**SUPPLEMENTARY MATERIALS**

**Table S1: Summary of Multi-level Self Predictors of NSSI**

|  |  |  |
| --- | --- | --- |
| ***Level of Analysis*** | | ***Measure*** |
| **Self-Report** | | Self Perception Profile for Adolescents - Global Self Worth |
| **Behavior**  (Variables selected after stepwise model testing) | Self Evaluations - Frequency | Negative |
| Self Evaluations - Reaction Time | Negative |
| Positive |
| **Brain - Self Network**  (Defined using regions of interest from the Glasser atlas) | Self Versus Change fMRI Task -- Negative > Positive Valence | Anterior node |
| Posterior node |
| Self Versus Change fMRI Task -- Self > Change | Anterior node |
| Posterior node |
| Resting State Functional Connectivity | Anterior node |
| Posterior node |
| Cortical Thickness | Anterior node |
| Posterior node |

*Participants*

One hundred and sixty-eight adolescents completed consent and at least some of the study procedures. After excluding four participants who did not meet inclusion criteria, we enrolled 164 adolescents in the longitudinal study. Of these, 6 withdrew, and 17 were lost to follow-up. The SITBI was completed with 162 participants. Neuroimaging was completed on 130 participants at Time 1. See Figure 2 in the main manuscript for more details about usable Self variables.

*Neuroimaging Acquisition*

Neuroimaging was conducted using a Siemens 3 Tesla Prisma scanner (Erlangen, Germany) and a 32-channel receive only head coil, using the Human Connectome Project (HCP) [(48)](https://paperpile.com/c/UGOgfT/oXuIN) multi-band sequences to collect high spatial and temporal resolution fMRI data. Structural scans were acquired using an eight-minute T1-weighted, multi-echo MP-RAGE (Magnetization-Prepared RApid Gradient-Echo) sequence with the following parameters: Repetition time (TR) = 2500 ms, echo times (TE) = 1.81/3.60/5.39/7.18 ms, inversion time (TI) = 1000 ms; 0.8 mm isotropic voxels, field of view (FOV) = 256, flip angle = 8 degrees and a six-minute T2-weighted SPACE (Sampling Perfection with Application optimized Contrasts using different flip angle Evolution) sequence: TR = 3200 ms, TE = 564 ms, 0.8 mm isotropic voxel, FOV = 256, variable flip angle. Two HCP spin echo EPI field map scans (AP and PA phase encode, 1 minute total) were acquired with voxel parameters matching those of the fMRI task acquisition and were used to correct the fMRI data for the geometric distortion caused by magnetic field inhomogeneity. Next, a series of functional fMRI scans were obtained consisting of whole brain T2\*-weighted functional volumes with 2 mm isotropic voxel resolution, with the following task fMRI parameters: TR = 800ms, TE = 37 ms, flip angle = 52°, FOV = 212 mm, 2 mm isotropic voxel, Multiband factor = 8. All functional data is acquired using the HCP multiband echo planar imaging sequence. The first of these consisted of a 12-minute (912 volume) resting-state scan during which participants were instructed to stay awake, keep their eyes open focused on a fixation cross, and to “not think about anything in particular.” Participants then completed three fMRI tasks: (1) an emotion-face matching task [(49)](https://paperpile.com/c/UGOgfT/yPo1), (2) an emotion GoNoGo task [(50)](https://paperpile.com/c/UGOgfT/rL7U), and (3) a self-evaluation task [(51)](https://paperpile.com/c/UGOgfT/dFYt) (described below; the only fMRI task addressed here). We also collected two diffusion imaging sequences (not examined here). Total scanning time per session was approximately 1.5 hours.

*Neuroimaging Preprocessing Steps*

HCP pipeline includes three parts for the structural and four parts for the functional pipeline. The structural pipeline includes: *(1) PreFreeSurfer* (undistorted structural volume spaces are produced, T1 and T2 weighted images are aligned, a bias field correction and a gradient distortion correction to correct for gradient inhomogeneities within anatomical scans are applied, and each participant’s native structural volume space is registered to MNI space), *(2) FreeSurfer* (the volume is segmented into predefined structures, including the subcortical parcels, white and pial cortical surfaces are reconstructed, and a folding-based surface registration to surface atlas is performed), and *(3) PostFreeSurfer* (volumetric and surface based images are produced, surface registration is applied, registered surfaces are downsampled, the final brain mask and myelin maps are created). The functional data preprocessing pipeline includes: *(1) fMRIVolume.* Gradient distortions within EPI images are corrected, spatial distortions are removed, volumes are realigned to compensate for subject motion, the fMRI data is registered to the structural data, the bias field is reduced, the 4D image is normalized to a global mean, and the data is masked with the final brain mask). (2) *fMRISurface.* Timeseries are brought from the volume into CIFTI space, the data are smoothed with surface-smoothing of 2mm FWHM to regularize the mapping process). (3) *ICAFIX*. Time series are linearly detrended with a high band pass filter cutoff of 2000s and a slow roll off, time series are concatenated across scans but within run and sent through independent component analysis (ICA). The FSL tool “FIX” uses the spatial independent components to classify components as “signal” or “noise”. The resulting components are then cleaned in two separate steps. First, the components are cleaned in a “non-aggressive” manner by regressing both the good and bad component time series into the data, and then the resulting bad spatial maps are multiplied by the associated time series and subtracted from the original dataset. Second, 24 head motion confounds were calculated and used as regressors to clean up all components. Third, 24 confound time series derived from the motion estimation (the 6 rigid-body parameter time series, their backwards-looking temporal derivatives, plus all 12 resulting regressors squared) are used (Satterthwaite et al., 2013). The motion parameters are then regressed out of the data aggressively, as they are not expected to contain variance of interest (Griffanti et al., 2014; Salimi-Khorshidi et al., 2014; Smith et al., 2013). *(4)* *MSMAll*. Participant data is applied for functional alignment to a group template that is based on myelin maps, resting state fMRI network and visuotopic maps (Robinson et al., 2014).

Once *ICAFIX* and *MSMAll* were complete, the concatenated time series were dissociated into their respective scans and used for subsequent analyses. Following *ICAFIX* denoising and *MSMAll* alignment, CIFTI space fMRI data (both resting-state and task) was parcellated into non-overlapping ROIs using a combination of the Glasser (Glasser et al., 2016) and Harvard-Oxford (Makris et al., 2006) atlases for the cortical and subcortical ROIs, respectively.

*Addressing subject motion.* Head motion during scanning was calculated using framewise displacement. Following the methods similar to Power et al [(51)](https://paperpile.com/c/UGOgfT/YPqCM), volumes with framewise displacement greater than 0.5 mm and/or a DVARS (an index of the rate of change of brain signal intensity at each volume; D = temporal derivative of time series; VARS = root mean squared variance over voxels) above a threshold set for this acquisition, together with the volume before and the two volumes after, were flagged as having excess motion. Volume censoring was not applied to the analysis but scans with greater than 25% flagged volumes were excluded from analysis.

**Supplementary Figure S1**

Defining the Self Network

A diagram of a structure

Description automatically generated

**Anterior node Self network Glasser regions:**

ACC/mPFC (Glasser Cluster 19) 33pr, p24pr, a24pr, p24, a24, p32pr, a32pr, d32, p32, s32, 8BM, 9m, 10v, 10r, 25, and OFC

**Posterior node Self network Glasser regions:**

Posterior Cingulate (Glasser Cluster 18) RSC, v23ab, d23ab, 31pv, 31pd, 31a, 23d, 23c, PCV, and 7m

**Supplementary Table S2: Individual Relationships between Multi-Level Self measures and Lifetime NSSI Episodes with Data Imputation**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
|  | **Lifetime NSSI Episodes** | | | | |
| *Predictors* | *Estimates* | *CI* | *p* | R2 / R2 adjusted | |  |
| (Intercept) | 2.21 | 1.83 – 2.59 | **<0.001** | | 0.233 / 0.228 |  |
| SPP-A Global Self Worth | -0.51 | -0.65 – -0.36 | **<0.001\*** | |  |  |
| (Intercept) | 0.19 | -0.07 – 0.45 | 0.156 | | 0.189 / 0.184 |  |
| Negative Self Evaluations - Frequency | 2.57 | 1.74 – 3.39 | **<0.001\*** | |  |  |
| (Intercept) | 2.30 | 1.52 – 3.07 | **<0.001** | | 0.072 / 0.067 |  |
| Negative Self Evaluations - Reaction Time | -1.25 | -1.95 – -0.56 | **<0.001\*** | |  |  |
| (Intercept) | 0.74 | -1.47 – 2.94 | 0.510 | | 0.000 / -0.006 |  |
| Positive Self Evaluations - Reaction Time | 0.19 | -2.05 – 2.43 | 0.867 | |  |  |
| (Intercept) | 0.92 | 0.79 – 1.06 | **<0.001** | | 0.000 / -0.006 |  |
| Anterior Self Network SVC Task Negative > Positive Valence Activation | -0.01 | -0.24 – 0.22 | 0.932 | |  |  |
| (Intercept) | 0.90 | 0.78 – 1.03 | **<0.001** | | 0.025 / 0.019 |  |
| Posterior Self Network SVC Task Negative > Positive Valence Activation | 0.17 | 0.00 – 0.34 | **0.044** | |  |  |
| (Intercept) | 1.11 | 0.92 – 1.30 | **<0.001** | | 0.039 / 0.033 |  |
| Anterior Self Network SVC Task Self > Change Activation | -0.23 | -0.40 – -0.05 | **0.011\*** | |  |  |
| (Intercept) | 1.01 | 0.83 – 1.19 | **<0.001** | | 0.012 / 0.006 |  |
| Posterior Self Network SVC Task Self > Change Activation | -0.11 | -0.26 – 0.05 | 0.167 | |  |  |
| (Intercept) | 1.27 | 0.93 – 1.60 | **<0.001** | | 0.029 / 0.023 |  |
| Anterior Self Network RSFC | -1.68 | -3.21 – -0.16 | **0.031\*** | |  |  |
| (Intercept) | 1.85 | 1.23 – 2.46 | **<0.001** | | 0.054 / 0.048 |  |
| Posterior Self Network RSFC | -2.10 | -3.47 – -0.73 | **0.003\*** | |  |  |
| (Intercept) | 3.90 | 0.83 – 6.97 | **0.013** | | 0.022 / 0.016 |  |
| Anterior Self Network Cortical Thickness | -0.92 | -1.87 – 0.03 | 0.057 | |  |  |
| (Intercept) | 3.88 | 0.39 – 7.37 | **0.030** | | 0.017 / 0.011 |  |
| Posterior Self Network Cortical Thickness | -0.96 | -2.09 – 0.17 | 0.096 | |  |  |

Results from individual regression analyses with multi-level Self variables as predictors and NSSI Lifetime Episodes (log transformed) as the outcome using imputed data (N=164). CI=confidence interval; SPP-A= Self Perception Profile for Adolescents, Global Self Worth; SVC=Self Versus Change; RSFC= resting-state functional connectivity; NSSI=non-suicidal self-injury.

\*Corrected p value still <0.05 after FDR correction for individual regressions

**Supplementary Table S3: Individual Relationships between Multi-Level Self measures and Lifetime NSSI Episodes with Covariates with Data Imputation**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
|  | **Lifetime NSSI Episodes** | | | | |
| *Predictors* | *Estimates* | *CI* | *p* | R2 / R2 adjusted | |  |
| (Intercept) | -0.49 | -1.98 – 0.99 | 0.511 | | 0.417 / 0.399 |  |
| Age | 0.10 | 0.02 – 0.19 | **0.019** | |  |  |
| CTQ Total | -0.00 | -0.01 – 0.01 | 0.916 | |  |  |
| BDI Total | 0.02 | 0.00 – 0.03 | **0.009** | |  |  |
| Medication Status | 0.49 | 0.27 – 0.72 | **<0.001** | |  |  |
| SPP-A Global Self Worth | -0.21 | -0.39 – -0.04 | **0.019\*** | |  |  |
| (Intercept) | -1.47 | -2.80 – -0.14 | **0.031** | | 0.410 / 0.391 |  |
| Age | 0.11 | 0.02 – 0.19 | **0.013** | |  |  |
| CTQ Total | 0.00 | -0.01 – 0.01 | 0.956 | |  |  |
| BDI Total | 0.02 | 0.01 – 0.03 | **0.001** | |  |  |
| Medication Status | 0.48 | 0.25 – 0.70 | **<0.001** | |  |  |
| Negative Self Evaluations - Frequency | 0.89 | -0.05 – 1.83 | 0.063 | |  |  |
| (Intercept) | -1.03 | -2.50 – 0.44 | 0.169 | | 0.400 / 0.381 |  |
| Age | 0.11 | 0.02 – 0.19 | **0.015** | |  |  |
| CTQ Total | 0.00 | -0.01 – 0.01 | 0.628 | |  |  |
| BDI Total | 0.02 | 0.01 – 0.03 | **<0.001** | |  |  |
| Medication Status | 0.48 | 0.25 – 0.71 | **<0.001** | |  |  |
| Negative Self Evaluations - Reaction Time | -0.29 | -0.91 – 0.34 | 0.368 | |  |  |
| (Intercept) | -0.22 | -2.65 – 2.21 | 0.860 | | 0.401 / 0.382 |  |
| Age | 0.09 | 0.00 – 0.18 | **0.039** | |  |  |
| CTQ Total | 0.00 | -0.01 – 0.01 | 0.463 | |  |  |
| BDI Total | 0.03 | 0.01 – 0.04 | **<0.001** | |  |  |
| Medication Status | 0.51 | 0.28 – 0.74 | **<0.001** | |  |  |
| Positive Self Evaluations - Reaction Time | -0.99 | -2.83 – 0.85 | 0.289 | |  |  |
| (Intercept) | -1.31 | -2.65 – 0.03 | 0.056 | | 0.397 / 0.378 |  |
| Age | 0.10 | 0.02 – 0.19 | **0.020** | |  |  |
| CTQ Total | 0.00 | -0.01 – 0.01 | 0.538 | |  |  |
| BDI Total | 0.03 | 0.01 – 0.04 | **<0.001** | |  |  |
| Medication Status | 0.50 | 0.27 – 0.73 | **<0.001** | |  |  |
| Anterior Self Network SVC Task Negative > Positive Valence Activation | -0.00 | -0.19 – 0.18 | 0.986 | |  |  |
| (Intercept) | -1.36 | -2.69 – -0.02 | **0.046** | | 0.402 / 0.383 |  |
| Age | 0.11 | 0.02 – 0.19 | **0.015** | |  |  |
| CTQ Total | 0.00 | -0.01 – 0.01 | 0.562 | |  |  |
| BDI Total | 0.02 | 0.01 – 0.04 | **<0.001** | |  |  |
| Medication Status | 0.49 | 0.26 – 0.72 | **<0.001** | |  |  |
| Posterior Self Network SVC Task Negative > Positive Valence Activation | 0.08 | -0.05 – 0.21 | 0.235 | |  |  |
| (Intercept) | -1.31 | -2.62 – 0.01 | 0.051 | | 0.419 / 0.400 |  |
| Age | 0.12 | 0.03 – 0.20 | **0.007** | |  |  |
| CTQ Total | 0.00 | -0.01 – 0.01 | 0.739 | |  |  |
| BDI Total | 0.02 | 0.01 – 0.03 | **<0.001** | |  |  |
| Medication Status | 0.49 | 0.27 – 0.71 | **<0.001** | |  |  |
| Anterior Self Network SVC Task Self > Change Activation | -0.17 | -0.31 – -0.03 | **0.016** | |  |  |
| (Intercept) | -1.27 | -2.60 – 0.05 | 0.060 | | 0.406 / 0.387 |  |
| Age | 0.11 | 0.02 – 0.19 | **0.014** | |  |  |
| CTQ Total | 0.00 | -0.01 – 0.01 | 0.637 | |  |  |
| BDI Total | 0.03 | 0.01 – 0.04 | **<0.001** | |  |  |
| Medication Status | 0.49 | 0.26 – 0.72 | **<0.001** | |  |  |
| Posterior Self Network SVC Task Self > Change Activation | -0.10 | -0.22 – 0.02 | 0.116 | |  |  |
| (Intercept) | -1.21 | -2.71 – 0.28 | 0.112 | | 0.397 / 0.378 |  |
| Age | 0.10 | 0.01 – 0.19 | **0.030** | |  |  |
| CTQ Total | 0.00 | -0.01 – 0.01 | 0.556 | |  |  |
| BDI Total | 0.03 | 0.01 – 0.04 | **<0.001** | |  |  |
| Medication Status | 0.49 | 0.26 – 0.72 | **<0.001** | |  |  |
| Anterior Self Network RSFC | -0.19 | -1.49 – 1.11 | 0.771 | |  |  |
| (Intercept) | -0.71 | -2.26 – 0.84 | 0.368 | | 0.405 / 0.386 |  |
| Age | 0.09 | 0.00 – 0.18 | **0.045** | |  |  |
| CTQ Total | 0.00 | -0.01 – 0.01 | 0.551 | |  |  |
| BDI Total | 0.03 | 0.01 – 0.04 | **<0.001** | |  |  |
| Medication Status | 0.47 | 0.24 – 0.70 | **<0.001** | |  |  |
| Posterior Self Network RSFC | -0.86 | -2.02 – 0.29 | 0.141 | |  |  |
| (Intercept) | 1.20 | -1.91 – 4.30 | 0.447 | | 0.408 / 0.390 |  |
| Age | 0.09 | -0.00 – 0.17 | 0.054 | |  |  |
| CTQ Total | 0.00 | -0.01 – 0.01 | 0.683 | |  |  |
| BDI Total | 0.03 | 0.02 – 0.04 | **<0.001** | |  |  |
| Medication Status | 0.50 | 0.27 – 0.72 | **<0.001** | |  |  |
| Anterior Self Network Cortical Thickness | -0.69 | -1.46 – 0.08 | 0.080 | |  |  |
| (Intercept) | 0.09 | -3.63 – 3.81 | 0.963 | | 0.399 / 0.380 |  |
| Age | 0.09 | -0.00 – 0.18 | 0.058 | |  |  |
| CTQ Total | 0.00 | -0.01 – 0.01 | 0.516 | |  |  |
| BDI Total | 0.02 | 0.01 – 0.04 | **<0.001** | |  |  |
| Medication Status | 0.50 | 0.28 – 0.73 | **<0.001** | |  |  |
| Posterior Self Network Cortical Thickness | -0.39 | -1.36 – 0.58 | 0.428 | |  |  |

Results from individual regression analyses with multi-level Self variables as predictors and NSSI Lifetime Episodes (log transformed) as the outcome using imputed data (N=164) with age, BDI-II, CTQ scores, and medication status as covariates. CI=confidence interval; SPP-A= Self Perception Profile for Adolescents, Global Self Worth; SVC=Self Versus Change; RSFC= resting-state functional connectivity; BDI=Beck Depression Inventory; CTQ=Child Trauma Questionnaire; NSSI=non-suicidal self-injury.

\*Corrected p value still <0.05 after FDR correction for individual regressions

**Supplementary Table S4: Relationships between Multi-Level Self measures and Lifetime NSSI Episodes with Data Imputation**

|  |  |  |  |
| --- | --- | --- | --- |
|  | **Lifetime NSSI Episodes** | | |
| *Predictors* | *Estimates* | *CI* | *p* |
| (Intercept) | 5.52 | 3.40 – 7.64 | **<0.001** |
| Posterior Self Network SVC Task Self > Change Activation | -0.12 | -0.25 – 0.01 | 0.077 |
| Anterior Self Network SVC Task Negative > Positive Valence Activation | -0.21 | -0.46 – 0.05 | 0.120 |
| Posterior Self Network SVC Task Negative > Positive Valence Activation | 0.17 | -0.02 – 0.36 | 0.072 |
| Negative Self Evaluations - Frequency | 1.72 | 0.55 – 2.89 | **0.004** |
| Positive Self Evaluations - Reaction Time | -3.47 | -5.54 – -1.40 | **0.001** |
| Posterior Self Network RSFC | -1.74 | -2.91 – -0.57 | **0.004** |
| SPP-A Global Self Worth | -0.31 | -0.51 – -0.12 | **0.002** |
| Observations | 164 | | |
| R2 / R2 adjusted | 0.350 / 0.321 | | |

*Note.* Results from multiple regression analysis with multi-level Self variables as predictors and NSSI Lifetime Episodes (log transformed) as the outcome using imputed data (N=164). CI=confidence interval; SPP-A= Self Perception Profile for Adolescents, Global Self Worth; SVC=Self Versus Change; RSFC= resting-state functional connectivity; NSSI=non-suicidal self-injury.

**Supplementary Table S5: Relationships between Multi-Level Self measures and Lifetime NSSI Episodes with Covariates with Data Imputation**

|  |  |  |  |
| --- | --- | --- | --- |
|  | **Lifetime NSSI Episodes** | | |
| *Predictors* | *Estimates* | *CI* | *p* |
| (Intercept) | 2.69 | -0.08 – 5.46 | 0.057 |
| Age | 0.07 | -0.01 – 0.16 | 0.092 |
| CTQ Total | -0.00 | -0.01 – 0.01 | 0.661 |
| BDI Total | 0.01 | 0.00 – 0.03 | **0.024** |
| Medication Status | 0.44 | 0.22 – 0.66 | **<0.001** |
| Posterior Self Network SVC Task Self > Change Activation | -0.12 | -0.24 – 0.00 | 0.057 |
| Anterior Self Network SVC Task Negative > Positive Valence Activation | -0.15 | -0.39 – 0.09 | 0.221 |
| Posterior Self Network SVC Task Negative > Positive Valence Activation | 0.14 | -0.03 – 0.31 | 0.115 |
| Negative Self Evaluations - Frequency | 0.94 | -0.19 – 2.07 | 0.103 |
| Positive Self Evaluations - Reaction Time | -2.57 | -4.54 – -0.61 | **0.011** |
| Posterior Self Network RSFC | -0.93 | -2.06 – 0.19 | 0.102 |
| SPP-A Global Self Worth | -0.17 | -0.37 – 0.03 | 0.103 |
| Observations | 164 | | |
| R2 / R2 adjusted | 0.467 / 0.429 | | |

*Note.* Results from multiple regression analysis with multi-level Self variables as predictors and NSSI Lifetime Episodes (log transformed) as the outcome using imputed data (N=164) with age, BDI-II, CTQ scores, and medication status as covariates. CI=confidence interval; SPP-A= Self Perception Profile for Adolescents, Global Self Worth; SVC=Self Versus Change; RSFC= resting-state functional connectivity; BDI=Beck Depression Inventory; CTQ=Child Trauma Questionnaire; NSSI=non-suicidal self-injury.

**Results without Data Imputation**

Results showed similar patterns in analyses with and without data imputation.

***Integrative analyses: Correlations across levels.*** We examined relationships between all study measures, with a particular interest in assessing patterns of convergence and divergence among multiple levels of Self-Knowledge without data imputation. The same pattern of correlations was found with the non-imputed data. As expected, NSSI severity correlated positively with depressive symptoms (BDI-II) and childhood trauma (CTQ), and negatively with self-worth (SPP-A). Key integrative findings included correlations between lower self-worth (SPP-A) with more frequent and faster RT during negative self-evaluations during the SvC task. No other correlations remained significant after the Hochberg correction. See supplementary Figure S2 for results without data imputation.

***Multi-level Self Variables Predicting NSSI Severity: Individual and Multiple Regression Results without data imputation***

**Individual Regressions.** Table S6 (3rd and 4th columns from right) presents a summary of the individual regression results in which variables within each level of analysis were used to predict NSSI severity. Key findings revealed inverse relationships between NSSI severity and SPPA global self-worth, negative evaluation RT, posterior Self Network RSFC as well as a positive relationship with negative evaluation frequency. Of these, only the SPPA finding remained after co-varying for age, medication status, BDI-II, CTQ scores.

**Stepwise model selection.** Stepwise model selection, which considered all Self variables, revealed the best model explaining the NSSI severity included: (1) SPP-A global self-worth, (2) SvC task behavior for negative self-evaluation frequency, (3) SvC task behavior for positive self-evaluation RT, (4) SvC task S>C anterior Self Network activation, (5) SvC task N>P anterior Self Network activation, and (6) SvC task N>P posterior Self Network activation (*N* = 87 when accounting for missing values across all Self variables).

**Multiple Regression.** A multiple regression model with these identified Self-Knowledge variables (*N =* 90 when accounting for missing values for this smaller subset of variables) significantly predicted NSSI severity (adjusted R = .33, *F*(6, 83) = 8.30, *p* < 0.001). Table S6 (columns 5 and 6) shows the relationship between each of the included Self-Knowledge variables and NSSI severity within this model. In this set of results, NSSI severity was significantly associated with S>C anterior node Self Network activation, negative self-evaluation frequency, and SPP-A global self-worth, while N>P anterior and posterior node Self Network activation trended toward significance (all relationships were negative except negative self-evaluation frequency and N>P posterior Self Network activation).

***Multiple Regression with Covariates.*** A follow-up analysis model with BDI-II, age, psychotropic medications, and CTQ as covariates (*N* = 81 when accounting for additional missing values from covariates) still significantly predicted NSSI severity (adjusted R = .43, *F*(10, 70) = 7.09, *p* < 0.001), and the significant predictors were S>C and N>P anterior Self Network activation, and N>P posterior Self Network activation. The model including both the Self variables and covariates (AIC = 163.16) was significantly superior to the model including only the covariates (AIC = 172.57), *F*(6, 70) = 3.53, *p* = 0.004.

**Supplementary Figure S2: Correlations across all study measures without data imputationA screenshot of a graph

Description automatically generated**

*Note.* RT=Reaction Time; N=negative; P=Positive; S=Self; C=Change, RSFC=resting-state functional connectivity; SPP-A= Self Perception Profile for Adolescents, Global Self Worth; CT=cortical thickness; CTQ=Child Trauma Questionnaire; BDI=Beck Depression Inventory; NSSI=non-suicidal self-injury. ‡Spearman’s Rho was used for Psychotropic Medication Use*\* p < .05 (*Hochberg corrected p-values in the upper matrix and uncorrected p values in the lower matrix)

**Supplementary Table S6: Relationships between Multi-Level Self measures and Lifetime NSSI Episodes without data imputation**

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| ***Level of Analysis***  N Individual regression | N Individual regression with covariates | | ***Measure*** | *Parameter Estimate, p value\**  [95% CI] | *Parameter Estimate, p value\**  [95% CI] | *Parameter Estimate, p value*  [95% CI] | *Parameter Estimate, p value*  [95% CI] |
|
| ***Statistical Approach*** | | | ***Individual regression without covarying*** *age, BDI, CTQ, medication status* | ***Individual regression covarying*** *age, BDI, CTQ, medication status* | ***Multiple regression without covarying*** *for age, BDI,CTQ, medication status*  N = 90 | ***Multiple regression covarying*** *for age, BDI,CTQ, medication status*  N = 81 |
| **Self-Report** | SPP-A  N = 117 | 107 | Global Self Worth | -0.45, <.001\*  [-0.61, -0.3] | -0.27, 0.011\*  [-0.48, -0.06] | -0.24, <0.05  [-0.47, 0] | -0.23, 0.08 [-0.49, 0.03] |
| **Behavior** | Self Evaluations - Frequency  N = 124 | 113 | Negative | 2.28, <.001\*  [1.44, 3.13] | 0.81, 0.11  [-0.18, 1.8] | 1.8, 0.01  [0.41, 3.2] | 0.75, 0.31 [-0.72, 2.21] |
| Self Evaluations -  Reaction Time  N = 124 | 113 | Negative | -1.18, 0.001\*  [-1.87, -0.49] | -0.33, 0.34  [-1.02, 0.35] | NI | |
| Positive | 0.17, 0.88  [-2.12, 2.45] | -0.027, 0.98  [-2.36, 2.3] | -2.39, 0.13  [-5.49, 0.71] | 0.43, 0.82 [-3.3, 4.16] |
| **Brain - Self Network** | SVC task -- Negative > Positive Valence  N = 105 | 95 | Anterior | 0.032, 0.78  [-0.2, 0.27] | -0.027, 0.79  [-0.23, 0.17] | -0.28, 0.07  [-0.58, 0.02] | -0.34, 0.02 [-0.63, -0.05] |
| Posterior | 0.18, 0.034  [0.01, 0.34] | 0.11, 0.12  [-0.03, 0.25] | 0.19, 0.09  [-0.03, 0.4] | 0.23, 0.04 [0.01, 0.44] |
| SVC task –  Self > Change  N = 105 | 95 | Anterior | -0.18, 0.043  [-0.36, -0.01] | -0.14, 0.06  [-0.29, 0.01] | -0.2, 0.02  [-0.37, -0.03] | -0.2, 0.02 [-0.36, -0.03] |
| Posterior | -0.087, 0.26  [-0.24, 0.07] | -0.09, 0.18  [-0.22, 0.04] | NI | |
| RSFC  N = 120 | 108 | Anterior | -1.5, 0.061  [-3.07, 0.07] | -0.79, 0.27  [-2.2, 0.62] | NI | |
| Posterior | -1.91, 0.0074\*  [-3.29, -0.52] | -1.06, 0.09  [-2.29, 0.17] | NI | |
| Cortical Thickness  N = 125 | 113 | Anterior | -0.76, 0.11  [-1.69, 0.18] | -0.5, 0.23  [-1.32, 0.32] | NI | |
| Posterior | -0.76, 0.18  [-1.87, 0.36] | -0.073, 0.89  [-1.08, 0.93] | NI | |

Results from individual (left) and multiple (right) regression analyses with multi-level Self variables as predictors and NSSI Lifetime Episodes (log transformed) as the outcome. Results are organized by level of analysis (self report, behavior, each type of brain imaging modality. CI=confidence interval; NS=Not significant; NI = Not included in final model for multiple regression; SPP-A= Self Perception Profile for Adolescents, Global Self Worth; SVC=Self Versus Change; RSFC= resting-state functional connectivity; BDI=Beck Depression Inventory; CTQ=Child Trauma Questionnaire; NSSI=non-suicidal self-injury.

\*Corrected p value still <0.05 after FDR correction for individual regressions

**Supplementary Table S7: Individual Relationships between Multi-Level Self measures and Lifetime NSSI Episodes without Data Imputation**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
|  | **Lifetime NSSI Episodes** | | | |  |
| *Predictors* | *Estimates* | *CI* | *p* | R2 / R2 adjusted | *N* |  |
| (Intercept) | 2.07 | 1.66 – 2.48 | **<0.001** | 0.231 / 0.225 | 117 |  |
| SPP-A Global Self Worth | -0.45 | -0.61 – -0.30 | **<0.001\*** |  |  |  |
| (Intercept) | 0.27 | -0.01 – 0.55 | 0.062 | 0.190 / 0.184 | 124 |  |
| Negative Self Evaluations - Frequency | 2.28 | 1.44 – 3.13 | **<0.001\*** |  |  |  |
| (Intercept) | 2.23 | 1.46 – 2.99 | **<0.001** | 0.085 / 0.078 | 124 |  |
| Negative Self Evaluations - Reaction Time | -1.18 | -1.87 – -0.49 | **0.001\*** |  |  |  |
| (Intercept) | 0.78 | -1.48 – 3.04 | 0.497 | 0.000 / -0.008 | 124 |  |
| Positive Self Evaluations - Reaction Time | 0.17 | -2.12 – 2.45 | 0.884 |  |  |  |
| (Intercept) | 1.01 | 0.85 – 1.18 | **<0.001** | 0.001 / -0.009 | 105 |  |
| Anterior Self Network SVC Task Negative > Positive Valence Activation | 0.03 | -0.20 – 0.27 | 0.784 |  |  |  |
| (Intercept) | 1.00 | 0.85 – 1.15 | **<0.001** | 0.043 / 0.033 | 105 |  |
| Posterior Self Network SVC Task Negative > Positive Valence Activation | 0.18 | 0.01 – 0.34 | **0.034** |  |  |  |
| (Intercept) | 1.18 | 0.96 – 1.39 | **<0.001** | 0.039 / 0.030 | 105 |  |
| Anterior Self Network SVC Task Self > Change Activation | -0.18 | -0.36 – -0.01 | **0.043** |  |  |  |
| (Intercept) | 1.09 | 0.90 – 1.29 | **<0.001** | 0.012 / 0.003 | 105 |  |
| Posterior Self Network SVC Task Self > Change Activation | -0.09 | -0.24 – 0.07 | 0.264 |  |  |  |
| (Intercept) | 1.24 | 0.88 – 1.59 | **<0.001** | 0.029 / 0.021 | 120 |  |
| Anterior Self Network RSFC | -1.50 | -3.07 – 0.07 | 0.061 |  |  |  |
| (Intercept) | 1.76 | 1.14 – 2.38 | **<0.001** | 0.059 / 0.051 | 120 |  |
| Posterior Self Network RSFC | -1.91 | -3.29 – -0.52 | **0.007\*** |  |  |  |
| (Intercept) | 3.37 | 0.36 – 6.38 | **0.029** | 0.021 / 0.013 | 125 |  |
| Anterior Self Network Cortical Thickness | -0.76 | -1.69 – 0.18 | 0.111 |  |  |  |
| (Intercept) | 3.26 | -0.18 – 6.70 | 0.063 | 0.014 / 0.006 | 125 |  |
| Posterior Self Network Cortical Thickness | -0.76 | -1.87 – 0.36 | 0.182 |  |  |  |

Results from individual regression analyses with multi-level Self variables as predictors and NSSI Lifetime Episodes (log transformed) as the outcome using without data imputation. CI=confidence interval; SPP-A= Self Perception Profile for Adolescents, Global Self Worth; SVC=Self Versus Change; RSFC= resting-state functional connectivity; NSSI=non-suicidal self-injury.

\*Corrected p value still <0.05 after FDR correction for individual regressions

**Supplementary Table S8: Individual Relationships between Multi-Level Self measures and Lifetime NSSI Episodes with Covariates without Data Imputation**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
|  | **Lifetime NSSI Episodes** | | | |  |
| *Predictors* | *Estimates* | *CI* | *p* | R2 / R2 adjusted | *N* |  |
| (Intercept) | 0.10 | -1.94 – 2.14 | 0.920 | 0.398 / 0.368 | 107 |  |
| Age | 0.08 | -0.03 – 0.19 | 0.175 |  |  |  |
| CTQ Total | -0.00 | -0.02 – 0.02 | 0.980 |  |  |  |
| BDI Total | 0.01 | -0.00 – 0.03 | 0.118 |  |  |  |
| Medication Status | 0.43 | 0.13 – 0.72 | **0.005** |  |  |  |
| SPP-A Global Self Worth | -0.27 | -0.48 – -0.06 | **0.011\*** |  |  |  |
| (Intercept) | -1.34 | -2.84 – 0.16 | 0.080 | 0.431 / 0.405 | 113 |  |
| Age | 0.09 | -0.01 – 0.19 | 0.073 |  |  |  |
| CTQ Total | 0.01 | -0.01 – 0.02 | 0.384 |  |  |  |
| BDI Total | 0.02 | 0.01 – 0.03 | **0.006** |  |  |  |
| Medication Status | 0.46 | 0.20 – 0.72 | **0.001** |  |  |  |
| Negative Self Evaluations - Frequency | 0.81 | -0.18 – 1.80 | 0.109 |  |  |  |
| (Intercept) | -0.93 | -2.55 – 0.69 | 0.259 | 0.422 / 0.395 | 113 |  |
| Age | 0.09 | -0.01 – 0.19 | 0.068 |  |  |  |
| CTQ Total | 0.01 | -0.00 – 0.02 | 0.198 |  |  |  |
| BDI Total | 0.02 | 0.01 – 0.04 | **0.001** |  |  |  |
| Medication Status | 0.45 | 0.19 – 0.72 | **0.001** |  |  |  |
| Negative Self Evaluations - Reaction Time | -0.33 | -1.02 – 0.35 | 0.341 |  |  |  |
| (Intercept) | -1.18 | -4.20 – 1.83 | 0.439 | 0.417 / 0.390 | 113 |  |
| Age | 0.08 | -0.02 – 0.18 | 0.107 |  |  |  |
| CTQ Total | 0.01 | -0.00 – 0.02 | 0.151 |  |  |  |
| BDI Total | 0.02 | 0.01 – 0.04 | **<0.001** |  |  |  |
| Medication Status | 0.47 | 0.22 – 0.73 | **<0.001** |  |  |  |
| Positive Self Evaluations - Reaction Time | -0.03 | -2.36 – 2.30 | 0.982 |  |  |  |
| (Intercept) | -0.85 | -2.66 – 0.95 | 0.351 | 0.373 / 0.338 | 95 |  |
| Age | 0.06 | -0.06 – 0.17 | 0.324 |  |  |  |
| CTQ Total | 0.01 | -0.00 – 0.03 | 0.092 |  |  |  |
| BDI Total | 0.02 | 0.01 – 0.04 | **0.003** |  |  |  |
| Medication Status | 0.42 | 0.12 – 0.72 | **0.006** |  |  |  |
| Anterior Self Network SVC Task Negative > Positive Valence Activation | -0.03 | -0.23 – 0.17 | 0.792 |  |  |  |
| (Intercept) | -0.94 | -2.72 – 0.85 | 0.301 | 0.389 / 0.355 | 95 |  |
| Age | 0.07 | -0.05 – 0.18 | 0.262 |  |  |  |
| CTQ Total | 0.01 | -0.00 – 0.02 | 0.105 |  |  |  |
| BDI Total | 0.02 | 0.01 – 0.04 | **0.004** |  |  |  |
| Medication Status | 0.41 | 0.12 – 0.71 | **0.006** |  |  |  |
| Posterior Self Network SVC Task Negative > Positive Valence Activation | 0.11 | -0.03 – 0.25 | 0.124 |  |  |  |
| (Intercept) | -0.86 | -2.63 – 0.91 | 0.339 | 0.397 / 0.363 | 95 |  |
| Age | 0.07 | -0.04 – 0.18 | 0.224 |  |  |  |
| CTQ Total | 0.01 | -0.00 – 0.02 | 0.150 |  |  |  |
| BDI Total | 0.02 | 0.01 – 0.04 | **0.002** |  |  |  |
| Medication Status | 0.41 | 0.12 – 0.70 | **0.006** |  |  |  |
| Anterior Self Network SVC Task Self > Change Activation | -0.14 | -0.29 – 0.01 | 0.060 |  |  |  |
| (Intercept) | -0.82 | -2.61 – 0.97 | 0.363 | 0.385 / 0.351 | 95 |  |
| Age | 0.06 | -0.05 – 0.18 | 0.280 |  |  |  |
| CTQ Total | 0.01 | -0.00 – 0.02 | 0.133 |  |  |  |
| BDI Total | 0.02 | 0.01 – 0.04 | **0.002** |  |  |  |
| Medication Status | 0.42 | 0.12 – 0.71 | **0.006** |  |  |  |
| Posterior Self Network SVC Task Self > Change Activation | -0.09 | -0.22 – 0.04 | 0.178 |  |  |  |
| (Intercept) | 0.03 | -1.69 – 1.75 | 0.972 | 0.412 / 0.383 | 108 |  |
| Age | 0.04 | -0.06 – 0.14 | 0.470 |  |  |  |
| CTQ Total | -0.00 | -0.01 – 0.01 | 0.430 |  |  |  |
| BDI Total | 0.03 | 0.02 – 0.04 | **<0.001** |  |  |  |
| Medication Status | 0.50 | 0.23 – 0.76 | **<0.001** |  |  |  |
| Anterior Self Network RSFC | -0.79 | -2.20 – 0.62 | 0.267 |  |  |  |
| (Intercept) | 0.30 | -1.44 – 2.04 | 0.734 | 0.421 / 0.393 | 108 |  |
| Age | 0.04 | -0.06 – 0.14 | 0.451 |  |  |  |
| CTQ Total | -0.00 | -0.01 – 0.01 | 0.490 |  |  |  |
| BDI Total | 0.03 | 0.02 – 0.04 | **<0.001** |  |  |  |
| Medication Status | 0.48 | 0.22 – 0.75 | **<0.001** |  |  |  |
| Posterior Self Network RSFC | -1.06 | -2.29 – 0.17 | 0.090 |  |  |  |
| (Intercept) | 1.09 | -2.34 – 4.52 | 0.529 | 0.404 / 0.376 | 113 |  |
| Age | 0.05 | -0.05 – 0.15 | 0.308 |  |  |  |
| CTQ Total | 0.00 | -0.01 – 0.01 | 0.891 |  |  |  |
| BDI Total | 0.03 | 0.02 – 0.04 | **<0.001** |  |  |  |
| Medication Status | 0.47 | 0.21 – 0.74 | **0.001** |  |  |  |
| Anterior Self Network Cortical Thickness | -0.50 | -1.32 – 0.32 | 0.231 |  |  |  |
| (Intercept) | -0.51 | -4.50 – 3.48 | 0.801 | 0.396 / 0.367 | 113 |  |
| Age | 0.07 | -0.04 – 0.17 | 0.226 |  |  |  |
| CTQ Total | 0.00 | -0.01 – 0.01 | 0.763 |  |  |  |
| BDI Total | 0.03 | 0.01 – 0.04 | **<0.001** |  |  |  |
| Medication Status | 0.47 | 0.20 – 0.73 | **0.001** |  |  |  |
| Posterior Self Network Cortical Thickness | -0.07 | -1.08 – 0.93 | 0.887 |  |  |  |

Results from individual regression analyses with multi-level Self variables as predictors and NSSI Lifetime Episodes (log transformed) as the outcome without data imputation with age, BDI-II, CTQ scores, and medication status as covariates. CI=confidence interval; SPP-A= Self Perception Profile for Adolescents, Global Self Worth; SVC=Self Versus Change; RSFC= resting-state functional connectivity; BDI=Beck Depression Inventory; CTQ=Child Trauma Questionnaire; NSSI=non-suicidal self-injury.

\*Corrected p value still <0.05 after FDR correction for individual regressions

**Supplementary Table S9: Relationships between Multi-Level Self measures and Lifetime NSSI Episodes without Data Imputation**

|  |  |  |  |
| --- | --- | --- | --- |
|  | **Lifetime NSSI Episodes** | | |
| *Predictors* | *Estimates* | *CI* | *p* |
| (Intercept) | 3.58 | 0.41 – 6.76 | **0.028** |
| Anterior Self Network SVC Task Self > Change Activation | -0.20 | -0.37 – -0.03 | **0.021** |
| Anterior Self Network SVC Task Negative > Positive Valence Activation | -0.28 | -0.58 – 0.02 | 0.070 |
| Posterior Self Network SVC Task Negative > Positive Valence Activation | 0.19 | -0.03 – 0.40 | 0.088 |
| Negative Self Evaluations - Frequency | 1.80 | 0.41 – 3.20 | **0.012** |
| Positive Self Evaluations - Reaction Time | -2.39 | -5.49 – 0.71 | 0.129 |
| SPP-A Global Self Worth | -0.24 | -0.47 – -0.00 | **0.047** |
| Observations | 90 | | |
| R2 / R2 adjusted | 0.375 / 0.330 | | |

*Note.* Results from multiple regression analysis with multi-level Self variables as predictors and NSSI Lifetime Episodes (log transformed) as the outcome without data imputation. CI=confidence interval; SPP-A= Self Perception Profile for Adolescents, Global Self Worth; SVC=Self Versus Change; RSFC= resting-state functional connectivity; NSSI=non-suicidal self-injury.

**Supplementary Table S10: Relationships between Multi-Level Self measures and Lifetime NSSI Episodes with Covariates without Data Imputation**

|  |  |  |  |
| --- | --- | --- | --- |
|  | **Lifetime NSSI Episodes** | | |
| *Predictors* | *Estimates* | *CI* | *p* |
| (Intercept) | -0.38 | -5.12 – 4.35 | 0.872 |
| Age | 0.09 | -0.04 – 0.22 | 0.182 |
| CTQ Total | -0.00 | -0.02 – 0.02 | 0.773 |
| BDI Total | 0.01 | -0.01 – 0.03 | 0.374 |
| Medication Status | 0.32 | 0.00 – 0.64 | **0.048** |
| Anterior Self Network SVC Task Self > Change Activation | -0.20 | -0.36 – -0.03 | **0.018** |
| Anterior Self Network SVC Task Negative > Positive Valence Activation | -0.34 | -0.63 – -0.05 | **0.023** |
| Posterior Self Network SVC Task Negative > Positive Valence Activation | 0.23 | 0.01 – 0.44 | **0.037** |
| Negative Self Evaluations - Frequency | 0.75 | -0.72 – 2.21 | 0.312 |
| Positive Self Evaluations - Reaction Time | 0.43 | -3.30 – 4.16 | 0.819 |
| SPP-A Global Self Worth | -0.23 | -0.49 – 0.03 | 0.081 |
| Observations | 81 | | |
| R2 / R2 adjusted | 0.503 / 0.432 | | |

*Note.* Results from multiple regression analysis with multi-level Self variables as predictors and NSSI Lifetime Episodes (log transformed) as the outcome without data imputation with age, BDI-II, CTQ scores, and medication status as covariates. CI=confidence interval; SPP-A= Self Perception Profile for Adolescents, Global Self Worth; SVC=Self Versus Change; RSFC= resting-state functional connectivity; BDI=Beck Depression Inventory; CTQ=Child Trauma Questionnaire; NSSI=non-suicidal self-injury.

**Supplementary Table S11: Relationships between Additional SVC Self Neural Activation Contrasts and Lifetime NSSI Episodes**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| ***Level of Analysis*** | | ***Measure*** | *Parameter Estimate, p value\**  [95% CI] | *Parameter Estimate, p value\**  [95% CI] |
|
| ***Statistical Approach*** | | | ***Individual regression without covarying*** *age, BDI, CTQ, medication status* | ***Individual regression covarying*** *age, BDI, CTQ, medication status* |
| **Brain - Self Network** | SVC task -- Negative Self Evaluation > Positive Self Evaluation  N = 84 | 75 | Anterior | -0.2, 0.087  [-0.43, 0.03] | -0.082, 0.39  [-0.27, 0.1] |
| Posterior | -0.28, 0.014  [-0.51, -0.06] | -0.16, 0.079  [-0.35, 0.02] |
| SVC task -- Negative Self > Positive Self  N = 105 | 95 | Anterior | 0.043, 0.72  [-0.19, 0.27] | 0.0069, 0.94  [-0.18, |
| Posterior | 0.083, 0.35  [-0.09, 0.26] | 0.026, 0.72  [-0.12, 0.17] |

Results from individual (left) and multiple (right) regression analyses with additional SVC Self Network activation during Negative Self Evaluation > Positive Self Evaluation contrast and the Negative > Positive contrast during self-trials only and NSSI Lifetime Episodes (log transformed) as the outcome. For self-evaluation trials, participants were only included if they had a minimum of 5 negative self evaluation and 5 positive self-evaluation trials. CI=confidence interval; SVC=Self Versus Change; CTQ=Child Trauma Questionnaire; BDI=Beck Depression Inventory; NSSI=non-suicidal self-injury

\*Corrected p value still <0.05 after FDR correction

**Additional Individual Regression Analyses using SVC Neural Activation Contrasts**

The Negative Self Evaluation > Positive Self Evaluation contrast compares trials with negative self-evaluation (saying “yes” to a negative or “no” to a positive word describing oneself) relative to positive self-evaluation (saying “yes” to a positive or “no” to a negative word describing oneself). Participants were only included in this analysis if they had a minimum of 5 negative self-evaluation and 5 positive self-evaluation trials. The Negative Self > Positive Self contrast compares trials where a negatively valenced word is presented relative to when a positively valenced word is presented during self trials, regardless of participant response. Using imputed data, there was a significant negative association between posterior Self Network node activation during the Negative Self Evaluation > Positive Self Evaluation contrast and Lifetime NSSI episodes. This is in the opposite direction compared to the N>P contrast in the posterior node (although this did not survive correction for multiple comparisons; see main results). There were no significant associations between activation in the anterior and posterior Self Network nodes during the N>P contrast when examining only the self trials. There was no significant association between anterior Self Network node activation during the Negative Self Evaluation > Positive Self Evaluation contrast. The same pattern of results was found with the non-imputed data.

**Supplementary Table S12: Relationships between Additional SVC Self Neural Activation Contrasts and Lifetime NSSI Episodes**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | **Lifetime NSSI Episodes** | |  |  |
| *Predictors* | *Estimates* | *CI* | *p* | R2 / R2 adjusted |  |
| (Intercept) | 1.02 | 0.85 – 1.18 | **<0.001** | 0.018 / 0.012 |  |
| Anterior Self Network SVC Task Negative Self Evaluation > Positive Self Evaluation Activation | -0.20 | -0.43 – 0.03 | 0.087 |  |  |
| (Intercept) | 1.08 | 0.90 – 1.25 | **<0.001** | 0.037 / 0.031 |  |
| Posterior Self Network SVC Task Negative Self Evaluation > Positive Self Evaluation Activation | -0.28 | -0.51 – -0.06 | **0.014** |  |  |
| (Intercept) | 0.92 | 0.79 – 1.05 | **<0.001** | 0.001 / -0.005 |  |
| Anterior Self Network SVC Task Negative Self > Positive Self Activation | 0.04 | -0.19 – 0.27 | 0.715 |  |  |
| (Intercept) | 0.92 | 0.79 – 1.04 | **<0.001** | 0.005 / -0.001 |  |
| Posterior Self Network SVC Task Negative Self > Positive Self Activation | 0.08 | -0.09 – 0.26 | 0.354 |  |  |

Results from individual regression analyses with Additional SVC Self Neural Activation Contrasts as predictors and NSSI Lifetime Episodes (log transformed) as the outcome using imputed data (N=164). CI=confidence interval; SPP-A= Self Perception Profile for Adolescents, Global Self Worth; SVC=Self Versus Change; RSFC= resting-state functional connectivity; NSSI=non-suicidal self-injury.

**Supplementary Table S13: Relationships between Additional SVC Self Neural Activation Contrasts and Lifetime NSSI Episodes with Covariates**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
|  | **Lifetime NSSI Episodes** | | | | |
| *Predictors* | *Estimates* | *CI* | *p* | R2 / R2 adjusted | |  |
| (Intercept) | -1.31 | -2.65 – 0.02 | 0.054 | | 0.400 / 0.381 |  |
| Age | 0.11 | 0.02 – 0.19 | **0.015** | |  |  |
| CTQ Total | 0.00 | -0.01 – 0.01 | 0.588 | |  |  |
| BDI Total | 0.02 | 0.01 – 0.04 | **<0.001** | |  |  |
| Medication Status | 0.49 | 0.26 – 0.72 | **<0.001** | |  |  |
| Anterior Self Network SVC Task Negative Self Evaluation > Positive Self Evaluation Activation | -0.08 | -0.27 – 0.10 | 0.386 | |  |  |
| (Intercept) | -1.30 | -2.63 – 0.02 | 0.054 | | 0.408 / 0.390 |  |
| Age | 0.11 | 0.03 – 0.20 | **0.011** | |  |  |
| CTQ Total | 0.00 | -0.01 – 0.01 | 0.677 | |  |  |
| BDI Total | 0.02 | 0.01 – 0.04 | **<0.001** | |  |  |
| Medication Status | 0.48 | 0.26 – 0.71 | **<0.001** | |  |  |
| Posterior Self Network SVC Task Negative Self Evaluation > Positive Self Evaluation Activation | -0.16 | -0.35 – 0.02 | 0.079 | |  |  |
| (Intercept) | -1.31 | -2.65 – 0.03 | 0.055 | | 0.397 / 0.378 |  |
| Age | 0.10 | 0.02 – 0.19 | **0.019** | |  |  |
| CTQ Total | 0.00 | -0.01 – 0.01 | 0.546 | |  |  |
| BDI Total | 0.03 | 0.01 – 0.04 | **<0.001** | |  |  |
| Medication Status | 0.50 | 0.27 – 0.73 | **<0.001** | |  |  |
| Anterior Self Network SVC Task Negative Self > Positive Self Activation | 0.01 | -0.18 – 0.19 | 0.941 | |  |  |
| (Intercept) | -1.31 | -2.64 – 0.03 | 0.056 | | 0.397 / 0.378 |  |
| Age | 0.10 | 0.02 – 0.19 | **0.019** | |  |  |
| CTQ Total | 0.00 | -0.01 – 0.01 | 0.574 | |  |  |
| BDI Total | 0.02 | 0.01 – 0.04 | **<0.001** | |  |  |
| Medication Status | 0.50 | 0.27 – 0.73 | **<0.001** | |  |  |
| Posterior Self Network SVC Task Negative Self > Positive Self Activation | 0.03 | -0.12 – 0.17 | 0.721 | |  |  |

Results from individual regression analyses with Additional SVC Self Neural Activation Contrasts and NSSI Lifetime Episodes (log transformed) as the outcome using imputed data (N=164) with age, BDI-II, CTQ scores, and medication status as covariates. CI=confidence interval; SPP-A= Self Perception Profile for Adolescents, Global Self Worth; SVC=Self Versus Change; RSFC= resting-state functional connectivity; BDI=Beck Depression Inventory; CTQ=Child Trauma Questionnaire; NSSI=non-suicidal self-injury.

***Multi-level Self Variables Predicting BSSI Total Score: Individual and Multiple Regression Results with and without Data Imputation***

BSSI total score was log-transformed to correct for skewness.

**Individual Regressions.** Table S14 (3rd and 4th columns from right) presents a summary of the individual regression results in which variables within each level of analysis were used to predict BSSI Total Score. Key findings revealed inverse relationships between BSSI Total Score and SPP-A global self-worth and negative evaluation RT as well as positive relationships with negative evaluation frequency and positive evaluation RT. Of these, only the SPP-A remained after co-varying for age, medication status, BDI-II, CTQ scores. The same results were found without data imputation (see Table S19).

**Stepwise model selection.** Stepwise model selection, which considered all Self variables, revealed the best model explaining the BSSI Total Score included: (1) SPP-A global self-worth and (2) SvC task behavior for negative self-evaluation frequency. The same results were found without data imputation.

**Multiple Regression.** A multiple regression model with these identified Self-Knowledge variables significantly predicted BSSI total score (adjusted R = .49, *F*(2, 161) = 78.60, *p* < 0.001). Supplementary Table S14 (columns 5 and 6) shows the relationship between each of the included Self-Knowledge variables and BSSI total score within this model. In this set of results, BSSI total score was significantly negatively associated with SPP-A global self-worth and positively associated with negative evaluation frequency. The same pattern of results was found without data imputation; negative self-evaluation frequency only trended toward significance however.

***Multiple Regression with Covariates.*** A follow-up analysis model with BDI-II, age, psychotropic medications, and CTQ as covariates still significantly predicted BSSI total score (adjusted R = .62, *F*(6, 157) = 45.70, *p* < 0.001), and only SPP-A global self-worth remained a significant predictor. The model including both the Self variables and covariates (AIC = 101.83) was significantly superior to the model including only the covariates (AIC = 115.46), *F*(2, 157) = 8.91, *p* < .001. The same findings were found without data imputation.

**Supplementary Table S14: Relationships between Multi-Level Self measures and BSSI total score with data imputation**

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| ***Level of Analysis***  N Individual regression | N Individual regression with covariates | | ***Measure*** | *Parameter Estimate, p value\**  [95% CI] | *Parameter Estimate, p value\**  [95% CI] | *Parameter Estimate, p value\**  [95% CI] | *Parameter Estimate, p value*  [95% CI] |
|
| ***Statistical Approach*** | | | ***Individual regression without covarying*** *age, BDI, CTQ, medication status* | ***Individual regression covarying*** *age, BDI, CTQ, medication status* | ***Multiple regression without covarying*** *for age, BDI,CTQ, medication status* | ***Multiple regression covarying*** *for age, BDI,CTQ, medication status* |
| **Self-Report** | SPP-A | Global Self Worth | -0.45, <.001\*  [-0.53, -0.38] | -0.19, <.001\*  [-0.28, -0.1] | -0.36, <.001  [-0.46, -0.25] | -0.18, <.001  [-0.28, -.08] |
| **Behavior** | Self Evaluations - Frequency | Negative | 2.23, <.001\*  [1.76, 2.69] | 0.59, 0.021  [0.09, 1.09] | .76, 0.01  [0.15, 1.36] | 0.13, 0.63  [-0.41, .68] |
| Self Evaluations -  Reaction Time | Negative | -1.02, <.001\*  [-1.45, -0.59] | -0.11, 0.52  [-0.44, 0.22] | NI | |
| Positive | 2.2, 0.0027\*  [0.76, 3.54] | 0.64, 0.19  [-0.32, 1.61] | NI | |
| **Brain - Self Network** | SVC task -- Negative > Positive Valence | Anterior | 0.018, 0.81  [-0.13, 0.17] | -0.026, 0.6  [-0.12, 0.07] | NI | |
| Posterior | 0.12, 0.029  [0.01, 0.22] | 0.0075, 0.83  [-0.06, 0.08] | NI | |
| SVC task –  Self > Change | Anterior | -0.13, 0.028  [-0.24, -0.01] | -0.04, 0.29  [-0.12, 0.04] | NI | |
| Posterior | -0.057, 0.26  [-0.16, 0.04] | -0.045, 0.17  [-0.11, 0.02] | NI | |
| RSFC | Anterior | -0.286, 0.57  [-1.28, 0.7] | 0.14, 0.69  [-0.55, 0.82] | NI | |
| Posterior | -0.583, 0.2  [-1.48, 0.31] | -0.166, 0.59  [-0.77, 0.44] | NI | |
| Cortical Thickness | Anterior | 0.16, 0.61  [-0.45, 0.77] | 0.082, 0.69  [-0.33, 0.49] | NI | |
| Posterior | 0.15, 0.68  [-0.58, 0.88] | 0.15, 0.55  [-0.35, 0.66] | NI | |

Results from individual (left) and multiple (right) regression analyses with multi-level Self variables as predictors and BSSI total score (log transformed) as the outcome. Results are organized by level of analysis (self report, behavior, each type of brain imaging modality. NS=Not significant; NI = Not included in final model for multiple regression; SPP-A= Self Perception Profile for Adolescents, Global Self Worth; SVC=Self Versus Change; RSFC= resting-state functional connectivity; BDI=Beck Depression Inventory; CTQ=Child Trauma Questionnaire; BSSI=Beck Scale for Suicidal Ideation.

\*Corrected p value still <0.05 after FDR correction for individual regressions

**Supplementary Table S15: Individual Relationships between Multi-Level Self measures and BSSI total score with data imputation**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
|  | **Lifetime NSSI Episodes** | | | | |
| *Predictors* | *Estimates* | *CI* | *p* | R2 / R2 adjusted | |  |
| (Intercept) | 1.60 | 1.40 – 1.79 | **<0.001** | | 0.475 / 0.471 |  |
| SPP-A Global Self Worth | -0.45 | -0.53 – -0.38 | **<0.001\*** | |  |  |
| (Intercept) | -0.20 | -0.35 – -0.05 | **0.009** | | 0.354 / 0.350 |  |
| Negative Self Evaluations - Frequency | 2.23 | 1.76 – 2.69 | **<0.001\*** | |  |  |
| (Intercept) | 1.56 | 1.09 – 2.04 | **<0.001** | | 0.121 / 0.115 |  |
| Negative Self Evaluations - Reaction Time | -1.02 | -1.45 – -0.59 | **<0.001\*** | |  |  |
| (Intercept) | -1.67 | -3.04 – -0.30 | **0.017** | | 0.054 / 0.048 |  |
| Positive Self Evaluations - Reaction Time | 2.15 | 0.76 – 3.54 | **0.003** | |  |  |
| (Intercept) | 0.44 | 0.35 – 0.52 | **<0.001** | | 0.000 / -0.006 |  |
| Anterior Self Network SVC Task Negative > Positive Valence Activation | 0.02 | -0.13 – 0.17 | 0.811 | |  |  |
| (Intercept) | 0.43 | 0.35 – 0.51 | **<0.001** | | 0.029 / 0.023 |  |
| Posterior Self Network SVC Task Negative > Positive Valence Activation | 0.12 | 0.01 – 0.22 | **0.029** | |  |  |
| (Intercept) | 0.55 | 0.42 – 0.67 | **<0.001** | | 0.029 / 0.023 |  |
| Anterior Self Network SVC Task Self > Change Activation | -0.13 | -0.24 – -0.01 | **0.028** | |  |  |
| (Intercept) | 0.49 | 0.37 – 0.60 | **<0.001** | | 0.008 / 0.002 |  |
| Posterior Self Network SVC Task Self > Change Activation | -0.06 | -0.16 – 0.04 | 0.255 | |  |  |
| (Intercept) | 0.50 | 0.28 – 0.72 | **<0.001** | | 0.002 / -0.004 |  |
| Anterior Self Network RSFC | -0.29 | -1.28 – 0.70 | 0.570 | |  |  |
| (Intercept) | 0.70 | 0.29 – 1.10 | **0.001** | | 0.010 / 0.004 |  |
| Posterior Self Network RSFC | -0.58 | -1.48 – 0.31 | 0.201 | |  |  |
| (Intercept) | -0.07 | -2.05 – 1.91 | 0.943 | | 0.002 / -0.005 |  |
| Anterior Self Network Cortical Thickness | 0.16 | -0.45 – 0.77 | 0.610 | |  |  |
| (Intercept) | -0.03 | -2.28 – 2.22 | 0.978 | | 0.001 / -0.005 |  |
| Posterior Self Network Cortical Thickness | 0.15 | -0.58 – 0.88 | 0.679 | |  |  |

*Note.* Results from individual regression analyses with multi-level Self variables as predictors and NSSI Lifetime Episodes (log transformed) as the outcome using imputed data (N=164). CI=confidence interval; SPP-A= Self Perception Profile for Adolescents, Global Self Worth; SVC=Self Versus Change; RSFC= resting-state functional connectivity; BSSI=Beck Scale for Suicidal Ideation.

\*Corrected p value still <0.05 after FDR correction for individual regressions

**Supplementary Table S16: Individual Relationships between Multi-Level Self measures and BSSI total score with covariates with data imputation**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
|  | **Lifetime NSSI Episodes** | | | | |
| *Predictors* | *Estimates* | *CI* | *p* | R2 / R2 adjusted | |  |
| (Intercept) | 0.98 | 0.23 – 1.73 | **0.010** | | 0.635 / 0.624 |  |
| Age | -0.03 | -0.08 – 0.01 | 0.123 | |  |  |
| CTQ Total | 0.00 | -0.00 – 0.01 | 0.204 | |  |  |
| BDI Total | 0.02 | 0.02 – 0.03 | **<0.001** | |  |  |
| Medication Status | 0.04 | -0.07 – 0.15 | 0.504 | |  |  |
| SPP-A Global Self Worth | -0.19 | -0.28 – -0.10 | **<0.001\*** | |  |  |
| (Intercept) | 0.15 | -0.55 – 0.85 | 0.670 | | 0.608 / 0.596 |  |
| Age | -0.03 | -0.07 – 0.02 | 0.205 | |  |  |
| CTQ Total | 0.00 | -0.00 – 0.01 | 0.089 | |  |  |
| BDI Total | 0.03 | 0.02 – 0.03 | **<0.001** | |  |  |
| Medication Status | 0.03 | -0.09 – 0.15 | 0.616 | |  |  |
| Negative Self Evaluations - Frequency | 0.59 | 0.09 – 1.09 | **0.021** | |  |  |
| (Intercept) | 0.37 | -0.41 – 1.14 | 0.349 | | 0.596 / 0.583 |  |
| Age | -0.03 | -0.08 – 0.01 | 0.187 | |  |  |
| CTQ Total | 0.01 | 0.00 – 0.01 | **0.021** | |  |  |
| BDI Total | 0.03 | 0.03 – 0.04 | **<0.001** | |  |  |
| Medication Status | 0.04 | -0.09 – 0.16 | 0.562 | |  |  |
| Negative Self Evaluations - Reaction Time | -0.11 | -0.44 – 0.22 | 0.516 | |  |  |
| (Intercept) | -0.45 | -1.72 – 0.82 | 0.487 | | 0.599 / 0.586 |  |
| Age | -0.03 | -0.07 – 0.02 | 0.267 | |  |  |
| CTQ Total | 0.01 | 0.00 – 0.01 | **0.023** | |  |  |
| BDI Total | 0.03 | 0.03 – 0.04 | **<0.001** | |  |  |
| Medication Status | 0.04 | -0.08 – 0.16 | 0.541 | |  |  |
| Positive Self Evaluations - Reaction Time | 0.64 | -0.32 – 1.61 | 0.191 | |  |  |
| (Intercept) | 0.27 | -0.43 – 0.97 | 0.450 | | 0.595 / 0.583 |  |
| Age | -0.03 | -0.08 – 0.01 | 0.150 | |  |  |
| CTQ Total | 0.01 | 0.00 – 0.01 | **0.014** | |  |  |
| BDI Total | 0.03 | 0.03 – 0.04 | **<0.001** | |  |  |
| Medication Status | 0.04 | -0.08 – 0.16 | 0.477 | |  |  |
| Anterior Self Network SVC Task Negative > Positive Valence Activation | -0.03 | -0.12 – 0.07 | 0.597 | |  |  |
| (Intercept) | 0.26 | -0.45 – 0.96 | 0.474 | | 0.595 / 0.582 |  |
| Age | -0.03 | -0.08 – 0.01 | 0.163 | |  |  |
| CTQ Total | 0.01 | 0.00 – 0.01 | **0.016** | |  |  |
| BDI Total | 0.03 | 0.03 – 0.04 | **<0.001** | |  |  |
| Medication Status | 0.04 | -0.08 – 0.16 | 0.488 | |  |  |
| Posterior Self Network SVC Task Negative > Positive Valence Activation | 0.01 | -0.06 – 0.08 | 0.833 | |  |  |
| (Intercept) | 0.27 | -0.43 – 0.96 | 0.454 | | 0.597 / 0.585 |  |
| Age | -0.03 | -0.07 – 0.02 | 0.199 | |  |  |
| CTQ Total | 0.01 | 0.00 – 0.01 | **0.023** | |  |  |
| BDI Total | 0.03 | 0.03 – 0.04 | **<0.001** | |  |  |
| Medication Status | 0.04 | -0.08 – 0.16 | 0.496 | |  |  |
| Anterior Self Network SVC Task Self > Change Activation | -0.04 | -0.12 – 0.04 | 0.293 | |  |  |
| (Intercept) | 0.28 | -0.42 – 0.97 | 0.434 | | 0.599 / 0.587 |  |
| Age | -0.03 | -0.08 – 0.01 | 0.183 | |  |  |
| CTQ Total | 0.01 | 0.00 – 0.01 | **0.022** | |  |  |
| BDI Total | 0.03 | 0.03 – 0.04 | **<0.001** | |  |  |
| Medication Status | 0.04 | -0.08 – 0.16 | 0.510 | |  |  |
| Posterior Self Network SVC Task Self > Change Activation | -0.05 | -0.11 – 0.02 | 0.166 | |  |  |
| (Intercept) | 0.19 | -0.60 – 0.97 | 0.635 | | 0.595 / 0.582 |  |
| Age | -0.03 | -0.08 – 0.02 | 0.208 | |  |  |
| CTQ Total | 0.01 | 0.00 – 0.01 | **0.015** | |  |  |
| BDI Total | 0.03 | 0.03 – 0.04 | **<0.001** | |  |  |
| Medication Status | 0.05 | -0.07 – 0.17 | 0.443 | |  |  |
| Anterior Self Network RSFC | 0.14 | -0.55 – 0.82 | 0.693 | |  |  |
| (Intercept) | 0.37 | -0.44 – 1.19 | 0.367 | | 0.595 / 0.583 |  |
| Age | -0.04 | -0.08 – 0.01 | 0.134 | |  |  |
| CTQ Total | 0.01 | 0.00 – 0.01 | **0.016** | |  |  |
| BDI Total | 0.03 | 0.03 – 0.04 | **<0.001** | |  |  |
| Medication Status | 0.04 | -0.08 – 0.16 | 0.540 | |  |  |
| Posterior Self Network RSFC | -0.17 | -0.77 – 0.44 | 0.592 | |  |  |
| (Intercept) | -0.04 | -1.69 – 1.61 | 0.961 | | 0.595 / 0.582 |  |
| Age | -0.03 | -0.08 – 0.02 | 0.196 | |  |  |
| CTQ Total | 0.01 | 0.00 – 0.01 | **0.015** | |  |  |
| BDI Total | 0.03 | 0.03 – 0.04 | **<0.001** | |  |  |
| Medication Status | 0.04 | -0.08 – 0.16 | 0.468 | |  |  |
| Anterior Self Network Cortical Thickness | 0.08 | -0.33 – 0.49 | 0.691 | |  |  |
| (Intercept) | -0.29 | -2.24 – 1.66 | 0.771 | | 0.596 / 0.583 |  |
| Age | -0.03 | -0.08 – 0.02 | 0.269 | |  |  |
| CTQ Total | 0.01 | 0.00 – 0.01 | **0.017** | |  |  |
| BDI Total | 0.03 | 0.03 – 0.04 | **<0.001** | |  |  |
| Medication Status | 0.04 | -0.08 – 0.16 | 0.489 | |  |  |
| Posterior Self Network Cortical Thickness | 0.15 | -0.35 – 0.66 | 0.553 | |  |  |

*Note.* Results from individual regression analyses with multi-level Self variables as predictors and NSSI Lifetime Episodes (log transformed) as the outcome using imputed data (N=164) with age, BDI-II, CTQ scores, and medication status as covariates. CI=confidence interval; SPP-A= Self Perception Profile for Adolescents, Global Self Worth; SVC=Self Versus Change; RSFC= resting-state functional connectivity; BDI=Beck Depression Inventory; CTQ=Child Trauma Questionnaire; BSSI=Beck Scale for Suicidal Ideation.

\*Corrected p value still <0.05 after FDR correction for individual regressions

**Supplementary Table S17: Relationships between Multi-Level Self measures and BSSI total score with data imputation**

|  |  |  |  |
| --- | --- | --- | --- |
|  | **BSSI Total** | | |
| *Predictors* | *Estimates* | *CI* | *p* |
| (Intercept) | 1.13 | 0.72 – 1.55 | **<0.001** |
| Negative Self Evaluations - Frequency | 0.76 | 0.15 – 1.36 | **0.014** |
| SPP-A Global Self Worth | -0.36 | -0.46 – -0.25 | **<0.001** |
| Observations | 164 | | |
| R2 / R2 adjusted | 0.494 / 0.488 | | |

*Note.* Results from multiple regression analysis with multi-level Self variables as predictors and NSSI Lifetime Episodes (log transformed) as the outcome using imputed data (N=164). CI=confidence interval; SPP-A= Self Perception Profile for Adolescents, Global Self Worth; SVC=Self Versus Change; RSFC= resting-state functional connectivity; BSSI=Beck Scale for Suicidal Ideation.

**Supplementary Table S18: Relationships between Multi-Level Self measures and BSSI total score with covariates with data imputation**

|  |  |  |  |
| --- | --- | --- | --- |
|  | **BSSI Total** | | |
| *Predictors* | *Estimates* | *CI* | *p* |
| (Intercept) | 0.91 | 0.11 – 1.71 | **0.026** |
| Age | -0.03 | -0.08 – 0.01 | 0.137 |
| CTQ Total | 0.00 | -0.00 – 0.01 | 0.243 |
| BDI Total | 0.02 | 0.02 – 0.03 | **<0.001** |
| Medication Status | 0.04 | -0.08 – 0.15 | 0.537 |
| Negative Self Evaluations - Frequency | 0.13 | -0.41 – 0.68 | 0.631 |
| SPP-A Global Self Worth | -0.18 | -0.28 – -0.08 | **0.001** |
| Observations | 164 | | |
| R2 / R2 adjusted | 0.636 / 0.622 | | |

*Note.* Results from multiple regression analysis with multi-level Self variables as predictors and NSSI Lifetime Episodes (log transformed) as the outcome using imputed data (N=164) with age, BDI-II, CTQ scores, and medication status as covariates. CI=confidence interval; SPP-A= Self Perception Profile for Adolescents, Global Self Worth; SVC=Self Versus Change; RSFC= resting-state functional connectivity; BDI=Beck Depression Inventory; CTQ=Child Trauma Questionnaire; BSSI=Beck Scale for Suicidal Ideation.

**Supplementary Table S19: Relationships between Multi-Level Self measures and BSSI total score without data imputation**

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| ***Level of Analysis***  N Individual regression | N Individual regression with covariates | | ***Measure*** | *Parameter Estimate, p value\**  [95% CI] | *Parameter Estimate, p value\**  [95% CI] | *Parameter Estimate, p value\**  [95% CI] | *Parameter Estimate, p value*  [95% CI] |
|
| ***Statistical Approach*** | | | ***Individual regression without covarying*** *age, BDI, CTQ, medication status* | ***Individual regression covarying*** *age, BDI, CTQ, medication status* | ***Multiple regression without covarying*** *for age, BDI,CTQ, medication status*  N = 90 | ***Multiple regression covarying*** *for age, BDI,CTQ, medication status*  N = 81 |
| **Self-Report** | SPP-A  N = 117 | 107 | Global Self Worth | -0.41, <.001\*  [-0.49, -0.33] | -0.17, 0.0017\*  [-0.27, -0.06] | -0.34, <0.001  [-0.46, -.22] | -0.18, 0.01 [-0.31, -.05] |
| **Behavior** | Self Evaluations - Frequency  N = 124 | 113 | Negative | 1.96, <.001\*  [1.44, 2.49] | 0.49, 0.11  [-0.1, 1.08] | .59, 0.11  [-.14, 1.33] | -.15, 0.66 [-0.83, .53] |
| Self Evaluations -  Reaction Time  N = 124 | 113 | Negative | -0.865, <.001\*  [-1.32, -0.41] | -0.074, 0.72  [-0.48, 0.33] | NI | |
| Positive | 1.9, 0.012\*  [0.41, 3.35] | 0.36, 0.59  [-0.95, 1.68] | NI | |
| **Brain - Self Network** | SVC task -- Negative > Positive Valence  N = 105 | 95 | Anterior | 0.011, 0.89  [-0.15, 0.17] | -0.041, 0.5  [-0.16, 0.08] | NI | |
| Posterior | 0.09, 0.11  [-0.02, 0.2] | -0.0077, 0.86  [-0.09, 0.08] | NI | |
| SVC task –  Self > Change  N = 105 | 95 | Anterior | -0.096, 0.12  [-0.22, 0.02] | -0.038, 0.41  [-0.13, 0.05] | NI | |
| Posterior | -0.05, 0.35  [-0.15, 0.05] | -0.035, 0.39  [-0.11, 0.04] | NI | |
| RSFC  N = 120 | 108 | Anterior | -0.147, 0.78  [-1.19, 0.9] | 0.14, 0.74  [-0.7, 0.99] | NI | |
| Posterior | -0.37, 0.44  [-1.32, 0.58] | -0.142, 0.71  [-0.89, 0.61] | NI | |
| Cortical Thickness  N = 125 | 113 | Anterior | 0.12, 0.7  [-0.52, 0.77] | 0.11, 0.67  [-0.38, 0.59] | NI | |
| Posterior | 0.066, 0.86  [-0.7, 0.83] | 0.14, 0.65  [-0.46, 0.73] | NI | |

Results from individual (left) and multiple (right) regression analyses with multi-level Self variables as predictors and BSSI total score (log transformed) as the outcome. Results are organized by level of analysis (self report, behavior, each type of brain imaging modality. NS=Not significant; NI = Not included in final model for multiple regression; SPP-A= Self Perception Profile for Adolescents, Global Self Worth; SVC=Self Versus Change; RSFC= resting-state functional connectivity; BDI=Beck Depression Inventory; CTQ=Child Trauma Questionnaire; BSSI=Beck Scale for Suicidal Ideation.

\*Corrected p value still <0.05 after FDR correction for individual regressions

**Supplementary Table S20: Individual Relationships between Multi-Level Self measures and BSSI total score without data imputation**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
|  | **Lifetime NSSI Episodes** | | | |  |
| *Predictors* | *Estimates* | *CI* | *p* | R2 / R2 adjusted | *N* |  |
| (Intercept) | 1.48 | 1.26 – 1.71 | **<0.001** | 0.461 / 0.456 | 116 |  |
| SPP-A Global Self Worth | -0.41 | -0.49 – -0.33 | **<0.001\*** |  |  |  |
| (Intercept) | -0.11 | -0.29 – 0.06 | 0.199 | 0.310 / 0.304 | 124 |  |
| Negative Self Evaluations - Frequency | 1.96 | 1.44 – 2.49 | **<0.001\*** |  |  |  |
| (Intercept) | 1.41 | 0.90 – 1.92 | **<0.001** | 0.103 / 0.095 | 124 |  |
| Negative Self Evaluations - Reaction Time | -0.86 | -1.32 – -0.41 | **<0.001\*** |  |  |  |
| (Intercept) | -1.39 | -2.84 – 0.06 | 0.061 | 0.050 / 0.042 | 124 |  |
| Positive Self Evaluations - Reaction Time | 1.88 | 0.41 – 3.35 | **0.012\*** |  |  |  |
| (Intercept) | 0.49 | 0.38 – 0.60 | **<0.001** | 0.000 / -0.010 | 105 |  |
| Anterior Self Network SVC Task Negative > Positive Valence Activation | 0.01 | -0.15 – 0.17 | 0.889 |  |  |  |
| (Intercept) | 0.48 | 0.38 – 0.59 | **<0.001** | 0.024 / 0.015 | 105 |  |
| Posterior Self Network SVC Task Negative > Positive Valence Activation | 0.09 | -0.02 – 0.20 | 0.115 |  |  |  |
| (Intercept) | 0.57 | 0.43 – 0.72 | **<0.001** | 0.024 / 0.014 | 105 |  |
| Anterior Self Network SVC Task Self > Change Activation | -0.10 | -0.22 – 0.02 | 0.115 |  |  |  |
| (Intercept) | 0.53 | 0.40 – 0.67 | **<0.001** | 0.009 / -0.001 | 105 |  |
| Posterior Self Network SVC Task Self > Change Activation | -0.05 | -0.15 – 0.05 | 0.347 |  |  |  |
| (Intercept) | 0.49 | 0.25 – 0.73 | **<0.001** | 0.001 / -0.008 | 120 |  |
| Anterior Self Network RSFC | -0.15 | -1.19 – 0.90 | 0.780 |  |  |  |
| (Intercept) | 0.62 | 0.19 – 1.05 | **0.005** | 0.005 / -0.003 | 120 |  |
| Posterior Self Network RSFC | -0.37 | -1.32 – 0.58 | 0.441 |  |  |  |
| (Intercept) | 0.06 | -2.02 – 2.13 | 0.957 | 0.001 / -0.007 | 125 |  |
| Anterior Self Network Cortical Thickness | 0.12 | -0.52 – 0.77 | 0.701 |  |  |  |
| (Intercept) | 0.25 | -2.10 – 2.60 | 0.831 | 0.000 / -0.008 | 125 |  |
| Posterior Self Network Cortical Thickness | 0.07 | -0.70 – 0.83 | 0.863 |  |  |  |

*Note.* Results from individual regression analyses with multi-level Self variables as predictors and NSSI Lifetime Episodes (log transformed) as the outcome without data imputation. CI=confidence interval; SPP-A= Self Perception Profile for Adolescents, Global Self Worth; SVC=Self Versus Change; RSFC= resting-state functional connectivity; BSSI=Beck Scale for Suicidal Ideation.

\*Corrected p value still <0.05 after FDR correction for individual regressions

**Supplementary Table S21: Individual Relationships between Multi-Level Self measures and BSSI total score with covariates without data imputation**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
|  | **Lifetime NSSI Episodes** | | | |  |
| *Predictors* | *Estimates* | *CI* | *p* | R2 / R2 adjusted | *N* |  |
| (Intercept) | 0.76 | -0.22 – 1.74 | 0.126 | 0.648 / 0.630 | 108 |  |
| Age | -0.03 | -0.08 – 0.02 | 0.252 |  |  |  |
| CTQ Total | 0.01 | -0.00 – 0.02 | 0.083 |  |  |  |
| BDI Total | 0.02 | 0.02 – 0.03 | **<0.001** |  |  |  |
| Medication Status | -0.00 | -0.14 – 0.14 | 0.992 |  |  |  |
| SPP-A Global Self Worth | -0.17 | -0.27 – -0.06 | **0.002\*** |  |  |  |
| (Intercept) | 0.14 | -0.73 – 1.02 | 0.751 | 0.544 / 0.523 | 114 |  |
| Age | -0.03 | -0.09 – 0.02 | 0.268 |  |  |  |
| CTQ Total | 0.01 | 0.00 – 0.01 | **0.040** |  |  |  |
| BDI Total | 0.03 | 0.02 – 0.03 | **<0.001** |  |  |  |
| Medication Status | 0.01 | -0.14 – 0.17 | 0.847 |  |  |  |
| Negative Self Evaluations -Frequency | 0.49 | -0.10 – 1.08 | 0.106 |  |  |  |
| (Intercept) | 0.28 | -0.67 – 1.24 | 0.558 | 0.534 / 0.512 | 114 |  |
| Age | -0.03 | -0.09 – 0.02 | 0.259 |  |  |  |
| CTQ Total | 0.01 | 0.00 – 0.02 | **0.010** |  |  |  |
| BDI Total | 0.03 | 0.02 – 0.04 | **<0.001** |  |  |  |
| Medication Status | 0.02 | -0.14 – 0.18 | 0.810 |  |  |  |
| Negative Self Evaluations - Reaction Time | -0.07 | -0.48 – 0.33 | 0.720 |  |  |  |
| (Intercept) | -0.17 | -1.84 – 1.49 | 0.836 | 0.535 / 0.513 | 114 |  |
| Age | -0.03 | -0.09 – 0.03 | 0.284 |  |  |  |
| CTQ Total | 0.01 | 0.00 – 0.02 | **0.011** |  |  |  |
| BDI Total | 0.03 | 0.02 – 0.04 | **<0.001** |  |  |  |
| Medication Status | 0.02 | -0.13 – 0.18 | 0.778 |  |  |  |
| Positive Self Evaluations - Reaction Time | 0.36 | -0.95 – 1.68 | 0.586 |  |  |  |
| (Intercept) | 0.30 | -0.75 – 1.34 | 0.575 | 0.498 / 0.470 | 96 |  |
| Age | -0.04 | -0.11 – 0.03 | 0.222 |  |  |  |
| CTQ Total | 0.01 | 0.00 – 0.02 | **0.008** |  |  |  |
| BDI Total | 0.03 | 0.02 – 0.04 | **<0.001** |  |  |  |
| Medication Status | 0.03 | -0.15 – 0.21 | 0.747 |  |  |  |
| Anterior Self Network SVC Task Negative > Positive Valence Activation | -0.04 | -0.16 – 0.08 | 0.496 |  |  |  |
| (Intercept) | 0.29 | -0.76 – 1.34 | 0.588 | 0.496 / 0.468 | 96 |  |
| Age | -0.04 | -0.11 – 0.03 | 0.226 |  |  |  |
| CTQ Total | 0.01 | 0.00 – 0.02 | **0.009** |  |  |  |
| BDI Total | 0.03 | 0.02 – 0.04 | **<0.001** |  |  |  |
| Medication Status | 0.03 | -0.15 – 0.21 | 0.722 |  |  |  |
| Posterior Self Network SVC Task Negative > Positive Valence Activation | -0.01 | -0.09 – 0.08 | 0.860 |  |  |  |
| (Intercept) | 0.28 | -0.77 – 1.32 | 0.599 | 0.500 / 0.472 | 96 |  |
| Age | -0.04 | -0.10 – 0.03 | 0.276 |  |  |  |
| CTQ Total | 0.01 | 0.00 – 0.02 | **0.013** |  |  |  |
| BDI Total | 0.03 | 0.02 – 0.04 | **<0.001** |  |  |  |
| Medication Status | 0.03 | -0.15 – 0.20 | 0.753 |  |  |  |
| Anterior Self Network SVC Task Self > Change Activation | -0.04 | -0.13 – 0.05 | 0.408 |  |  |  |
| (Intercept) | 0.29 | -0.75 – 1.34 | 0.580 | 0.500 / 0.472 | 96 |  |
| Age | -0.04 | -0.11 – 0.03 | 0.254 |  |  |  |
| CTQ Total | 0.01 | 0.00 – 0.02 | **0.013** |  |  |  |
| BDI Total | 0.03 | 0.02 – 0.04 | **<0.001** |  |  |  |
| Medication Status | 0.03 | -0.15 – 0.20 | 0.753 |  |  |  |
| Posterior Self Network SVC Task Self > Change Activation | -0.03 | -0.11 – 0.04 | 0.389 |  |  |  |
| (Intercept) | 0.25 | -0.82 – 1.32 | 0.647 | 0.510 / 0.486 | 109 |  |
| Age | -0.03 | -0.10 – 0.03 | 0.314 |  |  |  |
| CTQ Total | 0.01 | -0.00 – 0.01 | 0.080 |  |  |  |
| BDI Total | 0.03 | 0.02 – 0.04 | **<0.001** |  |  |  |
| Medication Status | 0.03 | -0.14 – 0.19 | 0.759 |  |  |  |
| Anterior Self Network RSFC | 0.14 | -0.70 – 0.99 | 0.740 |  |  |  |
| (Intercept) | 0.42 | -0.67 – 1.52 | 0.443 | 0.510 / 0.486 | 109 |  |
| Age | -0.04 | -0.10 – 0.02 | 0.235 |  |  |  |
| CTQ Total | 0.01 | -0.00 – 0.01 | 0.085 |  |  |  |
| BDI Total | 0.03 | 0.02 – 0.04 | **<0.001** |  |  |  |
| Medication Status | 0.01 | -0.15 – 0.18 | 0.863 |  |  |  |
| Posterior Self Network RSFC | -0.14 | -0.89 – 0.61 | 0.707 |  |  |  |
| (Intercept) | -0.16 | -2.18 – 1.86 | 0.876 | 0.524 / 0.502 | 114 |  |
| Age | -0.03 | -0.09 – 0.03 | 0.371 |  |  |  |
| CTQ Total | 0.01 | 0.00 – 0.01 | **0.032** |  |  |  |
| BDI Total | 0.03 | 0.02 – 0.04 | **<0.001** |  |  |  |
| Medication Status | 0.01 | -0.15 – 0.17 | 0.894 |  |  |  |
| Anterior Self Network Cortical Thickness | 0.11 | -0.38 – 0.59 | 0.671 |  |  |  |
| (Intercept) | -0.26 | -2.59 – 2.08 | 0.826 | 0.525 / 0.503 | 114 |  |
| Age | -0.02 | -0.09 – 0.04 | 0.424 |  |  |  |
| CTQ Total | 0.01 | 0.00 – 0.01 | **0.036** |  |  |  |
| BDI Total | 0.03 | 0.02 – 0.04 | **<0.001** |  |  |  |
| Medication Status | 0.01 | -0.15 – 0.17 | 0.903 |  |  |  |
| Posterior Self Network Cortical Thickness | 0.14 | -0.46 – 0.73 | 0.654 |  |  |  |

*Note.* Results from individual regression analyses with multi-level Self variables as predictors and NSSI Lifetime Episodes (log transformed) as the outcome without data imputation with age, BDI-II, CTQ scores, and medication status as covariates. CI=confidence interval; SPP-A= Self Perception Profile for Adolescents, Global Self Worth; SVC=Self Versus Change; RSFC= resting-state functional connectivity; BDI=Beck Depression Inventory; CTQ=Child Trauma Questionnaire; BSSI=Beck Scale for Suicidal Ideation.

\*Corrected p value still <0.05 after FDR correction for individual regressions

**Supplementary Table S22: Relationships between Multi-Level Self measures and BSSI total score without data imputation**

|  |  |  |  |
| --- | --- | --- | --- |
|  | **BSSI Total** | | |
| *Predictors* | *Estimates* | *CI* | *p* |
| (Intercept) | 1.15 | 0.66 – 1.63 | **<0.001** |
| Negative Self Evaluations - Frequency | 0.59 | -0.14 – 1.33 | 0.112 |
| SPP-A Global Self Worth | -0.34 | -0.46 – -0.22 | **<0.001** |
| Observations | 104 | | |
| R2 / R2 adjusted | 0.459 / 0.449 | | |

*Note.* Results from multiple regression analysis with multi-level Self variables as predictors and NSSI Lifetime Episodes (log transformed) as the outcome without data imputation. CI=confidence interval; SPP-A= Self Perception Profile for Adolescents, Global Self Worth; SVC=Self Versus Change; RSFC= resting-state functional connectivity; BSSI=Beck Scale for Suicidal Ideation.

**Supplementary Table S23: Relationships between Multi-Level Self measures and BSSI total score with covariates without data imputation**

|  |  |  |  |
| --- | --- | --- | --- |
|  | **BSSI Total** | | |
| *Predictors* | *Estimates* | *CI* | *p* |
| (Intercept) | 0.88 | -0.30 – 2.05 | 0.140 |
| Age | -0.04 | -0.09 – 0.02 | 0.236 |
| CTQ Total | 0.01 | -0.00 – 0.02 | 0.081 |
| BDI Total | 0.02 | 0.02 – 0.03 | **<0.001** |
| Medication Status | 0.00 | -0.16 – 0.16 | 0.997 |
| Negative Self Evaluations - Frequency | -0.15 | -0.83 – 0.53 | 0.663 |
| SPP-A Global Self Worth | -0.18 | -0.31 – -0.05 | **0.006** |
| Observations | 96 | | |
| R2 / R2 adjusted | 0.627 / 0.602 | | |

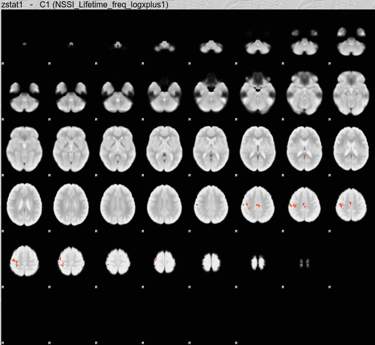
*Note.* Results from multiple regression analysis with multi-level Self variables as predictors and NSSI Lifetime Episodes (log transformed) as the outcome without data imputation with age, BDI-II, CTQ scores, and medication status as covariates. CI=confidence interval; SPP-A= Self Perception Profile for Adolescents, Global Self Worth; SVC=Self Versus Change; RSFC= resting-state functional connectivity; BDI=Beck Depression Inventory; CTQ=Child Trauma Questionnaire; BSSI=Beck Scale for Suicidal Ideation.

**Whole-brain analysis of SVC task data**

While the main analyses focused on the Self Network using *a priori* defined regions, for the SVC fMRI task, we additionally used a whole-brain approach since the task itself consistently probes the Self network. In the SVC task, adolescents are prompted to evaluate themselves with both negatively and positively valenced attributional words (Barendse, Cosme, et al., 2020; Barendse, Vijayakumar, et al., 2020; Pfeifer et al., 2007, 2013). To examine the relationship between NSSI severity and brain activation during positively and negatively valenced self-evaluations at every voxel in the brain, FSL FEAT was used to conduct a regression analysis measuring neural activation at each voxel of the brain during the SVC matching task. We considered the Self>Change and the Negative > Positive contrasts for subsequent analyses. The results of the two runs were combined using higher-level analysis in FSL FEAT using a fixed effects model. We then conducted a linear regression to test the relationship between NSSI Lifetime Episodes with brain activation in the Self > Change contrast and in the Positive > Valence contrasts using FLAME (FMRIB's Local Analysis of Mixed Effects) modelling and estimation. A voxel-wise significance threshold was set at z>3.1, and cluster threshold p<0.05.

*SvC fMRI and NSSI: Whole-brain analysis.* There were no significant clusters in the analysis examining the relationship between NSSI severity and activation in the self versus change contrast. For the valence contrast (Negative > Positive), greater NSSI severity correlated with greater activation (or lower deactivation) in precentral gyrus, posterior cingulate, postcentral and precuneus.

**Supplementary Figure S3: Lifetime NSSI: Negative > Positive Contrast Activation**



**Table S24: Lifetime NSSI: Negative > Positive Contrast**

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Cluster Index | Voxels | ROI | P | Z-MAX | Z-MAX X (mm) | Z-MAX Y (mm) | Z-MAX Z (mm) | Z-COG X (mm) | Z-COG Y (mm) | Z-COG Z (mm) | COPE-MAX | COPE-MAX X (mm) | COPE-MAX Y (mm) | COPE-MAX Z (mm) | COPE-MEAN |
| 4 | 340 | Precentral Gyrus | 6.99E-14 | 4.61 | 38 | -18 | 52 | 38.4 | -21.7 | 54.8 | 49.3 | 32 | -20 | 72 | 21.6 |
| 3 | 102 | PCC | 1.47E-05 | 4.66 | -2 | -24 | 46 | 1.7 | -17.1 | 47 | 33.3 | -2 | -24 | 46 | 20.8 |
| 2 | 54 | Postcentral Gyrus | 0.00318 | 4.1 | 56 | -18 | 46 | 55.8 | -18.1 | 45.6 | 42.1 | 58 | -18 | 48 | 22 |
| 1 | 38 | Precuneus | 0.0264 | 4.49 | 2 | -50 | 16 | 3.08 | -48.2 | 15 | 36.5 | 2 | -50 | 16 | 26.8 |

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