

## Supplementary Online Content

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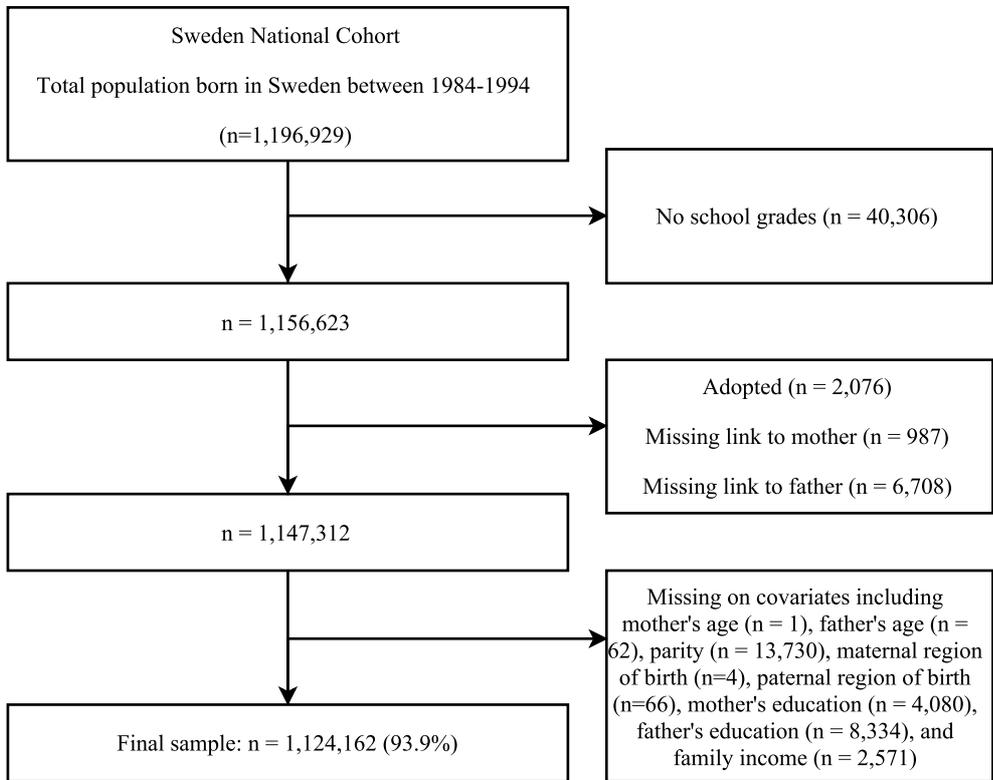
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This supplementary material has been provided by the authors to give readers additional information about their work.



eFigure 1: Study sample derivation

**eTable 1.** Characteristics of study sample and dropout sample in a national Swedish cohort born 1984-1994, N = 1,196,929.

| Covariates                           | Study sample<br>(n = 1,124,162)<br>N (%) | Excluded<br>(n = 72,767)<br>N (%) |
|--------------------------------------|--|-----------------------------------|
| <b>Child sex</b>                     |  |                                   |
| Male                                 | 574,194 (51.1%)                          | 39,997 (55.0%)                    |
| Female                               | 549,968 (48.9%)                          | 32,770 (45.0%)                    |
| <b>Multibirth</b>                    |  |                                   |
| No                                   | 1,098,796 (97.7%)                        | 71,375 (98.1%)                    |
| Yes                                  | 25,366 (2.3%)                            | 1,392 (1.9%)                      |
| <b>Maternal age (years)</b>          |  |                                   |
| <20                                  | 28,947 (2.6%)                            | 3,665 (5.0%)                      |
| 20-24                                | 254,211 (22.6%)                          | 17,852 (24.5%)                    |
| 25-29                                | 420,427 (37.4%)                          | 23,643 (32.5%)                    |
| 30-34                                | 287,409 (25.6%)                          | 16,828 (23.1%)                    |
| 35-39                                | 112,367 (10.0%)                          | 7,753 (10.7%)                     |
| 40-44                                | 20,159 (1.8%)                            | 1,713 (2.4%)                      |
| 45+                                  | 642 (0.1%)                               | 95 (0.1%)                         |
| Missing                              | 0 (0.0%)                                 | 1,218 (1.7%)                      |
| <b>Birth order</b>                   |  |                                   |
| 1                                    | 458,173 (40.8%)                          | 23,935 (32.9%)                    |
| 2                                    | 402,458 (35.8%)                          | 17,028 (23.4%)                    |
| 3                                    | 185,621 (16.5%)                          | 8,733 (12.0%)                     |
| >=4                                  | 77,910 (6.9%)                            | 5,719 (7.9%)                      |
| Missing                              | 0 (0.0%)                                 | 17,352 (23.8%)                    |
| <b>Maternal smoking at pregnancy</b> |  |                                   |
| No                                   | 791,157 (70.4%)                          | 33,273 (45.7%)                    |
| Yes                                  | 262,544 (23.4%)                          | 17,553 (24.1%)                    |
| Missing                              | 70,461 (6.3%)                            | 21,941 (30.2%)                    |
| <b>Paternal age (years)</b>          |  |                                   |
| <20                                  | 6,977 (0.6%)                             | 780 (1.1%)                        |
| 20-24                                | 130,567 (11.6%)                          | 8,594 (11.8%)                     |
| 25-29                                | 354,873 (31.6%)                          | 18,407 (25.3%)                    |
| 30-34                                | 344,245 (30.6%)                          | 18,023 (24.8%)                    |
| 35-39                                | 189,429 (16.9%)                          | 11,130 (15.3%)                    |
| 40-44                                | 71,033 (6.3%)                            | 5,075 (7.0%)                      |
| 45-49                                | 19,740 (1.8%)                            | 1,843 (2.5%)                      |
| 50+                                  | 7,298 (0.6%)                             | 992 (1.4%)                        |
| Missing                              | 0 (0.0%)                                 | 7,923 (10.9%)                     |
| <b>Maternal region of birth</b>      |  |                                   |
| Sweden                               | 992,803 (88.3%)                          | 54,009 (74.2%)                    |
| Nordic countries                     | 43,507 (3.9%)                            | 4,101 (5.6%)                      |
| Outside Nordic countries             | 87,852 (7.8%)                            | 13,435 (18.5%)                    |

|   |                          |                   |                |
|---|--------------------------|-------------------|----------------|
|   | Missing                  | 0 (0.0%)          | 1,222 (1.7%)   |
| <b>Paternal region of birth</b>                             |                          |                   |                |
|   | Sweden                   | 985,748 (87.7%)   | 46,373 (63.7%) |
|   | Nordic countries         | 36,848 (3.3%)     | 3,578 (4.9%)   |
|   | Outside Nordic countries | 101,566 (9.0%)    | 14,889 (20.5%) |
|   | Missing                  | 0 (0.0%)          | 7,927 (10.9%)  |
| <b>Maternal highest education level</b>                     |                          |                   |                |
|   | <9 years                 | 207,560 (18.5%)   | 20,229 (27.8%) |
|   | 10-12 years              | 616,969 (54.9%)   | 32,100 (44.1%) |
|   | >12 years                | 299,633 (26.7%)   | 13,575 (18.7%) |
|   | Missing                  | 0 (0.0%)          | 6,863 (9.4%)   |
| <b>Paternal highest education level</b>                     |                          |                   |                |
|   | <9 years                 | 251,933 (22.4%)   | 16,192 (22.3%) |
|   | 10-12 years              | 582,316 (51.8%)   | 25,859 (35.5%) |
|   | >12 years                | 289,913 (25.8%)   | 12,879 (17.7%) |
|   | Missing                  | 0 (0.0%)          | 17,837 (24.5%) |
| <b>Family income</b>  |                          |                   |                |
|   | 1st quartile (lowest)    | 194,644 (17.3%)   | 20,622 (28.3%) |
|   | 2nd quartile             | 231,353 (20.6%)   | 14,216 (19.5%) |
|   | 3rd quartile             | 232,305 (20.7%)   | 11,666 (16.0%) |
|   | 4th quartile             | 233,265 (20.8%)   | 10,849 (14.9%) |
|   | 5th quartile (highest)   | 232,595 (20.7%)   | 11,627 (16.0%) |
|   | Missing                  | 0 (0.0%)          | 3,787 (5.2%)   |
| <b>Maternal alcohol abuse before the birth of the child</b> |                          |                   |                |
|   | No                       | 1,121,074 (99.7%) | 72,220 (99.2%) |
|   | Yes                      | 3,088 (0.3%)      | 547 (0.8%)     |
| <b>Paternal alcohol abuse before the birth of the child</b> |                          |                   |                |
|   | No                       | 1,113,747 (99.1%) | 71,346 (98.0%) |
|   | Yes                      | 10,415 (0.9%)     | 1,421 (2.0%)   |

**eTable 2.** Study sample characteristics and school performance at the end of compulsory education in the Stockholm County subsample born 1984-1994, N = 214,668.

| <b>Covariates</b>                       | <b>N (%)</b>    | <b>Mean difference in school performance decile (95% CI)*</b> |
|---|-----------------|---|
| <b>Child sex</b>                        |                 |   |
| Male                                    | 109,356 (50.9%) | ref   |
| Female                                  | 105,312 (49.1%) | 1.03 (1.00 to 1.05)   |
| <b>Multibirth</b>                       |                 |   |
| No                                      | 209,782 (97.7%) | ref   |
| Yes                                     | 4,886 (2.3%)    | 0.17 (0.09 to 0.25)   |
| <b>Maternal age (years)</b>             |                 |   |
| <20                                     | 4,983 (2.3%)    | -1.80 (-1.87 to -1.72)  |
| 20-24                                   | 40,465 (18.9%)  | -0.92 (-0.95 to -0.88)  |
| 25-29                                   | 75,018 (34.9%)  | ref   |
| 30-34                                   | 62,254 (29.0%)  | 0.45 (0.42 to 0.48)   |
| 35-39                                   | 26,603 (12.4%)  | 0.54 (0.50 to 0.58)   |
| 40-44                                   | 5,199 (2.4%)    | 0.44 (0.37 to 0.52)   |
| 45+                                     | 146 (0.1%)      | 0.18 (-0.36 to 0.66)  |
| <b>Birth order</b>                      |                 |   |
| 1                                       | 94,602 (44.1%)  | ref   |
| 2                                       | 77,048 (35.9%)  | -0.40 (-0.43 to -0.37)  |
| 3                                       | 30,924 (14.4%)  | -0.73 (-0.76 to -0.69)  |
| >=4                                     | 12,094 (5.6%)   | -1.32 (-1.38 to -1.27)  |
| <b>Maternal smoking at pregnancy</b>    |                 |   |
| No                                      | 149,285 (69.5%) | ref   |
| Yes                                     | 45,760 (21.3%)  | -1.41 (-1.44 to -1.38)  |
| Missing                                 | 19,623 (9.1%)   | -0.62 (-0.66 to -0.58)  |
| <b>Paternal age (years)</b>             |                 |   |
| <20                                     | 1,390 (0.6%)    | -1.77 (-1.89 to -1.64)  |
| 20-24                                   | 21,498 (10.0%)  | -0.90 (-0.94 to -0.86)  |
| 25-29                                   | 60,427 (28.1%)  | ref   |
| 30-34                                   | 66,765 (31.1%)  | 0.53 (0.50 to 0.57)   |
| 35-39                                   | 40,519 (18.9%)  | 0.64 (0.61 to 0.68)   |
| 40-44                                   | 16,783 (7.8%)   | 0.57 (0.53 to 0.62)   |
| 45-49                                   | 5,294 (2.5%)    | 0.51 (0.43 to 0.59)   |
| 50+                                     | 1,992 (0.9%)    | 0.34 (0.21 to 0.47)   |
| <b>Maternal region of birth</b>         |                 |   |
| Sweden                                  | 169,822 (79.1%) | ref   |
| Nordic countries                        | 12,820 (6.0%)   | -0.49 (-0.54 to -0.44)  |
| Outside Nordic countries                | 32,026 (14.9%)  | -0.55 (-0.59 to -0.52)  |
| <b>Paternal region of birth</b>         |                 |   |
| Sweden                                  | 167,896 (78.2%) | ref   |
| Nordic countries                        | 8,790 (4.1%)    | -0.90 (-0.96 to -0.83)  |
| Outside Nordic countries                | 37,982 (17.7%)  | -0.65 (-0.68 to -0.62)  |
| <b>Maternal highest education level</b> |                 |   |
| <9 years                                | 39,160 (18.2%)  | -1.15 (-1.17 to -1.11)  |

|   |                        |                 |                        |
|---|------------------------|-----------------|------------------------|
|   | 10-12 years            | 104,722 (48.8%) | ref                    |
|   | >12 years              | 70,786 (33.0%)  | 1.71 (1.69 to 1.74)    |
| <b>Paternal highest education level</b>                     |                        |                 |                        |
|   | <9 years               | 43,260 (20.2%)  | -0.95 (-0.98 to -0.92) |
|   | 10-12 years            | 98,281 (45.8%)  | ref                    |
|   | >12 years              | 73,127 (34.1%)  | 1.74 (1.71 to 1.76)    |
| <b>Family income</b>  |                        |                 |                        |
|   | 1st quartile (lowest)  | 33,474 (15.6%)  | -0.40 (-0.44 to -0.36) |
|   | 2nd quartile           | 32,591 (15.2%)  | -0.30 (-0.34 to -0.26) |
|   | 3rd quartile           | 35,122 (16.4%)  | ref                    |
|   | 4th quartile           | 42,445 (19.8%)  | 0.41 (0.37 to 0.45)    |
|   | 5th quartile (highest) | 71,036 (33.1%)  | 1.37 (1.34 to 1.41)    |
| <b>Maternal alcohol abuse before the birth of the child</b> |                        |                 |                        |
|   | No                     | 214,100 (99.7%) | ref                    |
|   | Yes                    | 568 (0.3%)      | -1.71 (-1.92 to -1.49) |
| <b>Paternal alcohol abuse before the birth of the child</b> |                        |                 |                        |
|   | No                     | 213,220 (99.3%) | ref                    |
|   | Yes                    | 1,448 (0.7%)    | -1.67 (-1.80 to -1.54) |

\* School performance is parameterized as deciles from 1 (lowest) to 10 (highest). Estimates shown are the average differences in school performance decile between different category values. For example, on average, females scored 1.14 deciles higher compared with males (the reference group). 95% confidence intervals were calculated using bootstrap resampling method with 1,000 iterations.

**eTable 3.** Associations of parental depression at different time periods and school performance at the end of compulsory education in the Stockholm County subsample born 1984-1994, N = 214,668.

|                                       | Mean difference in decile of school performance (95% CI)* |                             |                             |                             |                             |
|---------------------------------------|---|-----------------------------|-----------------------------|-----------------------------|-----------------------------|
|                                       | Model 3a  | Model 3b                    | Model 3c                    | Model 3d                    | Model 3e                    |
| <b><u>Before birth of child</u></b>   |   |                             |                             |                             |                             |
| Maternal depression (n=1,044)         | <b>-0.30 (-0.47, -0.14)</b>                               | <b>-0.30 (-0.46, -0.13)</b> | <b>-0.28 (-0.45, -0.12)</b> | <b>-0.25(-0.42, -0.08)</b>  | <b>-0.21 (-0.37, -0.04)</b> |
| Paternal depression (n=757)           | -0.04 (-0.23, 0.16)                                       | -0.04 (-0.23, 0.16)         | -0.01 (-0.20, 0.18)         | 0.01(-0.19, 0.20)           | 0.04 (-0.16, 0.23)          |
| <b><u>Postnatal</u></b>               |   |                             |                             |                             |                             |
| Maternal depression (n= 94)           | --  | <b>-0.46 (-0.94, 0.03)</b>  | -0.42 (-0.91, 0.06)         | -0.38(-0.87, 0.10)          | -0.32 (-0.81, 0.16)         |
| Paternal depression (n=62)            | --  | <b>-0.07 (-0.66, 0.52)</b>  | 0.02 (-0.57, 0.61)          | 0.04(-0.55, 0.63)           | 0.07 (-0.52, 0.66)          |
| <b><u>Child's age 1-5 years</u></b>   |   |                             |                             |                             |                             |
| Maternal depression (n=1,325)         | --  | --                          | <b>-0.31 (-0.45, -0.18)</b> | <b>-0.25 (-0.38, -0.12)</b> | <b>-0.19 (-0.32, -0.05)</b> |
| Paternal depression (n= 890)          | --  | --                          | <b>-0.33 (-0.50, -0.17)</b> | <b>-0.30 (-0.46, -0.13)</b> | <b>-0.26 (-0.42, -0.09)</b> |
| <b><u>Child's age 6-10 years</u></b>  |   |                             |                             |                             |                             |
| Maternal depression (n= 5,238)        | --  | --                          | --                          | <b>-0.29 (-0.36, -0.22)</b> | <b>-0.18 (-0.25, -0.10)</b> |
| Paternal depression (n=2,880)         | --  | --                          | --                          | <b>-0.19 (-0.28, -0.09)</b> | <b>-0.12 (-0.21, -0.02)</b> |
| <b><u>Child's age 11-16 years</u></b> |   |                             |                             |                             |                             |
| Maternal depression (n= 11,958)       | --  | --                          | --                          | --                          | <b>-0.41 (-0.46, -0.36)</b> |
| Paternal depression (n=5,952)         | --  | --                          | --                          | --                          | <b>-0.26 (-0.32, -0.19)</b> |

\* Model 3a-3e adjusted for all covariates from Model 3 in Table 2: child characteristics (sex, multiple births, and birth year), pregnancy characteristics (birth order, maternal age, and maternal smoking at pregnancy), and family characteristics (paternal age, maternal and paternal alcohol abuse before the birth of the child, maternal and paternal highest education levels, quartiles of annual family income adjusted by for year and family size, maternal and paternal regions of origin). Bolded coefficients are P <0.05. To interpret associations for parental depression in the period of interest (e.g., postnatal), refer to the shaded square for the model in which the period of interest is the last examined period (Model 3b). Subsequent models that adjust for depression in later time periods (3c-f) likely adjust for potential mediators on the causal pathway.