0.43)           | <0.001   | -0.37 (-0.66, -0.08)           | 0.012    | 0.40 (0.14, 0.65)              | 0.002    |
| BMI z-score                | -0.3 (1.3)<br>[n=174]  | 0.2 (1.3)<br>[n=152]         | 0.2 (1.4)<br>[n=111]   | 0.4 (1.2)<br>[n=142]         | -0.50 (-0.79, -0.22)           | 0.001    | -0.20 (-0.51, 0.11)            | 0.208    | 0.27 (-0.01, 0.54)             | 0.062    |
| Head circumference z-score | -1.3 (1.3)<br>[n=174]  | -0.0 (1.0)<br>[n=152]        | -1.6 (1.3)<br>[n=106]  | -0.3 (1.3)<br>[n=142]        | -1.33 (-1.58, -1.08)           | <0.001   | -1.23 (-1.57, -0.90)           | <0.001   | -0.32 (-0.59, -0.05)           | <0.001   |