**Supplementary Methods**

**Additional measures**

**The N-Back test:** The N-Back test was administered in the same ‘research in focus’ clinic as the affective go/no-go task, when participants were 18 years of age. In the N-back task (2-back condition), participants were asked to monitor a series of numbers (0-9) and respond with a ‘1’ keystroke when any number was the same as the one presented 2 trials previously, and a ‘2’ keystroke if it was different. Forty-eight trials were presented, including eight 2-back matches. The N-back task is widely used to measure working memory. A measure of discriminability (dʹ) was chosen as the parameter of interest given it is an overall performance estimate. High scores on number of hits indicated more accurate identification, while high scores on false alarms indicated less accurate identification. High scores on dʹ, therefore, indicated a greater ability to distinguish signal from noise.

**Additional analyses**

**Cross-sectional analyses:** We further adjusted our analyses of total errors on the affective go/no-go task and depressive symptoms for d’prime scores on the N-Back task. We also analysed the d’prime scores themselves as the outcome. We used linear regressions for this analysis with d’prime scores as the outcome and depressive symptoms as the exposure, before and after adjusting for confounders.

**Longitudinal analyses:** We further adjusted our analyses of errors on the affective go/no-go task and later depressive symptoms for the d’prime scores on the N-Back task. We also analysed the d’prime scores themselves as the exposure. We used linear regressions for this analysis with d’prime scores as the exposure and depressive symptoms as the outcome, before and after adjusting for confounders.

Supplementary Table 1. Behavioural studies using the affective go/no-go task to investigate associations with depression.

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **Study characteristics** | | | | | **Findings** | | |
| **Study name (first author)** | **Year of publication** | **Design** | **Sample/setting** | **N** | **Omissionsa** | **Commission errors (CE)b** | **Reaction times for target wordsc** |
| Murphy | 1999 | Case-control | UK Secondary care patients. Controls recruited by community advertisement | 18 bipolar  28 depressed  22 controls | No evidence | No evidence | Depressed: slower to positive than negative |
| Erickson | 2005 | Case-control | Not clear | 20 depressed  20 controls | Depressed: more positive than negative. Controls: more negative. | No evidence | Depressed: slower to positive than negative |
| Kyte | 2005 | Case-control | UK secondary care adolescents with recent first episode major depression. Controls from ongoing population-based cohort | 30 depressed  49 controls | No evidence | Depressed: more CE to negative. Controls: more CE to positive. | No evidence |
| Maalouf | 2012 | Case-control | Not clear | 40 depressed (20 acute, 20 remission)  17 controls | No evidence | Depressed: more CE overall | Depressed: faster to negative than positive. Controls and remitted: faster to positive. |
| Owens | 2012 | Cohort | UK sub-sample of larger population-based cohort, selected for high-risk of depression | 238 | Not reported | Neutral & negative CE  ass with  later emotional disorder | No evidence |
| Kilford | 2015 | Cohort | UK; children of parents with recurrent depression | 263 | No c-sec evidence. Omissions overall ass with  later depression | Positive CE,  ass with  later depressiond | Depressed: faster irrespective of valence: c-sec & longit ass with depression |

Abbreviations: ass: associated with; CE: commission errors; c-sec: cross-sectional.

aMore positive omissions means that more positive target words (correct responses) were missed and same for negative and neutral omissions.

bA positive commission error means more commission errors (incorrect responses) when distractor words were positive and same for neutral and negative CE

**c**Targets refers to the target word (the correct response)

dIn shift conditions only.

Studies were identified by searching PubMed for studies published in English before January 2019 using the search terms ‘affective go/no-go’ AND ‘depress\*’. We then manually searched reference lists.

Supplementary Table 2. The association between depressive symptoms (continuous exposure) and total number of errors (continuous outcome) was compared across the strata represented by cells a to d using a 3-way interaction test.

|  |  |  |
| --- | --- | --- |
| Error type | Valence of the word observed | |
| Positive | Negative |
| Commission error | a | c |
| Omission error | b | d |

Supplementary Table 3. The association between depressive symptoms (continuous exposure) and total number of errors (continuous outcome) was compared across the strata represented by cells a to h using a 4-way interaction test.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Error type | Valence of the word observed | | | |
| Positive | | Negative | |
| No shift | Shift | No shift | Shift |
| Commission error | a | b | e | f |
| Omission error | c | d | g | h |

Supplementary Table 4. Characteristics of the sample with complete data on the AGNG task, depressive symptoms (at age 18) and confounders (n=1271), compared to the rest of the core ALSPAC sample.

|  |  |  |
| --- | --- | --- |
| Characteristic | ALSPAC core sample  (n=12,685) | Complete data  (n=1271) |
| Female, n (%) | 6030 (47.5) | 714 (56.2) |
| Lower maternal education, O Level or less, n (%) | 7321 (66.2) | 647 (50.9) |
| Lower maternal social class, n (%) | 1905 (23.1) | 204 (16.1) |
| Offspring depression diagnoses at age 18, CIS-R, n (%) | 261 (8.8) | 73 (5.8) |
| Maternal age at birth, mean (SD) | 27.8 (5.0) | 29.5 (4.5) |
| IQ score of the child at age 15, mean (SD) | 91.5 (13.1) | 93.2 (12.6) |
| Offspring sMFQ score at 18, mean (SD) | 6.8 (5.3) | 6.1 (5.1) |

Abbreviations: n – number; CIS-R – Clinical Interview Schedule-Revised; sMFQ – short Mood and Feelings Questionnaire; IQ – Intelligence Quotient; SD – Standard Deviation.

Supplementary Table 5. Cross-sectional associations at age 18 showing change in number of errors (95% confidence intervals and p value) for a one SD change in depressive symptoms (assessed with the CIS-R), and according to error type, valence and shift (n=2315, based on multiply imputed data).

|  |  |  |
| --- | --- | --- |
| Exposure variable | Unadjusted modela (n=2315) | Adjusted modelb (n=2315) |
| CIS-R depressive symptomsa | -.001 (-.02 to .02) .89 | .01 (-.010 to .04) .27 |
| Error type |  |  |
| Omission | Reference category | Reference category |
| Commission | -.46 (-.48 -.44) <.00001 | -.46 (-.48 -.44) <.00001 |
| Valence |  |  |
| Negative | Reference category | Reference category |
| Positive | .33 (.31 .35) <.00001 | .33 (.31 .35) <.00001 |
| Shift |  |  |
| No shift | Reference category | Reference category |
| Shift | .27 (.25 .29) .89 | .27 (.25 .29) .89 |

aModel simultaneously included depressive symptoms, error type (commission or omission), valence (positive or negative) and shift condition (yes or no)

bConfounders were offspring age, sex and IQ, maternal education and social class

Supplementary Table 6. Cross-sectional associations at age 18 showing the percentage change in number of errors (95% confidence intervals and p value) for a one SD change in depressive symptoms (exposure), adjusted for d’prime scores from the N-Back test.

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Model | Exposure variable | | | | | | | | |
| CIS-R depressive symptomsa | | | sMFQ depressive symptomsa | | | CIS-R total scorea | | |
| Change | 95% CI | p | Change | 95% CI | p | Change | 95% CI | p |
| Model 1b:Using sample with complete data (n=1267) | .006 | -.02 to .04 | .67 | .03 | .00 to .06 | .05 | -.01 | -.04 to .02 | .38 |
| Model 2 c:Model 3 adjusted for confounders (n=1267) | .02 | -.006 to .05 | .12 | .03 | -.00 to .06 | .06 | .007 | -.02 to .04 | .66 |

aSeparate models were run for the SMFQ and CIS-R exposures because they were highly correlated and measuring the same construct

bModel simultaneously included depressive symptoms, error type (commission or omission), valence (positive or negative), shift condition (yes or no) and d’prime scores from N-Back.

cConfounders were offspring age, gender and IQ, maternal education and social class

Supplementary Table 7. Cross-sectional associations at age 18 showing the change in d’prime scores from the N-Back test (95% confidence intervals and p value), for a one SD change in depressive symptoms (exposure).

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Model | Exposure variable | | | | | | | | |
| CIS-R depressive symptomsa | | | sMFQ depressive symptomsa | | | CIS-R total scorea | | |
| Change | 95% CI | p | Change | 95% CI | p | Change | 95% CI | p |
| Model 1b:Using sample with complete data (n=1159) | -.02 | -.12 to .08 | .69 | -.08 | -.17 to .02 | .13 | -.01 | -.11 to .09 | .84 |
| Model 2 c:Model 3 adjusted for confounders (n=1159) | -.008 | -.11 to .09 | .87 | -.01 | -.11 to .08 | .75 | -.007 | -.10 to .09 | .88 |

aSeparate models were run for the SMFQ and CIS-R exposures because they were highly correlated and measuring the same construct

bUnivariable model including d’prime scores from N-Back as exposure and depressive symptoms as outcome.

cConfounders were offspring age, gender and IQ, maternal education and social class

Supplementary Table 8. Longitudinal associations showing change in sMFQ points (unstandardized regression coefficient) at age 19 (95% confidence intervals and p value) for a one point increase in errors at age 18, adjusted for d’ prime score on the N-Back test.

|  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Model | Exposure variable | | | | | | | | | | | |
| Positive commissions | | | Negative commissions | | | Positive omissions | | | Negative omissions | | |
| Change | 95% CI | p | Change | 95% CI | p | Change | 95% CI | p | Change | 95% CI | p |
| Model 1:a Sample with complete data (n=680) | .02 | -.08 to .11 | .75 | .02 | -.09 to .11 | .75 | -.04 | -.13 to .04 | .67 | .00 | -.11 to .11 | .98 |
| Model 2:b Model 1 adjusted for confounders (n=680) | .007 | -.08 to .09 | .87 | -.01 | -.11 to .09 | .82 | -.02 | -.09 to .05 | .61 | -.03 | -.12 to .07 | .58 |

aIncludes positive and negative commission errors and positive and negative omissions (collapsed across shift), along with d’prime scores from N-Back

bConfounders were offspring age, gender and IQ, maternal education, social class and baseline depressive symptoms

Supplementary Table 9. Longitudinal associations showing change in sMFQ points (unstandardized regression coefficient) at age 19 (95% confidence intervals and p value), for a one point increase in d’ prime score on the N-Back test at age 18.

|  |  |  |  |
| --- | --- | --- | --- |
| Model | Depressive symptoms | | |
| Change | 95% CI | p |
| Model 1:a Sample with complete data (n=680) | -.14 | -.38 to .10 | .24 |
| Model 2:b Model 1 adjusted for confounders (n=680) | -.15 | -.37 to .066 | .17 |

aUnivariable model including d’prime scores from N-Back as exposure and depressive symptoms as outcome.

bConfounders were offspring age, gender and IQ, maternal education, social class and baseline depressive symptoms.