**Suppl. Fig. 1.** Flow chart illustrating the number of infants recruited in the study.



**Suppl. Table 1.** Definitions of predictor variables

|  |  |
| --- | --- |
| **Perinatal period** | **Definition** |
| Preeclampsia | pregnancy-induced hypertension (>140/90 mm Hg) associated with proteinuria and edema during the second half of gestation |
| Clinical chorioamnionitis | maternal fever >38°C together with uterine tenderness or foul-smelling vaginal discharge |
| **Neonatal period** | **Definition** |
| BPD | oxygen dependence for at least 28 postnatal days, and requirement for supplemental oxygen >21% and/or positive pressure (continuous positive airway pressure or mechanical ventilation) at postmenstrual age 36 weeks (ref. 1) |
| Sepsis | clinical signs of infection and antibiotic treatment for at least 5 days with positive blood cultures |
| NECa | >= stage II according to the modified Bell’s staging criteria (ref. 2) |
| Severe IVHb | Detected by sonography: grade III (flooding of >=50% of lateral ventricles with acute ventricular dilatation), or any grade of IVH with intraparenchymal lesion due to venous infarction (ref. 3) |
| cPVL | Detected by sonography: periventricular echolucent cystic lesions excluding those caused by venous infarction (ref. 3) |
| Severe ROPc | treatment-demanding or >= stage III ROP (ref. 4) |
| **Sociodemographic factors** | **Definition** |
| Low maternal education | less than high school level |
| Low SES | determined by parents’ education and occupation and categorized into five classes (I-V), with class IV and class V as low status (ref. 5) |
| SGA | birthweights lower than the 10th percentile for sex and gestational age according to the growth charts for Taiwanese infants (ref 6) |
| **Anthropometric data** | **Definition** |
| Microcephaly | head circumference less than the 10th percentile for sex and age according to World Health Organization growth charts (ref 7) |

BPD, bronchopulmonary dysplasia; NEC, necrotizing enterocolitis; IVH, intraventricular haemorrhage; cPVL, cystic periventricular leukomalacia; ROP, retinopathy of prematurity; SES, socioeconomic status; SGA, small for gestational age. aclassified into stage I-III with increased severity; bclassified into grade I-III and periventricular parenchymal haemorrhage with increased severity; cclassified into stage I-V with increased severity.

**Reference**

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**Suppl. Table 2.** Model fit statistics for the three-group and four-group classifications

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Number of groups** | **Group** | **Parameter** | **Estimate** | **SE** | **T** | **BIC** |
| 3 | 1 (5.0%) | Intercept | 68.16545 | 4.41573 | 15.437 | -18934 |
|  | Linear | -0.85863 | 0.66743 | -1.286 |
|  | Quadratic | 0.00045 | 0.02124 | 0.021 |
| 2 (35.5%) | Intercept | 86.31247 | 1.58325 | 54.516 |
|  | Linear | 0.34052 | 0.24765 | 1.375 |
|  | Quadratic | -0.03149 | 0.0081 | -3.886 |
| 3 (59.7%) | Intercept | 91.76399 | 1.20702 | 76.025 |
|  | Linear | 0.2335 | 0.19268 | 1.212 |
|  | Quadratic | -0.00087 | 0.00624 | -0.139 |
| 4 | 1 (0.79%) | Intercept | 47.10358 | 10.82872 | 4.35 | -18802 |
|  | Linear | -1.00379 | 1.6842 | -0.596 |
|  | Quadratic | -0.00762 | 0.05335 | -0.143 |
| 2 (8.84%) | Intercept | 75.89628 | 3.09356 | 24.534 |
|  | Linear | -0.31946 | 0.50342 | -0.635 |
|  | Quadratic | -0.02019 | 0.01612 | -1.253 |
| 3 (51.87%) | Intercept | 88.5791 | 1.25466 | 70.6 |
|  | Linear | 0.23224 | 0.19756 | 1.176 |
|  | Quadratic | -0.02051 | 0.00655 | -3.133 |
| 4 (38.47%) | Intercept | 92.17545 | 1.42993 | 64.461 |
|  | Linear | 0.32669 | 0.23327 | 1.4 |
|  | Quadratic | 0.00124 | 0.00743 | 0.167 |

BIC, Bayesian information criterion.

**Suppl. Table 3.** Differences in the demographics, morbidities and head size data among the three mental performance trajectory groups

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
|  | All  infants  (n = 1680) | High-  stable  (n = 1003) | High- declining  (n = 593) | Low- declining  (n = 84) | *P*  value |
| **Perinatal period**  Low maternal education, n (%)  Low SES, n (%)  Preeclampsia, n (%)  Clinical chorioamnionitis, n (%)  5-min Apgar score < 5, n (%)  Male, n (%)  Gestational age, mean (SD)  Birth weight, mean (SD)  SGA, n (%)  Multiple births, n (%)  **Neonatal period**  Severe IVH, n (%)  cPVL, n (%)  Sepsis, n (%)  NEC, n (%)  BPD, n (%)  Severe ROP, n (%)  **After discharge**  6-month microcephaly, n (%)  12-month microcephaly, n (%) | 791 (47.1)  863 (51.4)  219 (13.0)  186 (11.1)  143 (8.5)  920 (54.8)  28.0 (2.0)  1087 (250)  326 (19.4)  393 (23.4)  100 (6.0)  61 (3.6)  411 (24.5)  129 (7.7)  554 (33.0)  246 (14.6)  399 (23.8)  362 (21.5) | 380 (37.9)  449 (46)  141 (14.1)  97 (9.7)  72 (7.5)  455 (45.4)  28.3 (1.9)  1122 (237)  172 (17.1)  218 (21.7)  44 (4.4)  21 (2.4)  228 (22.8)  65 (6.5)  261 (26.0)  123 (12.4)  194 (21.2)  159 (17.2) | 356 (60.0)  355 (61.2)  72 (12.1)  76 (12.9)  51 (9.0)  374 (63.1)  27.8 (2.1)  1054.7 (258)  131 (22.1)  138 (23.3)  43 (7.3)  21 (4.1)  155 (26.2)  54 (9.1)  245 (41.5)  97 (16.9)  156 (29.3)  158 (28.4) | 55 (65.5)  59 (72)  6 (7.1)  13 (15.5)  20 (24.7)  58 (69.0)  26.9 (2.4)  926.1 (251)  23 (27.4)  21 (25.0)  13 (15.5)  19 (25.3)  28 (33.3)  10 (11.9)  48 (57.1)  26 (31.7)  49 (68.1)  45 (61.6) | < 0.001  < 0.001  0.14  0.21  < 0.001  < 0.001  < 0.001  < 0.001  0.01  0.46  < 0.001  < 0.001  0.05  0.05  < 0.001  < 0.001  < 0.001  < 0.001 |

SES, socioeconomic status; SGA, small for gestational age; IVH, intraventricular haemorrhage; cPVL, cystic periventricular leukomalacia; NEC, necrotizing enterocolitis; BPD, bronchopulmonary dysplasia; ROP, retinopathy of prematurity.

**Suppl. Table 4.** Prediction models that include risk factors alone, risk factors plus trajectory groups or plus 24-month MDI for intelligence outcomes

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
|  | **Intellectual disability, odds ratio (95% confidence interval)\*** | | | | |
|  | Unadjusted |  | Adjusted | | |
| Model |  |  | Risk factors only | Risk factors plus  trajectory groups | Risk factors plus  24-month MDI |
| Low maternal education  Low SES  Severe IVH  cPVL  NEC  BPD  Severe ROP  6-month microcephaly  Trajectory group  High-stable  High-declining  Low-declining  24-month MDI | 3.00 (1.94-4.63)c  3.06 (1.94-4.82)c  3.94 (1.92-8.07)c  8.50 (4.14-17.45)c  2.06 (1.23-4.13)a  2.10 (1.38-3.20)c  2.60 (1.56-4.34)c  5.40 (3.50-8.33)c  1.00 (reference)  17.3 (3.37-24.71)  42.5 (31.5-53.2)c  0.85 (0.83-0.87)c |  | 2.92 (1.61-5.31)c  1.69 (0.91-3.12)  2.44 (1.03-5.82)a  6.53 (2.79-15.30)c  1.92 (1.19-3.95)a  2.02 (1.61-2.72)c  1.90 (1.03-3.52)a  2.56 (1.34-4.89)b  ------  ------  ------  ------ | 2.25 (1.10-4.60)a  1.77 (0.85-3.68)  1.84 (0.60-5.69)  3.00 (0.96-9.36)  2.95 (1.22-7.15)a  1.92 (1.02-3.64)b  1.75 (0.83-3.72)  2.25 (0.99-5.10)  1.00 (reference)  14.46 (0.99-21.04)  37.7 (26.3-48.1)c  ------ | 3.15 (1.35-7.36)b  1.31 (0.56-3.07)  3.95 (1.09-7.30)a  4.50 (1.17-13.25)a  3.25 (1.16-7.08)a  2.27 (1.10-4.67)a  1.27 (0.52-3.07)  3.34 (1.28-6.70)a  ------  ------  ------  0.80 (0.78-0.83)c |
|  | **Borderline intelligence, odds ratio (95% confidence interval)\*** | | | | |
|  | Unadjusted |  | Adjusted | | |
| Model |  |  | Risk factors only | Risk factors plus  trajectory group | Risk factors plus  24-month MDI |
| Low maternal education  Low SES  Severe IVH  cPVL  NEC  BPD  Severe ROP  6-month microcephaly  Trajectory group  High-stable  High-declining  Low-declining  24-month MDI | 2.05 (1.53-2.75)c  2.06 (1.53-2.77)c  1.38 (0.67-2.84)  1.93 (0.87-4.28)  2.10 (1.27-3.47)b  1.52 (1.20-1.97)a  2.00 (1.35-2.95)c  2.26 (1.65-3.10)c  1.00 (reference)  4.28 (3.15-5.81)a  5.99 (1.70-11.08)  0.94 (0.92-0.95)c |  | 1.73 (1.18-2.53)b  1.51 (1.03-2.23)a  1.12 (0.52-2.43)  1.76 (0.76-4.04)  1.80 (1.06-3.05)a  1.86 (1.61-2.23)c  2.00 (1.29-3.09)b  2.10 (1.34-3.30)b  ------  ------  ------  ------ | 1.57 (1.06-2.34)a  1.52 (1.01-2.29)a  1.15 (0.51-2.62)  1.60 (0.67-3.83)  1.62 (0.80-3.05)  1.54 (1.05-2.26)b  2.02 (1.27-3.21)b  1.85 (0.94-3.31)  1.00 (reference)  4.37 (3.11-6.13)b  5.66 (0.97-10.11)  ------ | 1.58 (1.04-2.41)a  1.46 (1.05-2.26)a  1.23 (0.52-2.91)  1.99 (0.78-5.07)  2.01 (1.10-3.65)a  1.79 (1.18-2.67)b  1.83 (1.10-3.06)a  2.64 (1.57-4.44)c  ------  ------  ------  0.91 (0.89-0.92)c |

\*Using the average intelligence group as the reference. SES, socioeconomic status; IVH, intraventricular haemorrhage; cPVL, cystic periventricular leukomalacia; NEC, necrotizing enterocolitis; BPD, bronchopulmonary dysplasia; ROP, retinopathy of prematurity; MDI, mental development index of the Bayley scales. a*P*< 0.05; b*P* < 0.01; c*P* < 0.001.