**SUPPLEMENTARY ONLINE MATERIAL**

**Online Supplement 1: Description of covariate factors**

A range of factors were selected from the study database to control the associations between adolescent depression and later outcomes at 30 and 35 years for the effects of social, family and individual context. These measures spanned domains of childhood and family adversity; individual characteristics; and comorbid mental health problems in adolescence. The measures were selected on the basis that: (a) they were theoretically relevant predictors of depression in adolescence, or factors comorbid with adolescent depression; and (b) they had been linked in previous research with one or more of the adult functional outcomes included in the analysis. These measures were:

***Family background and functioning***

*Childhood adversity.* To identify children who had been exposed to high risk family environments, a general index of family adversity was used. The construction of this index has been described in a previous paper ([Fergusson *et al.*, 1994](#_ENREF_7)). The index was based on a series of 39 prospectively measured items describing aspects of the cohort member’s family circumstances and childhood experiences over the period up to age 15 including: family social and economic disadvantage, early parent-child interaction and childhood experiences, family instability, marital conflict, changes of residence and changes of school, and related experiences. The 39 dichotomous items were summed to create an adversity index. Adversity scores ranged from 0-19, giving a mean and standard deviation of mean=7.4; S.D.=5.3.

*Parental adjustment problems.* When cohort members were aged 11, parent(s) were questioned about their history of illicit drug use. At the age 15 assessment, parent(s) were further questioned regarding whether any parent had a history of alcohol problems, criminal offending or a history of depression/anxiety/suicidal behaviors. From this information four dichotomous variables were constructed representing whether or not the cohort members’ parent(s) reported a history of these adjustment problems. For the purposes of the current study, these variables were summed to create a count measure of the number of parental adjustment problems: 68.9% of parents were reported to have no adjustment problems; 26.4% to have one problem and 4.7% to have two or more problems.

*Childhood maltreatment (<16 years).* At ages 18 and 21, cohort members reported on the extent to which their parents used physical punishment/maltreatment during their childhood and exposure to any forms of childhood sexual abuse (prior to age 16 years). For childhood physical punishment, cohort members reported on the extent to which their parents used physical punishment/maltreatment during their childhood. Separate ratings were obtained for each parent. These ratings were then combined into a single 4-point scale of parental physical punishment/maltreatment, based on the most severe rating for either parent at either the 18- or 21-year interview: (0) parents never used physical punishment (4.4%); (1) parents seldom used physical punishment (77.9%); (2) at least one parent regularly used physical punishment (11.7%); (3) at least one parent used frequent or severe punishment or treated the cohort member in a harsh/abusive manner (6.0%)([Fergusson *et al.*, 2011](#_ENREF_5); [Fergusson and Lynskey, 1997](#_ENREF_9)). For childhood exposure to sexual abuse, cohort members were questioned about their exposure to any forms of childhood sexual abuse, including: (1) non-contact episodes involving indecent exposure, public masturbation or unwanted sexual propositions; (2) episodes involving sexual contact in the form of sexual fondling, genital contact or attempts to undress the respondent; and (3) episodes involving attempted or completed vaginal, oral or anal intercourse ([Fergusson *et al.*, 2011](#_ENREF_5); [Fergusson *et al.*, 1996a](#_ENREF_8); [Fergusson *et al.*, 1996b](#_ENREF_10)). Using these data cohort members were classified on a single 4-point scale reflecting the most severe form of abuse exposure reported at either age 18 or 21: (0) no childhood sexual abuse (86.6%); (1) non-contact childhood sexual abuse (2.4%); (2) contact childhood sexual abuse not involving attempted or completed sexual penetration (4.9%); and (3) severe childhood sexual abuse involving attempted or completed sexual penetration (6.0%).

***Child factors***

*Gender.* Recorded at birth (49.9% male, 50.1% female).

*Cognitive ability (8-9 years).* The cohort member’s cognitive ability was assessed at ages 8 and 9 years using the Revised Wechsler Intelligence Scale for Children (WISC-R ([Wechsler, 1974](#_ENREF_12))). The split half reliabilities of the scales were 0.93 at age 8 and 0.95 at age 9. For this study, the WISC-R total IQ scores at ages 8 and 9 were combined by averaging over the two administrations giving an overall mean and standard deviation of mean=102.9; S.D.=14.2.

*Neuroticism (14 years).* At age 14, neuroticism was assessed using a short-form version of the neuroticism scale of the Eysenck Personality Inventory ([Eysenck and Eysenck, 1964](#_ENREF_4)). The internal consistency of this scale was α=0.80.

*Novelty seeking (16 years).* At age 16, cohort members were assessed on the novelty seeking scale of the Tridimensional Personality Questionnaire ([Cloninger, 1987](#_ENREF_2)). This 31-item scale provides a measure of the extent to an individual considered themselves to be ``impulsive, exploratory, excitable, disorderly and distractible'' (Cloninger, 1987, p.411). Scale items were summed to produce an overall novelty-seeking measure. The internal consistency of the scale was α=0.76.

*Parental attachment score (15 years).* At age 15, cohort members were interviewed about the quality of their relationship with their parents using the parental attachment scale of the Inventory of Parent and Peer Attachment (IPPA) ([Armsden and Greenberg, 1987](#_ENREF_1)). The internal consistency of the scale was α=0.87.

***Comorbid mental health problems (14-16 years)***

Parallel to the assessment of adolescent depression, at age 15 and 16 years cohort members and their parents were also interviewed about other aspects of the young person’s mental health over the preceding 12 months. These interviews combined a range of standardized assessment instruments including components of the relevant version (self or parent report) of the Diagnostic Interview Schedule for Children (DISC) ([Costello *et al.*, 1982](#_ENREF_3)), the Self-Report Early Delinquency Inventory ([Moffitt and Silva, 1988](#_ENREF_11)) and the Rutgers Alcohol Problems Index ([White and Labouvie, 1989](#_ENREF_13)) together with custom written survey items to assess DSM-III-R symptom criteria for a range of mental disorders as well as the occurrence of suicidal behaviors (suicidal ideation or attempt) in each interview period (see Fergusson, Horwood and Lynskey ([1993](#_ENREF_6)) for further information). These data were combined over the two assessments to derive a series of dichotomous measures reflecting whether the young person met criteria on the basis of either parent or self-report for a diagnosis of anxiety disorder (generalized anxiety disorder, overanxious disorder, phobias), conduct or oppositional defiant disorder, ADHD, alcohol and illicit substance abuse, or had experienced suicidal ideation or a suicide attempt over the period from age 14-16 years.

**Online Supplement 2. Associations between depression at 14-16 years and a series of mental health and psychosocial outcomes assessed at ages 30, 35 years, and pooled across observations.**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | Depression (14-16 years) | | |  |
| Outcome | None | Sub-threshold | Major depression | *pa* |
| **Mental health** | |  |  |  |
| Major depression % | |  |  |  |
| 25-30 years | 17.6 | 22.6 | 35.2 |  |
| *N* | 626 | 168 | 128 |  |
| 30-35 years | 15.5 | 20.4 | 30.9 |  |
| *N* | 614 | 162 | 123 |  |
| Pooled | 16.5 | 21.5 | 33.1 | *p*<0.001 |
| *N* | 1240 | 330 | 251 |  |
| Anxiety disorder % | |  |  |  |
| 25-30 years | 13.4 | 22.0 | 28.9 |  |
| *N* | 626 | 168 | 128 |  |
| 30-35 years | 11.9 | 19.1 | 35.8 |  |
| *N* | 614 | 162 | 123 |  |
| Pooled | 12.7 | 20.6 | 32.3 | *p*<0.001 |
| *N* | 1240 | 330 | 251 |  |
| Suicidal ideation/attempt % | |  |  |  |
| 25-30 years | 5.1 | 9.5 | 14.1 |  |
| *N* | 626 | 168 | 128 |  |
| 30-35 years | 2.6 | 4.3 | 8.1 |  |
| *N* | 614 | 162 | 123 |  |
| Pooled | 3.9 | 7.0 | 11.1 | *p*<0.001 |
| *N* | 1240 | 330 | 251 |  |
| Alcohol abuse/dependence % | |  |  |  |
| 25-30 years | 13.3 | 16.7 | 14.8 |  |
| *N* | 626 | 168 | 128 |  |
| 30-35 years | 16.0 | 20.4 | 16.3 |  |
| *N* | 614 | 162 | 123 |  |
| Pooled | 14.6 | 18.5 | 15.5 | *p*=0.450 |
| *N* | 1240 | 330 | 251 |  |

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Illicit substance abuse/dependence % | | | |  |  |
| 25-30 years | | 7.0 | 11.9 | 15.6 |  |
| *N* | | 626 | 168 | 128 |  |
| 30-35 years | | 7.2 | 10.5 | 11.4 |  |
| *N* | | 614 | 162 | 123 |  |
| Pooled | | 7.1 | 11.2 | 13.5 | *p*=0.002 |
| *N* | | 1240 | 330 | 251 |  |
| Any mental health problem % | | | |  |  |
| 25-30 years | | 37.9 | 49.4 | 63.3 |  |
| *N* | | 626 | 168 | 128 |  |
| 30-35 years | | 35.0 | 46.9 | 61.0 |  |
| *N* | | 614 | 162 | 123 |  |
| Pooled | | 36.5 | 48.2 | 62.2 | *p*<0.001 |
| *N* | | 1240 | 330 | 251 |  |
| **Education and economic circumstances** | | | |  |  |
| Degree attainment % | | | |  |  |
| 30 years | 32.5 | | 22.9 | 18.3 |  |
| *N* | 644 | | 175 | 131 |  |
| 35 years | 34.2 | | 25.0 | 21.4 |  |
| *N* | 647 | | 176 | 131 |  |
| Pooled | 33.3 | | 23.9 | 19.9 | *p*=0.001 |
| *N* | 1291 | | 351 | 262 |  |
| Welfare dependence % | | |  |  |  |
| 25-30 years | | 13.1 | 17.9 | 28.1 |  |
| *N* | | 626 | 168 | 128 |  |
| 30-35 years | | 12.9 | 14.2 | 26.0 |  |
| *N* | | 614 | 162 | 123 |  |
| Pooled | | 13.0 | 16.1 | 27.1 | *p*<0.001 |
| *N* | | 1240 | 330 | 251 |  |
| Net personal weekly income (NZD) mean (S.D.) | | | |  |  |
| 29-30 years | | 806.9 (585.0) | 653.8 (517.0) | 563.7 (547.0) |  |
| *N* | | 623 | 167 | 128 |  |
| 34-35 years | | 837.0 (626.4) | 700.0 (531.6) | 617.8 (644.3) |  |
| *N* | | 614 | 162 | 123 |  |
| Pooled | | 821.8 (605.9) | 676.5 (523.9) | 590.2 (596.0) | *p*<0.001 |
| *N* | | 1237 | 329 | 251 |  |
| **Partnership and family outcomes** | | | |  |  |
| Any unintended pregnancies % | | | |  |  |
| 30 years | | 34.0 | 42.3 | 53.9 |  |
| *N* | | 626 | 168 | 128 |  |
| 35 years | | 40.7 | 50.6 | 58.5 |  |
| *N* | | 614 | 162 | 123 |  |
| Pooled | | 37.3 | 46.4 | 56.2 | *p*<0.001 |
| *N* | | 1240 | 330 | 251 |  |
| Sole parenthood % | | | |  |  |
| 30 years | | 3.8 | 6.0 | 14.8 |  |
| *N* | | 626 | 168 | 128 |  |
| 35 years | | 5.9 | 8.0 | 11.4 |  |
| *N* | | 614 | 162 | 123 |  |
| Pooled | | 4.8 | 7.0 | 13.2 | *p*<0.001 |
| *N* | | 1240 | 330 | 251 |  |
| Relationship quality mean (S.D.)b | | | |  |  |
| 29-30 years | | 27.7 (7.1) | 26.6 (7.9) | 26.1 (8.8) |  |
| *N* | | 556 | 148 | 112 |  |
| 34-35 years | | 28.5 (6.3) | 28.0 (6.3) | 27.5 (7.0) |  |
| *N* | | 529 | 140 | 110 |  |
| Pooled | | 28.1 (6.7) | 27.3 (7.5) | 26.8 (8.0) | *p*=0.013 |
| *N* | | 1085 | 288 | 222 |  |
| Intimate partner violence perpetration mean (S.D.)b | | | | | |
| 29-30 years | | 2.0 (1.9) | 2.1 (2.0) | 2.6 (2.3) |  |
| *N* | | 558 | 148 | 112 |  |
| 34-35 years | | 2.0 (1.7) | 2.3 (1.7) | 2.5 (1.9) |  |
| *N* | | 528 | 140 | 110 |  |
| Pooled | | 2.0 (1.8) | 2.2 (1.9) | 2.5 (2.1) | *p*<0.001 |
| *N* | | 1086 | 288 | 222 |  |
| Intimate partner violence victimization mean (S.D.)b | | | | |  |
| 29-30 years | | 2.1 (2.0) | 2.2 (2.3) | 2.9 (3.0) |  |
| *N* | | 558 | 148 | 112 |  |
| 34-35 years | | 2.3 (2.1) | 2.6 (2.5) | 2.8 (2.3) |  |
| *N* | | 528 | 140 | 110 |  |
| Pooled | | 2.2 (2.1) | 2.4 (2.4) | 2.9 (2.6) | *p*<0.001 |
| *N* | | 1086 | 288 | 222 |  |

S.D., standard deviation; NZD, New Zealand dollars. Unadjusted regression coefficients (B) and standard errors (S.E.) are shown in Table 1 of the manuscript.  
a P-values for the associations between extent of adolescent depression and the outcomes were obtained from fitting population-averaged generalized estimating equation regression models to the data (see Statistical methods in the manuscript).

b Analysis restricted to respondents in any romantic partnership over the previous 12 months, at 29-30 years and 34-35 years, who also had information on adolescent depression: 30 years n=818; 35 years n=779; and pooled n=1596.

**Online Supplement 3: Sensitivity analysis using number of depressive symptoms (14-16 years)**

As described in the paper a sensitivity analysis was conducted to examine the robustness of analysis findings to the use of an alternative measure of adolescent depression, a count of the number of DSM major depression symptoms reported for the interval 14-16 years, where a symptom was counted as present if it was reported by either the child or the parent. The table below summarises the fitted regression coefficients from population averaged regression models fitted to the repeated measures data at ages 30, 35 years for the effect of number of depressive symptoms on each outcome, before and after adjustment for covariates.

Associations between number of depressive symptoms in adolescence (14-16 years) and adult functional outcomes assessed at 30, 35 years before and after adjustment for covariates

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Outcome | Unadjusted | |  | Adjusted | | Significant  Covariatesc |
| B (S.E.) | *P* |  | B (S.E.) | *P* |
| **Mental health problems** |  |  |  |  |  |  |
| Major depression | 0.126 (0.022) | <0.001 |  | 0.056 (0.025) | 0.024 | 1, 4-7 |
| Anxiety disorder | 0.163 (0.023) | <0.001 |  | 0.086 (0.027) | 0.002 | 2, 5, 7 |
| Suicidal ideation/attempt | 0.156 (0.034) | <0.001 |  | 0.059 (0.044) | 0.18 | 3, 4 |
| Alcohol abuse/dependencea | 0.023 (0.027) | 0.381 |  | - | - |  |
| Illicit substance abuse/ dependence | 0.103 (0.034) | <0.001 |  | 0.085 (0.037) | 0.021 | 2, 5, 9, 10 |
| Any mental health problem | 0.149 (0.020) | <0.001 |  | 0.084 (0.023) | <0.001 | 2, 3, 5, 7, 9 |
| **Education and economic circumstances** | |  |  |  |  |  |
| Degree attainment | -0.103 0.029) | <0.001 |  | -0.019 (0.037) | 0.62 | 1, 5, 9 |
| Welfare dependence | 0.117 (0.025) | <0.001 |  | 0.030 (0.030) | 0.33 | 1, 3, 4 |
| Net weekly personal income (NZD) | -34.76 (6.40) | <0.001 |  | -10.68 (6.27) | 0.09 | 1, 5, 6, 9 |
| **Partnership and family outcomes** | |  |  |  |  |  |
| Unintended pregnancy | 0.125 (0.024) | <0.001 |  | 0.033 (0.027) | 0.24 | 1, 4, 9 |
| Sole parenthood | 0.146 (0.034) | <0.001 |  | 0.021 (0.038) | 0.58 | 1, 5, 6, 9, 10 |
| Relationship qualityb | -0.220 (0.072) | 0.002 |  | -0.051 (0.083) | 0.54 | 8, 10 |
| Intimate partner violenceb perpetration | 0.033 (0.007) | <0.001 |  | 0.006 (0.008) | 0.43 | 1, 3, 4, 9, 10 |
| Intimate partner violenceb victimization | 0.035 (0.006) | <0.001 |  | 0.018 (0.007) | 0.015 | 2, 3-5, 7, 9, 10 |

Note. S.E.= standard error; OR=odds ratio; IRR=incidence rate ratio; CI=confidence interval; PAR%=population attributable risk percent; NZD=New Zealand dollars.  
a The outcome alcohol abuse/dependence was excluded from the covariate adjusted analysis because of the non-significant unadjusted bivariate association with adolescent depression.

b Analysis restricted to respondents in any romantic partnership over the previous 12 months, at 29-30 years and 34-35 years, who also had information on adolescent depression: 30 years n=818; 35 years n=779; and pooled n=1596. c Statistically significant (p<0.05) covariates: 1=childhood adversity score; 2=parental adjustment problems score; 3=childhood sexual abuse; 4= childhood physical punishment; 5 = gender; 6=cognitive ability (8-9 years); 7=neuroticism (14 years); 8=parental attachment (15 years); 9=novelty seeking (16 years); 10=conduct/oppositional defiant disorder (14-16 years)

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