**Supplementary Information**

**Methods Supplement.** *NIH Toolbox Cognitive Battery*

A full description of the tasks, administration procedures and psychometric properties is available in Weintraub et al. (2013) and Luciana et al. (2018). All tasks are administered on a computer and monitored by a researcher. Normed t-scores are generated automatically based on data from the NIH Toolbox norming project.

***NIH Toolbox Flanker Task***. This is a conflict monitoring task requiring response modulation for congruent/incongruent trials. On each trial, a central directional target (arrow) is flanked by four similar stimuli on the left and right. The four flanking stimuli (2 on the left and 2 on the right side of the screen) are facing the same direction. The target (arrow) in the middle is then either facing the same (congruent trial) or opposite (incongruent trial) direction as the flankers. The participant must push a button indicate the direction of the target stimulus.

A scoring algorithm calculates accuracy, which is used widely to measure performance in childhood, and reaction time, which is used more widely to measure adult performance (Weintraub et al., 2013). There are a total of 40 mixed congruent and incongruent trials. These are presented in a pseudorandom order, with 1-3 congruent trials preceding each incongruent trial. A scoring algorithm integrates accuracy and reaction time (for participants who maintained a level of accuracy above 80%), yielding scores ranging from 0-10. Accuracy scores (range 0-5) are calculated as follows: 0.125 x Number of Correct Responses on both congruent and incongruent trials. Reaction time (RT) scores (range 0-5) were calculated as follows: (1) Trials with RTs lower than 100 msec or greater than 3 SDs from the participant's mean RT were discarded as outliers; (2) median RT was calculated based on correct incongruent trials; (3) a log transform was applied to each participant's median RT score; (4) and the range of acceptable RT for scoring was set from 500 msec to 3,000 msec, and all scores outside of this range (range of 100–10,000 msec) were reset to the maximum or minimum respectively (Zelazo et al., 2013). Rescaled RT scores are then added to the accuracy scores for participants who scored over 80% on accuracy. The average time to complete the task is 4 minutes.

***NIH List Sort Working Memory Task***. This task assesses working memory (WM) based on sequencing and categorising visual and auditory stimuli. A series of objects (foods or animals) are displayed on the screen and/or presented orally (e.g., “elephant”, “bird”) one at a time for 2 seconds. At the end of each trial, the participant must recall the objects in order of size from smallest to largest. The first trial begins with two objects within the same category (1-list block). With each correct response, the number of objects to recall increases by one. The 1-list block ends and switches to the 2-list version when the participant either fails two trials in a row or when they correctly complete a 7 item trial. Next, the same task must be completed but combining the two categories (both foods and animals), starting again with a two-item trial. After all items are presented, the participant must first recall all items from one category by order or size, followed by all items from the second category, also by order of size. The task is discontinued when the participant fails two trials in a row or when they correctly sequence two categories of 7 items each. The score is based on the sum of the total number of items recalled correctly across all trials. The average time to compete the task is 7 min.

***NIH Dimensional Card Change Sort Task***. This task measures shifting (i.e., cognitive flexibility) by requiring participants to change the categorisation of a set of items. A target picture is presented on screen that represents one of two categories: either shape or colour. Participants are then asked to sort a series of pictures (e.g., yellow balls and blue trucks) by the target category (e.g., sort them based on colour). When a “switch” trial is administered, the target category switches (e.g., sorting must now be based on shape). For example, after three trials matching on colour, the participant is asked to match on shape for the next two trials, and then switch back to matching by shape. The block consists of 50 trials that mixes the two categories (shape and colour) at with a 10/40 split between categories presented in a pseudorandom order (2-5 trials of frequent categories precede each trial with the infrequent category).

Scoring is based on a combination of accuracy and reaction time (RT) for the total number of switch trials completed, generating a score ranging from 0 to 10. Accuracy is first scored from 0-5: 0.125 x Number of Correct Responses. For participants who score lower than 80% correct on accuracy, the final score is equal to the accuracy score. The RT score (range 0-5) is then calculated based on each participant's median RT on correct infrequent trials on the mixed block: (1) Trials with RTs lower than 100 msec or greater than 3 SDs from the participant's mean RT are discarded as outliers; (2) median RT is calculated based on correct infrequent trials; (3) a log transform is applied to each participant's median RT score; (4) and the range of acceptable RT for scoring is set from 500 msec to 3,000 msec, and all scores outside of this range (range of 100–10,000 msec) are reset to the maximum or minimum respectively (Zelazo et al., 2013). Rescaled RT scores are then added to the accuracy scores for participants who scored over 80% on accuracy. The average time to compete the task is 4 min.

**Figure S1.** *Distribution of internalising factor scores*

*Chart, histogram

Description automatically generated*

*Notes.* Internalising factor scores were t-scored to have a mean of 50 and standard deviation of 10.

**RESULTS SUPPLEMENT**

**Internalising Dimensions**

**Table S1.** *Factor loadings for the four-factor ELA internalising model at Baseline (T0)*

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | **F1/Anxiety** | **SF2/Somatic Problems** | **F3/Withdrawal** | **F4//Depression** |
| ***Primary loading items*** |  |  |  |  |
| There is very little they enjoy |  |  | 0.42 |  |
| Fears certain animals, situations, or places, other than school | 0.47 |  |  |  |
| Fears they might think or do something bad | 0.31 |  |  |  |
| Feels he/she has to be perfect | 0.36 |  |  |  |
| Feels or complains that no one loves them |  |  |  | 0.58 |
| Feels worthless or inferior |  |  |  | 0.68 |
| Would rather be alone than with others |  |  | 0.49 |  |
| Nervous, highstrung, or tense | 0.54 |  |  |  |
| Too fearful or anxious | 0.73 |  |  |  |
| Feels dizzy or lightheaded |  | 0.31 |  |  |
| Feels too guilty | 0.30 |  |  |  |
| Aches or pains, other |  | 0.33 |  |  |
| Headaches |  | 0.47 |  |  |
| Nausea, feels sick |  | 0.72 |  |  |
| Stomachaches |  | 0.67 |  |  |
| Vomiting, throwing up |  | 0.46 |  |  |
| Refuses to talk |  |  | 0.48 |  |
| Secretive, keeps things to self |  |  | 0.43 |  |
| Self-conscious or easily embarrassed | 0.39 |  |  |  |
| Talks about killing self |  |  |  | 0.33 |
| Underactive, slow moving, or lacks energy |  |  | 0.43 |  |
| Unhappy, sad, or depressed |  |  |  | 0.41 |
| Withdrawn, doesn't get involved with others |  |  | 0.59 |  |
| Worries | 0.57 |  |  |  |
| ***Cross-loading and no loading items*** |  |  |  |  |
| Too shy or timid | 0.30 |  | 0.40 |  |
| Problems with eyes, not corrected by glasses |  |  |  |  |
| Rashes or other skin problems |  |  |  |  |
| Fears going to school |  |  |  |  |
| Nightmares |  |  |  |  |
| Constipated, doesn't move bowels |  |  |  |  |
| Overtired without good reason |  |  |  |  |
| Cries a lot |  |  |  |  |

*Notes.* Factor loadings for the 4-factor Spearman matrix EFA solution at Baseline (age 10) using the 32 symptom items from the internalising composite scale in the Child Behaviour Checklist (Achenbach, 2011).

**Table S2.** *Factor correlations for the four-factor internalising model at Baseline (T0)*

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | **F1/Anxiety** | **F2/Somatic Problems** | **F3/Withdrawal** | **F4/Depression** |
| F1/Anxiety | 1 |  |  |  |
| F2/Somatic Problems | 0.40 | 1 |  |  |
| F3/Withdrawal | 0.48 | 0.29 | 1 |  |
| F4/Depression | 0.50 | 0.32 | 0.44 | 1 |

*Notes.* Factor correlations for the 4-factor Spearman matrix EFA solution at Baseline (age 10) using the 32 symptom items from the internalising composite scale in the Child Behaviour Checklist (Achenbach, 2011).

**Table S3.** *Factor loadings for the four-factor ELA internalising model at Follow Up (T1)*

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | **F1/Anxiety** | **SF2/Somatic Problems** | **F3/Withdrawal** | **F4//Depression** |
| ***Primary loading items*** |  |  |  |  |
| There is very little they enjoy |  |  | 0.44 |  |
| Cries a lot |  |  |  | 0.34 |
| Fears certain animals, situations, or places, other than school | 0.44 |  |  |  |
| Fears they might think or do something bad | 0.31 |  |  | 0.30 |
| Feels he/she has to be perfect | 0.38 |  |  |  |
| Feels or complains that no one loves them |  |  |  | 0.59 |
| Feels worthless or inferior |  |  |  | 0.55 |
| Would rather be alone than with others |  |  | 0.57 |  |
| Nervous, highstrung, or tense | 0.61 |  |  |  |
| Too fearful or anxious | 0.72 |  |  |  |
| Feels dizzy or lightheaded |  | 0.30 |  |  |
| Feels too guilty | 0.35 |  |  |  |
| Overtired without good reason |  |  | 0.32 |  |
| Aches or pains, other |  | 0.37 |  |  |
| Headaches |  | 0.41 |  |  |
| Nausea, feels sick |  | 0.72 |  |  |
| Stomachaches |  | 0.69 |  |  |
| Vomiting, throwing up |  | 0.46 |  |  |
| Refuses to talk |  |  | 0.40 |  |
| Secretive, keeps things to self |  |  | 0.37 |  |
| Self-conscious or easily embarrassed | 0.41 |  |  |  |
| Talks about killing self |  |  |  | 0.39 |
| Underactive, slow moving, or lacks energy |  |  | 0.44 |  |
| Unhappy, sad, or depressed |  |  |  | 0.48 |
| Withdrawn, doesn't get involved with others |  |  | 0.61 |  |
| Worries | 0.63 | 0.04 |  |  |
| ***Cross-loading and no loading items*** |  |  |  |  |
| Too shy or timid | 0.31 |  | 0.37 |  |
| Problems with eyes, not corrected by glasses |  |  |  |  |
| Rashes or other skin problems |  |  |  |  |
| Fears going to school |  |  |  |  |
| Nightmares |  |  |  |  |
| Constipated, doesn't move bowels |  |  |  |  |

*Notes.* Factor loadings for the 4-factor Spearman matrix EFA solution at T1 (age 12) using the 32 symptom items from the internalising composite scale in the Child Behaviour Checklist (Achenbach, 2011).

**Table S4.** *Factor correlations for the four-factor internalising model at Follow Up (T1)*

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | **F1/Anxiety** | **F2/Somatic Problems** | **F3/Withdrawal** | **F4/Depression** |
| F1/Anxiety | 1 |  |  |  |
| F2/Somatic Problems | 0.39 | 1 |  |  |
| F3/Withdrawal | 0.45 | 0.29 | 1 |  |
| F4/Depression | 0.51 | 0.32 | 0.43 | 1 |

*Notes.* Factor correlations for the 4-factor Spearman matrix EFA solution at T1 (age 12) using the 32 symptom items from the internalising composite scale in the Child Behaviour Checklist (Achenbach, 2011).

**Figure S2.** *Four-factor confirmatory model of internalising symptoms at Follow Up (T1)*

**Diagram

Description automatically generated**

*Notes.*Confirmatoryfactor structure for the 25 symptom items that had factor loadings ≥ 0.3 in the exploratory factor analysis at T1. Factors - Anxt= Anxiety; Smtc= Somatic Problems; Wthdrwl= Withdrawal; Dprs= Depression. Observed variables - Fers = Fears; FrDB= FearsDoBad; Prfc = Perfect; Nrvs= Nervous; Frfl= Fearful; Glty = Guilty; SlfC = SelfConscious; Wrrs= Worries; Dzzy= Dizzy; Achs= Aches; Hdch= Headaches; Naus=Nausea; Stmc= Stomachaches; Vmts= Vomits; EnjL= EnjoysLittle; RtBA= RatherbeAlone; WntT= Won’tTalk; Scrt = Secretive; LckE= LacksEnergy; Withrwn= Withdrawn; Shy= Shy; Unlv = Unloved; Wrth = Worthless; ThnS = Thinks Suicide; Sad = Sad.

**Links between executive function and age 10 and internalising symptoms at age 10 and 12**

**Table S5.** *Correlations between executive function measures and factor scores*

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  |  | ***r*** | ***p*** |  |
| Withdrawal T0 | Anxiety T0 | 0.475 | <.001 | \*\*\* |
| Depression T0 | Anxiety T0 | 0.541 | <.001 | \*\*\* |
| Depression T0 | Withdrawal T0 | 0.494 | <.001 | \*\*\* |
| Somatic T0 | Anxiety T0 | 0.353 | <.001 | \*\*\* |
| Somatic T0 | Withdrawal T0 | 0.270 | <.001 | \*\*\* |
| Somatic T0 | Depression T0 | 0.277 | <.001 | \*\*\* |
| Inhibition | Anxiety T0 | -0.039 | 0.003 | \*\* |
| Inhibition | Withdrawal T0 | -0.028 | 0.030 | \* |
| Inhibition | Depression T0 | -0.044 | <.001 | \*\*\* |
| Inhibition | Somatic T0 | 0.007 | 0.578 |  |
| Working Memory | Anxiety T0 | -0.023 | 0.075 |  |
| Working Memory | Withdrawal T0 | -0.021 | 0.110 |  |
| Working Memory | Depression T0 | -0.036 | 0.006 | \*\* |
| Working Memory | Somatic T0 | -0.020 | 0.120 |  |
| Working Memory | Inhibition | 0.180 | <.001 | \*\*\* |
| Shifting | Anxiety T0 | -0.011 | 0.389 |  |
| Shifting | Withdrawal T0 | -0.046 | <.001 | \*\*\* |
| Shifting | Depression T0 | -0.031 | 0.018 | \* |
| Shifting | Somatic T0 | -0.005 | 0.678 |  |
| Shifting | Inhibition | 0.395 | <.001 | \*\*\* |
| Shifting | Working Memory | 0.218 | <.001 | \*\*\* |
| Externalising | Anxiety T0 | 0.458 | <.001 | \*\*\* |
| Externalising | Withdrawal T0 | 0.454 | <.001 | \*\*\* |
| Externalising | Depression T0 | 0.495 | <.001 | \*\*\* |
| Externalising | Somatic T0 | 0.296 | <.001 | \*\*\* |
| Externalising | Inhibition | -0.034 | 0.010 | \* |
| Externalising | Working Memory | -0.076 | <.001 | \*\*\* |
| Externalising | Shifting | -0.041 | 0.002 | \*\* |
| Anxiety T1 | Anxiety T0 | 0.626 | <.001 | \*\*\* |
| Anxiety T1 | Withdrawal T0 | 0.348 | <.001 | \*\*\* |
| Anxiety T1 | Depression T0 | 0.389 | <.001 | \*\*\* |
| Anxiety T1 | Somatic T0 | 0.263 | <.001 | \*\*\* |
| Anxiety T1 | Inhibition | -0.036 | 0.006 | \*\* |
| Anxiety T1 | Working Memory | -0.033 | 0.010 | \* |
| Anxiety T1 | Shifting | -0.002 | 0.854 |  |
| Anxiety T1 | Externalising | 0.313 | <.001 | \*\*\* |
| Somatic T1 | Anxiety T0 | 0.242 | <.001 | \*\*\* |
| Somatic T1 | Withdrawal T0 | 0.188 | <.001 | \*\*\* |
| Somatic T1 | Depression T0 | 0.215 | <.001 | \*\*\* |
| Somatic T1 | Somatic T0 | 0.472 | <.001 | \*\*\* |
| Somatic T1 | Inhibition | -0.008 | 0.536 |  |
| Somatic T1 | Working Memory | -0.028 | 0.029 | \* |
| Somatic T1 | Shifting | -0.013 | 0.337 |  |
| Somatic T1 | Externalising | 0.222 | <.001 | \*\*\* |
| Somatic T1 | Anxiety T1 | 0.368 | <.001 | \*\*\* |
| Withdrawal T1 | Anxiety T0 | 0.335 | <.001 | \*\*\* |
| Withdrawal T1 | Withdrawal T0 | 0.545 | <.001 | \*\*\* |
| Withdrawal T1 | Depression T0 | 0.332 | <.001 | \*\*\* |
| Withdrawal T1 | Somatic T0 | 0.179 | <.001 | \*\*\* |
| Withdrawal T1 | Inhibition | -0.029 | 0.027 | \* |
| Withdrawal T1 | Working Memory | -0.015 | 0.237 |  |
| Withdrawal T1 | Shifting | -0.022 | 0.099 |  |
| Withdrawal T1 | Externalising | 0.318 | <.001 | \*\*\* |
| Withdrawal T1 | Anxiety T1 | 0.502 | <.001 | \*\*\* |
| Withdrawal T1 | Somatic T1 | 0.271 | <.001 | \*\*\* |
| Depression T1 | Anxiety T0 | 0.369 | <.001 | \*\*\* |
| Depression T1 | Withdrawal T0 | 0.327 | <.001 | \*\*\* |
| Depression T1 | Depression T0 | 0.481 | <.001 | \*\*\* |
| Depression T1 | Somatic T0 | 0.207 | <.001 | \*\*\* |
| Depression T1 | Inhibition | -0.036 | 0.005 | \*\* |
| Depression T1 | Working Memory | -0.031 | 0.017 | \* |
| Depression T1 | Shifting | -0.015 | 0.243 |  |
| Depression T1 | Externalising | 0.363 | <.001 | \*\*\* |
| Depression T1 | Anxiety T1 | 0.543 | <.001 | \*\*\* |
| Depression T1 | Somatic T1 | 0.315 | <.001 | \*\*\* |
| Depression T1 | Withdrawal T1 | 0.529 | <.001 | \*\*\* |

*Notes*. Pearson correlations between executive function measures, internalising factor scores, and externalising symptoms without weights. All executive function measures taken at baseline. \**p* < .05 \*\**p*< .01 \*\*\**p* < .001.

**Table S6.** *Full regression results of the association between baseline executive function and internalising factors*

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
|  | **Baseline (T0)** | | |  | **Follow Up (T1)** | | |
|  | *b* | *t* | *p* |  | *b* | *t* | *p* |
| **Anxiety T0** |  |  |  | **Anxiety T1** |  |  |  |
| Inhibition | -0.064 | -4.250 | < .001 | Inhibition | -0.025 | -1.501 | 0.133 |
| Externalising | 0.801 | 70.380 | < .001 | Externalising | 0.409 | 28.663 | <.001 |
|  |  |  |  | Anxiety T0 | 0.659 | 60.026 | <.001 |
| **Withdrawal T0** |  |  |  | **Withdrawal T1** |  |  |  |
| Inhibition | -0.078 | -4.720 | < .001 | Inhibition | -0.088 | -4.578 | <.001 |
| Externalising | 0.945 | 77.570 | < .001 | Externalising | 0.637 | 38.094 | <.001 |
|  |  |  |  | Withdrawal T0 | 0.504 | 41.640 | <.001 |
| **Depression T0** |  |  |  | **Depression T1** |  |  |  |
| Inhibition | -0.080 | -5.274 | < .001 | Inhibition | -0.042 | -2.263 | 0.024 |
| Externalising | 1.081 | 99.058 | < .001 | Externalising | 0.836 | 52.717 | <.001 |
|  |  |  |  | Depression T0 | 0.343 | 29.005 | <.001 |
| **Somatic T0** |  |  |  | **Somatic T1** |  |  |  |
| Inhibition | 0.036 | 2.186 | 0.029 | Inhibition | -0.045 | -2.283 | 0.022 |
| Externalising | 0.646 | 49.068 | < .001 | Externalising | 0.426 | 25.122 | <.001 |
|  |  |  |  | Somatic T0 | 0.529 | 40.311 | <.001 |
| **Anxiety T0** |  |  |  | **Anxiety T1** |  |  |  |
| Working memory | 0.019 | 1.368 | 0.171 | Working memory | -0.043 | -2.654 | 0.008 |
| Externalising | 0.805 | 70.423 | < .001 | Externalising | 0.405 | 28.315 | <.001 |
|  |  |  |  | Anxiety T0 | 0.661 | 60.181 | <.001 |
| **Withdrawal T0** |  |  |  | **Withdrawal T1** |  |  |  |
| Working memory | 0.011 | 0.710 | 0.478 | Working memory | -0.042 | -2.301 | 0.021 |
| Externalising | 0.948 | 77.43 | < .001 | Externalising | 0.635 | 37.871 | <.001 |
|  |  |  |  | Withdrawal T0 | 0.506 | 41.776 | <.001 |
| **Depression T0** |  |  |  | **Depression T1** |  |  |  |
| Working memory | 0.003 | 0.194 | 0.846 | Working memory | -0.007 | -0.372 | 0.710 |
| Externalising | 1.084 | 98.883 | <.001 | Externalising | 0.837 | 52.730 | <.001 |
|  |  |  |  | Depression T0 | 0.343 | 28.979 | <.001 |
| **Somatic T0** |  |  |  | **Somatic T1** |  |  |  |
| Working memory | -0.010 | 0.640 | 0.522 | Working memory | 0.013 | 0.698 | 0.485 |
| Externalising | 0.646 | 48.76 | < .001 | Externalising | 0.429 | 25.069 | <.001 |
|  |  |  |  | Somatic T0 | 0.528 | 40.238 | <.001 |
| **Anxiety T0** |  |  |  | **Anxiety T1** |  |  |  |
| Shifting | -0.071 | -4.943 | < .001 | Shifting | 0.060 | 3.909 | <.001 |
| Externalising | 0.800 | 70.170 | < .001 | Externalising | 0.409 | 28.714 | <.001 |
|  |  |  |  | Anxiety T0 | 0.661 | 60.277 | <.001 |
| **Withdrawal T0** |  |  |  | **Withdrawal T1** |  |  |  |
| Shifting | -0.110 | -7.157 | < .001 | Shifting | -0.034 | -1.904 | 0.057 |
| Externalising | 0.941 | 77.195 | < .001 | Externalising | 0.637 | 38.004 | <.001 |
|  |  |  |  | Withdrawal T0 | 0.505 | 41.677 | <.001 |
| **Depression T0** |  |  |  | **Depression T1** |  |  |  |
| Shifting | -0.016 | -1.155 | 0.248 | Shifting | 0.028 | 1.624 | 0.104 |
| Externalising | 1.083 | 98.829 | <.001 | Externalising | 0.840 | 52.899 | <.001 |
|  |  |  |  | Depression T0 | 0.342 | 28.865 | <.001 |
| **Somatic T0** |  |  |  | **Somatic T1** |  |  |  |
| Shifting | -0.003 | -0.190 | 0.850 | Shifting | -0.039 | -2.072 | 0.038 |
| Externalising | 0.645 | 48.74 | <.001 | Externalising | 0.425 | 25.065 | <.001 |
|  |  |  |  | Somatic T0 | 0.529 | 40.292 | <.001 |

*Notes*. Reported values are the standardized slope (beta) after controlling for concurrent externalising problems. Longitudinal analyses controlled for baseline factor scores.

**Table S7.** *Regression results without controlling for baseline internalising symptoms*

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
|  | **Baseline (T0)** | | |  | **Follow Up (T1)** | | |
|  | *b* | *t* | *p* |  | *b* | *t* | *p* |
| **Anxiety T0** |  |  |  | **Anxiety T1** |  |  |  |
| Inhibition | -0.064 | -4.250 | < .001 | Inhibition | -0.060 | -2.842 | 0.005 |
| Externalising | 0.798 | 69.980 | <.001 | Externalising | 0.761 | 46.161 | <.001 |
| **Withdrawal T0** |  |  |  | **Withdrawal T1** |  |  |  |
| Inhibition | -0.078 | -4.820 | < .001 | Inhibition | -0.111 | -5.093 | < .001 |
| Externalising | 0.945 | 77.464 | <.001 | Externalising | 0.929 | 53.629 | <.001 |
| **Depression T0** |  |  |  | **Depression T1** |  |  |  |
| Inhibition | -0.080 | -5.274 | < .001 | Inhibition | -0.039 | -1.942 | 0.052 |
| Externalising | 1.086 | 99.011 | <.001 | Externalising | 1.067 | 72.191 | <.001 |
| **Somatic T0** |  |  |  | **Somatic T1** |  |  |  |
| Inhibition | 0.036 | 2.186 | 0.029 | Inhibition | -0.011 | -0.486 | 0.627 |
| Externalising | 0.649 | 49.269 | <.001 | Externalising | 0.659 | 35.522 | <.001 |
| **Anxiety T0** |  |  |  | **Anxiety T1** |  |  |  |
| Working memory | 0.019 | 1.368 | 0.171 | Working memory | -0.023 | -1.169 | 0.243 |
| Externalising | 0.802 | 70.021 | <.001 | Externalising | 0.760 | 45.893 | <.001 |
| **Withdrawal T0** |  |  |  | **Withdrawal T1** |  |  |  |
| Working memory | 0.011 | 0.710 | 0.478 | Working memory | -0.031 | -1.497 | 0.134 |
| Externalising | 0.948 | 77.322 | <.001 | Externalising | 0.928 | 53.450 | <.001 |
| **Depression T0** |  |  |  | **Depression T1** |  |  |  |
| Working memory | 0.003 | 0.194 | 0.846 | Working memory | -0.008 | -0.395 | 0.693 |
| Externalising | 1.089 | 98.806 | <.001 | Externalising | 1.068 | 72.120 | <.001 |
| **Somatic T0** |  |  |  | **Somatic T1** |  |  |  |
| Working memory | -0.010 | 0.640 | 0.522 | Working memory | 0.007 | 0.309 | 0.757 |
| Externalising | 0.649 | 48.791 | <.001 | Externalising | 0.650 | 35.237 | <.001 |
| **Anxiety T0** |  |  |  | **Anxiety T1** |  |  |  |
| Shifting | -0.074 | -5.110 | < .001 | Shifting | 0.033 | 1.666 | 0.090 |
| Externalising | 0.796 | 69.770 | <.001 | Externalising | 0.762 | 46.238 | <.001 |
| **Withdrawal T0** |  |  |  | **Withdrawal T1** |  |  |  |
| Shifting | -0.110 | -7.157 | < .001 | Shifting | -0.055 | -2.690 | 0.007 |
| Externalising | 0.941 | 77.089 | <.001 | Externalising | 0.929 | 53.538 | <.001 |
| **Depression T0** |  |  |  | **Depression T1** |  |  |  |
| Shifting | -0.016 | -1.155 | 0.248 | Shifting | 0.048 | 2.603 | 0.009 |
| Externalising | 1.088 | 98.762 | <.001 | Externalising | 1.071 | 72.506 | <.001 |
| **Somatic T0** |  |  |  | **Somatic T1** |  |  |  |
| Shifting | -0.003 | -0.190 | 0.850 | Shifting | -0.017 | -0.774 | 0.439 |
| Externalising | 0.648 | 48.95 | <.001 | Externalising | 0.648 | 35.455 | <.001 |

*Notes*. Reported values are the standardized slope (beta) after controlling for concurrent externalising problems. Longitudinal analyses uncontrolled for baseline factor scores.

**Table S8.** *Regression results without controlling for concurrent externalising symptoms*

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
|  | **Baseline (T0)** | | |  | **Follow Up (T1)** | | |
|  | *b* | *t* | *p* |  | *b* | *t* | *p* |
| **Anxiety T0** |  |  |  | **Anxiety T1** |  |  |  |
| Inhibition | -0.118 | -6.479 | <.001 | Inhibition | -0.027 | -1.520 | 0.129 |
|  |  |  |  | Anxiety T0 | 0.789 | 73.870 | <.001 |
| **Withdrawal T0** |  |  |  | **Withdrawal T1** |  |  |  |
| Inhibition | -0.128 | -6.307 | <.001 | Inhibition | -0.082 | -3.790 | <.001 |
|  |  |  |  | Withdrawal T0 | 0.692 | 56.150 | <.001 |
| **Depression T0** |  |  |  | **Depression T1** |  |  |  |
| Inhibition | -0.150 | -7.209 | <.001 | Inhibition | -0.101 | -4.461 | <.001 |
|  |  |  |  | Depression T0 | 0.651 | 52.067 | <.001 |
| **Somatic T0** |  |  |  | **Somatic T1** |  |  |  |
| Inhibition | 0.016 | 0.856 | 0.392 | Inhibition | -0.062 | -3.000 | 0.003 |
|  |  |  |  | Somatic T0 | 0.631 | 48.050 | <.001 |
| **Anxiety T0** |  |  |  | **Anxiety T1** |  |  |  |
| Working memory | -0.079 | -4.663 | <.001 | Working memory | -0.085 | -4.954 | <.001 |
|  |  |  |  | Anxiety T0 | 0.789 | 74.012 | <.001 |
| **Withdrawal T0** |  |  |  | **Withdrawal T1** |  |  |  |
| Working memory | -0.105 | -5.608 | <.001 | Working memory | -0.071 | -3.512 | <.001 |
|  |  |  |  | Withdrawal T0 | 0.693 | 56.270 | <.001 |
| **Depression T0** |  |  |  | **Depression T1** |  |  |  |
| Working memory | -0.129 | -6.517 | <.001 | Working memory | -0.081 | -3.740 | <.001 |
|  |  |  |  | Depression T0 | 0.650 | 51.980 | <.001 |
| **Somatic T0** |  |  |  | **Somatic T1** |  |  |  |
| Working memory | -0.077 | -4.571 | <.001 | Working memory | -0.050 | -2.576 | 0.010 |
|  |  |  |  | Somatic T0 | 0.628 | 47.761 | <.001 |
| **Anxiety T0** |  |  |  | **Anxiety T1** |  |  |  |
| Shifting | -0.144 | -8.306 | <.001 | Shifting | 0.059 | 3.568 | <.001 |
|  |  |  |  | Anxiety T0 | 0.791 | 74.139 | <.001 |
| **Withdrawal T0** |  |  |  | **Withdrawal T1** |  |  |  |
| Withdrawal T0 | -0.197 | -10.30 | <.001 | Shifting | -0.032 | -1.595 | 0.111 |
|  |  |  |  | Withdrawal T0 | 0.693 | 56.166 | <.001 |
| **Depression T0** |  |  |  | **Depression T1** |  |  |  |
| Shifting | -0.137 | -7.025 | <.001 | Shifting | -0.043 | -2.090 | 0.037 |
|  |  |  |  | Depression T0 | 0.652 | 52.150 | <.001 |
| **Somatic T0** |  |  |  | **Somatic T1** |  |  |  |
| Shifting | -0.084 | -4.717 | <.001 | Shifting | -0.065 | -3.264 | 0.001 |
|  |  |  |  | Somatic T0 | 0.630 | 48.021 | <.001 |

*Notes*. Regressions did not control for concurrent externalising symptoms. Longitudinal analyses controlled for baseline factor scores.

**Table S9.** *Unweighted**regression results*

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
|  | **Baseline (T0)** | | |  | **Follow Up (T1)** | | |
|  | *b* | *t* | *p* |  | *b* | *t* | *p* |
| **Anxiety T0** |  |  |  | **Anxiety T1** |  |  |  |
| Inhibition | -0.019 | -1.966 | 0.049 | Inhibition | -0.008 | -0.791 | 0.429 |
| Externalising | 0.434 | 50.027 | <.001 | Externalising | 0.245 | 23.019 | <.001 |
|  |  |  |  | Anxiety T0 | 0.549 | 52.831 | <.001 |
| **Withdrawal T0** |  |  |  | **Withdrawal T1** |  |  |  |
| Inhibition | -0.022 | -2.374 | 0.018 | Inhibition | -0.009 | -0.776 | 0.438 |
| Externalising | 0.435 | 52.226 | <.001 | Externalising | 0.311 | 27.909 | <.001 |
|  |  |  |  | Withdrawal T0 | 0.456 | 41.098 | <.001 |
| **Depression T0** |  |  |  | **Depression T1** |  |  |  |
| Inhibition | -0.030 | -3.246 | 0.001 | Inhibition | -0.012 | -1.090 | 0.276 |
| Externalising | 0.474 | 58.314 | <.001 | Externalising | 0.389 | 33.520 | <.001 |
|  |  |  |  | Depression T0 | 0.331 | 29.840 | <.001 |
| **Somatic T0** |  |  |  | **Somatic T1** |  |  |  |
| Inhibition | 0.015 | 1.492 | 0.136 | Inhibition | -0.006 | -0.512 | 0.609 |
| Externalising | 0.293 | 32.939 | <.001 | Externalising | 0.207 | 17.528 | <.001 |
|  |  |  |  | Somatic T0 | 0.424 | 37.164 | <.001 |
| **Anxiety T0** |  |  |  | **Anxiety T1** |  |  |  |
| Working memory | 0.018 | 2.033 | 0.042 | Working memory | -0.005 | -0.346 | 0.729 |
| Externalising | 0.436 | 52.125 | <.001 | Externalising | 0.245 | 22.953 | <.001 |
|  |  |  |  | Anxiety T0 | 0.549 | 52.882 | <.001 |
| **Withdrawal T0** |  |  |  | **Withdrawal T1** |  |  |  |
| Working memory | 0.006 | 0.642 | 0.521 | Working memory | 0.016 | 1.556 | 0.120 |
| Externalising | 0.436 | 52.21 | <.001 | Externalising | 0.313 | 27.974 | <.001 |
|  |  |  |  | Withdrawal T0 | 0.456 | 41.124 | <.001 |
| **Depression T0** |  |  |  | **Depression T1** |  |  |  |
| Working memory | 0.005 | 0.570 | 0.569 | Working memory | 0.009 | 0.824 | 0.410 |
| Externalising | 0.475 | 58.29 | <.001 | Externalising | 0.390 | 33.516 | <.001 |
|  |  |  |  | Depression T0 | 0.331 | 29.901 | <.001 |
| **Somatic T0** |  |  |  | **Somatic T1** |  |  |  |
| Working memory | 0.009 | 0.956 | 0.339 | Working memory | -0.005 | -0.452 | 0.652 |
| Externalising | 0.293 | 32.871 | <.001 | Externalising | 0.207 | 17.476 | <.001 |
|  |  |  |  | Somatic T0 | 0.423 | 37.158 | <.001 |
| **Anxiety T0** |  |  |  | **Anxiety T1** |  |  |  |
| Shifting | 0.005 | 0.557 | 0.577 | Shifting | 0.014 | 1.459 | 0.145 |
| Externalising | 0.425 | 52.046 | <.001 | Externalising | 0.245 | 23.077 | <.001 |
|  |  |  |  | Anxiety T0 | 0.549 | 52.885 | <.001 |
| **Withdrawal T0** |  |  |  | **Withdrawal T1** |  |  |  |
| Withdrawal T0 | -0.024 | -2.701 | 0.007 | Shifting | 0.012 | 1.182 | 0.237 |
| Shifting | 0.434 | 52.055 | <.001 | Externalising | 0.312 | 27.954 | <.001 |
|  |  |  |  | Withdrawal T0 | 0.456 | 41.142 | <.001 |
| **Depression T0** |  |  |  | **Depression T1** |  |  |  |
| Shifting | -0.009 | -1.057 | 0.291 | Shifting | 0.012 | 1.131 | 0.258 |
| Externalising | 0.473 | 58.245 | <.001 | Externalising | 0.389 | 33.553 | <.001 |
|  |  |  |  | Depression T0 | 0.331 | 29.911 | <.001 |
| **Somatic T0** |  |  |  | **Somatic T1** |  |  |  |
| Shifting | 0.008 | 0.827 | 0.409 | Shifting | -0.001 | -0.121 | 0.903 |
| Externalising | 0.292 | 32.885 | <.001 | Externalising | 0.207 | 17.528 | <.001 |
|  |  |  |  | Somatic T0 | 0.424 | 37.160 | <.001 |

*Notes*. No weights were applied to internalising factor scores. Reported values are the standardized slope (beta) after controlling for concurrent externalising problems. Longitudinal analyses controlled for baseline factor scores. Most significant associations are washed out when weights are not used as very few children experience elevated levels of internalising symptoms in our sample, with most children falling within the low range, making it difficult to detect significant effects of interest.

**Table S10.** *Regression results with age as a covariate*

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
|  | **Baseline (T0)** | | |  | **Follow Up (T1)** | | |
|  | *b* | *t* | *p* |  | *b* | *t* | *p* |
| **Anxiety T0** |  |  |  | **Anxiety T1** |  |  |  |
| Inhibition | -0.651 | -4.297 | <.001 | Inhibition | -0.026 | -1.549 | 0.122 |
| Externalising | 0.798 | 69.973 | <.001 | Externalising | 0.410 | 28.793 | <.001 |
| Age | 0.022 | 1.218 | 0.223 | Age | 0.039 | 2.012 | 0.004 |
|  |  |  |  | Anxiety T0 | 0.666 | 60.491 | <.001 |
| **Withdrawal T0** |  |  |  | **Withdrawal T1** |  |  |  |
| Inhibition | -0.079 | -4.834 | <.001 | Inhibition | -0.088 | -4.642 | <.001 |
| Externalising | 0.944 | 77.443 | <.001 | Externalising | 0.636 | 38.381 | <.001 |
| Age | 0.049 | 2.486 | 0.012 | Age | 0.181 | 9.134 | <.001 |
|  |  |  |  | Withdrawal T0 | 0.508 | 42.052 | <.001 |
| **Depression T0** |  |  |  | **Depression T1** |  |  |  |
| Inhibition | -0.087 | -5.745 | <.001 | Inhibition | -0.049 | -2.622 | 0.009 |
| Externalising | 1.086 | 99.093 | <.001 | Externalising | 0.832 | 52.840 | <.001 |
| Age | 0.092 | 4.965 | <.001 | Age | 0.139 | 6.429 | <.001 |
|  |  |  |  | Depression T0 | 0.349 | 29.404 | <.001 |
| **Somatic T0** |  |  |  | **Somatic T1** |  |  |  |
| Inhibition | 0.035 | 2.113 | 0.035 | Inhibition | -0.045 | -2.284 | 0.022 |
| Externalising | 0.651 | 49.431 | <.001 | Externalising | 0.427 | 25.151 | <.001 |
| Age | 0.01 | 4.954 | <.001 | Age | 0.022 | 0.960 | 0.337 |
|  |  |  |  | Somatic T0 | 0.539 | 40.833 | <.001 |
| **Anxiety T0** |  |  |  | **Anxiety T1** |  |  |  |
| Working memory | 0.018 | 1.270 | 0.204 | Working memory | -0.042 | -2.610 | 0.009 |
| Externalising | 0.802 | 1.270 | 0.204 | Externalising | 0.407 | 28.460 | <.001 |
| Age | 0.017 | 0.952 | 0.341 | Age | 0.039 | 2.010 | 0.045 |
|  |  |  |  | Anxiety T0 | 0.667 | 60.650 | <.001 |
| **Withdrawal T0** |  |  |  | **Withdrawal T1** |  |  |  |
| Working memory | 0.008 | 0.515 | 0.607 | Working memory | -0.040 | -2.265 | 0.024 |
| Externalising | 0.947 | 77.271 | <.001 | Externalising | 0.634 | 38.158 | <.001 |
| Age | 0.048 | 2.40 | 0.016 | Age | 0.179 | 8.064 | <.001 |
|  |  |  |  | Withdrawal T0 | 0.510 | 42.189 | <.001 |
| **Depression T0** |  |  |  | **Depression T1** |  |  |  |
| Working memory | -0.003 | -0.207 | 0.836 | Working memory | -0.010 | -0.564 | 0.574 |
| Externalising | 1.089 | 98.862 | <.001 | Externalising | 0.834 | 52.843 | <.001 |
| Age | 0.085 | 4.564 | <.001 | Age | 0.136 | 6.313 | <.001 |
|  |  |  |  | Depression T0 | 0.349 | 29.379 | <.001 |
| **Somatic T0** |  |  |  | **Somatic T1** |  |  |  |
| Working memory | 0.007 | 0.483 | 0.629 | Working memory | 0.012 | 0.659 | 0.510 |
| Externalising | 0.651 | 49.118 | <.001 | Externalising | 0.429 | 25.101 | <.001 |
| Age | 0.10 | 4.977 | <.001 | Age | 0.020 | 0.872 | 0.383 |
|  |  |  |  | Somatic T0 | 0.538 | 40.761 | <.001 |
| **Anxiety T0** |  |  |  | **Anxiety T1** |  |  |  |
| Shifting | -0.075 | -5.177 | <.001 | Shifting | 0.057 | 3.701 | <.001 |
| Externalising | 0.796 | 69.757 | <.001 | Externalising | 0.410 | 28.830 | <.001 |
| Age | 0.024 | 1.341 | 0.180 | Age | 0.032 | 1.641 | 0.101 |
|  |  |  |  | Anxiety T0 | 0.660 | 60.730 | <.001 |
| **Withdrawal T0** |  |  |  | **Withdrawal T1** |  |  |  |
| Shifting | -0.112 | -7.344 | <.001 | Shifting | -0.042 | -2.373 | 0.018 |
| Externalising | 0.94 | 77.058 | <.001 | Externalising | 0.635 | 38.30 | <.001 |
| Age | 0.055 | 2.770 | 0.006 | Age | 0.183 | 8.183 | <.001 |
|  |  |  |  | Withdrawal T0 | 0.509 | 42.078 | <.001 |
| **Depression T0** |  |  |  | **Depression T1** |  |  |  |
| Shifting | -0.021 | -0.014 | 0.140 | Shifting | -0.017 | 0.996 | 0.320 |
| Externalising | 1.088 | 98.821 | <.001 | Externalising | 0.836 | 52.974 | <.001 |
| Age | 0.086 | 4.642 | <.001 | Age | 0.134 | 6.174 | <.001 |
|  |  |  |  | Depression T0 | 0.348 | 29.301 | <.001 |
| **Somatic T0** |  |  |  | **Somatic T1** |  |  |  |
| Shifting | -0.007 | -0.420 | 0.674 | Shifting | -0.041 | -2.167 | 0.030 |
| Externalising | 0.649 | 49.094 | <.001 | Externalising | 0.426 | 15.088 | <.001 |
| Age | 0.101 | 5.012 | <.001 | Age | 0.025 | 1.084 | 0.279 |
|  |  |  |  | Somatic T0 | 0.538 | 40.815 | <.001 |

*Notes*. Reported values are the standardized slope (beta) after controlling for concurrent externalising problems and age in months. Longitudinal analyses controlled for baseline factor scores.

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