**Supplementary Materials**

**Methods**

Trauma and PTSD assessment

In 2008, trauma exposure was assessed with a 16-item modified version of the Brief Trauma Questionnaire, a reliable and valid trauma exposure measure that parallels interview measures (Morgan et al., 2001; Schnurr, Vielhauer, Weathers, & Findler, 1999). Lifetime exposure to 15 traumatic events (e.g., physical assault, natural disaster), in addition to “a seriously traumatic event not already covered,” was assessed. Respondents reported whether events occurred and identified the worst/most distressing event.

For women who reported a history of trauma exposure, PTSD symptoms subsequent to their worst trauma were assessed using the Short Screening Scale for DSM-IV PTSD (Breslau, Peterson, Kessler, & Schultz, 1999). Lifetime and past-month experience of seven symptoms were assessed: (1) avoided places/people/activities associated with the trauma; (2) lost interest in important/enjoyable activities; (3) felt isolated/distant from others; (4) found it hard to have love/affection for others; (5) had a sense of foreshortened future; (6) had sleep difficulties; (7) became jumpy/easily startled. In a validation study of this screener, a score of ≥4 identified PTSD cases with sensitivity=85% and specificity=93% (Breslau et al., 1999).

Cognitive assessment

The Cogstate Brief Battery is a validated self-administered online tool comprised of four tasks: Detection (DET), Identification (IDN), One Card Learning (OCL), and One Back (ONB), measuring psychomotor speed, attention, visual learning, and working memory, respectively (Fredrickson et al., 2010; Koyama et al., 2015). Following previous research (Koyama et al., 2015; Mielke et al., 2015; Sumner et al., 2017), task scores were log-transformed reaction times or arcsine-transformed task accuracy. Furthermore, using established thresholds, we excluded women who failed integrity checks on all four tasks at each assessment from subsequent analyses (0.87% of participants at baseline and 0-0.04% across follow-up sessions). Standardized z scores were calculated using means and standard deviations at baseline for each task. Two composite scores were generated: (1) a psychomotor speed/attention composite averaged the standardized DET and IDN scores and (2) a learning/working memory composite averaged the standardized OCL and ONB. For both composites, higher scores reflect better cognitive function.

Multiple imputation

Multiple imputations (MI) were performed for the missing values in covariates using the MI procedures in SAS statistical software v9.4 (SAS Institute, SAS Circle, Cary, NC, USA). First, we ran a PROC MI procedure with a fully conditional specification (FCS) method (Brand, 1999; van Buuren, 2007) to generate 10 imputation datasets. Ten imputations were obtained as more imputations add little practical benefits (Rubin, 1987; Schafer, 1999). We used predictive mean matching for continuous variables and logistic regression for binary and categorical variables except for race and smoking, which had small categories, and thus a discriminant function method was used.

The imputation procedure included all covariates, PTSD status, baseline cognitive composites, past-week depressive symptoms and history of physician-diagnosed depression. The missing rate was lower than 5.0% for depression variables and all covariates except for participant’s education (24.4%). PTSD status was observed for all participants. A small proportion of participants had missing baseline cognitive composites (0.2% for psychomotor speed/attention and 0.06% for learning/working memory); while these values were also imputed during the PROC MI procedure, we did not use the imputed cognitive scores in association analysis to be consistent with unimputed follow-up cognition data.

Then, each imputed dataset was analyzed using linear regression and linear mixed-effects models as described in Statistical Analysis, and results were combined using PROC MIANALYZE based on Rubin’s rule (Rubin, 1987).

Secondary analyses

*Adjustment for depression*

Depression is a common comorbidity of PTSD (Rytwinski, Scur, Feeny, & Youngstrom, 2013), which is associated with PTSD disease course and the likelihood of remission (Chapman et al., 2012; Steinert, Hofmann, Leichsenring, & Kruse, 2015). Depression is also associated with cognitive function and decline (Plassman, Williams, Burke, Holsinger, & Benjamin, 2010; Wang & Blazer, 2015). We evaluated the PTSD-cognition association independent of depression by further controlling for depressive symptoms in 2008 and any diagnosis of depression during 2003-2007. In the longitudinal analysis, we additionally added the interaction between depression and time.

*Adjustment for practice effects*

As reported in our previous work in the same data, Cogstate test scores increased over time due to practice effects (Roberts et al., 2022). Following previous work, we further control for the potential influence of prior practice in analyses by adding the number of prior tests taken (range=0 to 4, modeled as a categorical variable) to the covariates. For example, the number of prior tests taken was 0 for baseline assessments, and 3 for the 4th assessments.

In addition, we explored several alternative modeling approaches for practice effects to evaluate how results were affected by the parameterization of practice effects (Vivot et al., 2016):

* Adjusting for the number of prior tests as a continuous variable, which assumes constant improvements in test performance with each additional test.
* Adjusting for the square root of the number of prior tests as a continuous variable, which assumes that improvements in test performance become progressively smaller with more tests.
* Adjusting for a binary indicator of baseline versus post-baseline assessments (0 = baseline responses, 1 = post-baseline assessments), which assumes a “jump up” in performance between the first cognitive assessments and subsequent assessments.

*Alternative imputation methods*

To evaluate the extent to which the results were affected by the imputation of missing values particularly in participant’s education (24.4% missing), we examined several alternative imputation methods, described below. For methods a-c, we imputed other continuous covariates using mean conditional on PTSD status, and other categorical variables using mode conditional on PTSD status.

1. Group-specific mode. Missing values in participant’s education were filled in with the most common category conditional on PTSD, age, parental education, and spouse education.
2. Hot-deck imputation. Missing values in participant’s education were filled in with the education level of a randomly selected participant with the same level of PTSD, age, parental education, and spouse education.
3. Missing indicator. Missing values in participant’s education were assigned to a separate category.
4. Single imputation. Using the same imputation method as in MI, but only one dataset was generated.

We then examined how the cross-sectional and longitudinal analyses changed when using these alternative imputation methods.

*Selection into Cogstate*

We assessed how selection into Cogstate sample affected the validity of results using inverse probability weighting (IPW) in one imputation dataset. We compared the characteristics of women in this analytical sample (n=12,270) to the original cohort of women who reported trauma exposure in the 2008 PTSD survey (n=44,573). Next, we weighted the samples in cross-sectional and longitudinal analyses by the inverse probability of being included in this Cogstate sample, conditional on PTSD status, depression, sociodemographic factors, biobehavioral factors, and health conditions. Logistic regression models were used to estimate the conditional probability. We then applied the weights in association analyses, and robust variance estimator was used for statistical testing.

*Loss to follow-up*

We compared the characteristics of women who completed different numbers of cognitive assessments (range=1-5) and evaluated how PTSD status and cognitive function were associated with study dropouts. We assessed how the loss to follow-up during the Cogstate assessments affected the validity of longitudinal analysis using IPW in one imputation dataset. We weighted the samples at each session by the inverse of the probability of completing all assessments through this point. As shown in the formula below, this probability was calculated by the cumulative product of the conditional probabilities of completing each session, given remaining in the study up to the prior session, PTSD status, sociodemographic factors, biobehavioral factors, health conditions, and all prior cognitive scores.

$$w\_{it}=\frac{1}{\prod\_{j=1}^{t}P(R\_{ij}=1|R\_{i,j-1}=1, X\_{i},C\_{i,j-1},Y\_{i,j-1},Y\_{i,j-2},…,Y\_{i,0})}$$

i indicates individual; t indicates session; $w\_{it}$ is the weight at session t; $R\_{ij}$=1 indicates remaining in study at session j, and $R\_{ij}$=0 indicates dropout at session j; $ X\_{i}$ indicates PTSD status in 2008; $C\_{i,j-1}$ indicates covariates measured at session (j-1); $Y\_{i,j}$ indicates cognitive score at session j.

Logistic regression was used to estimate these conditional probabilities. We then applied the weights in linear mixed-effects models, and robust variance estimator was used for statistical testing.

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**Table S1. Distribution of trauma types and lifetime PTSD symptoms by PTSD status**

|  |  | **No PTSD sx** | **Remitted****1-3 PTSD sx** | **Remitted****4-7 PTSD sx** | **Unresolved****1-3 PTSD sx** | **Unresolved****4-7 PTSD sx** |
| --- | --- | --- | --- | --- | --- | --- |
|  |  | (n=4,017) | (n=3,347) | (n=1,125) | (n=2,997) | (n=784) |
| **Number of different trauma types experienced** a | 2.3 (1.4) | 3 (1.7) | 3.6 (1.9) | 3.7 (2) | 4.5 (2.4) |
| **Worst trauma event, %(n) b** |  |  |  |  |  |
|  | Serious accident | 8.7 (312) | 6.1 (196) | 3.1 (34) | 5.3 (154) | 4.8 (36) |
|  | Natural/human-made disaster | 5.1 (184) | 4.0 (129) | 1.2 (13) | 2.6 (75) | 1.1 (8) |
|  | Life-threatening illness | 5.9 (214) | 6.9 (220) | 3.7 (41) | 9.4 (270) | 7.5 (57) |
|  | Physical punishments/beatings before age 18 | 2.8 (102) | 3.4 (110) | 4.3 (47) | 7.7 (223) | 9.0 (68) |
|  | Other physical attack | 3.1 (112) | 6.0 (191) | 9.1 (100) | 6.5 (186) | 7.4 (56) |
|  | Unwanted sexual contact | 7.2 (260) | 13.0 (417) | 13.8 (151) | 14.8 (426) | 13.6 (103) |
|  | Miscarriage/Stillbirth | 16.7 (602) | 12.8 (411) | 11.4 (125) | 6.0 (174) | 2.5 (19) |
|  | Death of offspring | 1.1 (40) | 2.5 (79) | 6.8 (74) | 3.8 (108) | 5.3 (40) |
|  | Complications of pregnancy/labor | 7.5 (270) | 3.3 (106) | 4.4 (48) | 3.0 (85) | 1.5 (11) |
|  | Sexual harassment at work | 1.9 (68) | 1.3 (42) | 0.8 (9) | 0.9 (26) | 1.5 (11) |
|  | Serious injury or fear of injury | 3.1 (110) | 3.7 (118) | 3.3 (36) | 3.8 (108) | 4.2 (32) |
|  | Death of a close family member or friend | 14.6 (526) | 16.9 (542) | 13.1 (143) | 12.2 (350) | 8.6 (65) |
|  | Witness of injury/death outside of work | 6.6 (239) | 4.9 (156) | 2.0 (22) | 2.6 (76) | 2.9 (22) |
|  | War-related casualties | 0.5 (19) | 0.5 (16) | 0.3 (3) | 0.8 (23) | 0.5 (4) |
|  | Treating civilians with traumatic injuries | 8.9 (321) | 2.2 (71) | 0.7 (8) | 1.4 (40) | 0.8 (6) |
|  | Other | 6.2 (223) | 12.5 (402) | 21.9 (240) | 19.3 (556) | 28.9 (219) |
| **Lifetime PTSD symptoms, %(n)** |  |  |  |  |  |
| Avoided being reminded of this experience by staying away from certain places, people or activities c | 0.0 (0) | 49.3 (1651) | 85.1 (957) | 60.3 (1808) | 82.5 (647) |
| Lost interest in activities that were once important or enjoyable c | 0.0 (0) | 17.1 (574) | 79.9 (899) | 48.3 (1447) | 88.6 (695) |
|  Felt more isolated or distant from other people c | 0.0 (0) | 33.2 (1112) | 93.1 (1047) | 62.2 (1863) | 95.5 (749) |
| Found it hard to have love or affection for other people c | 0.0 (0) | 11.0 (368) | 58.2 (655) | 36.8 (1103) | 75.8 (594) |
| Felt that there was no point in planning for the future c | 0.0 (0) | 4.9 (164) | 42.8 (481) | 20.8 (624) | 60.2 (472) |
| Had more trouble than usual falling asleep or staying asleep d | 0.0 (0) | 41.6 (1393) | 84.5 (951) | 65.5 (1964) | 88.1 (691) |
| Became jumpy or got easily startled by ordinary noises or movements d | 0.0 (0) | 16.3 (547) | 47.3 (532) | 35.2 (1055) | 67.1 (526) |
| **Number of lifetime avoidance/numbing symptoms** | 0 (0) | 1.2 (0.8) | 3.6 (0.9) | 2.3 (1.4) | 4.0 (0.9) |
| **Number of lifetime hyperarousal symptoms** | 0 (0) | 0.6 (0.6) | 1.3 (0.6) | 1.0 (0.7) | 1.6 (0.6) |

Values are means (SD) for continuous variables or percentages (N) for categorical variables.

a Women reported their lifetime exposure to 15 traumatic events, in addition to “a seriously traumatic event not already covered”. The mean (SD) of the total number of trauma type is shown.

b The worst traumatic event identified by the women.

c Avoidance and numbing symptoms under DSM-IV Criteria C.
d Hyperarousal symptoms under DSM-IV Criteria D.

**Table S2.** Association between PTSD status (3 levels) and Cogstate composite scores at baseline

|  |  |  |  |
| --- | --- | --- | --- |
|  | **Model 0** | **Model 1** | **Model 2** |
| ***b* (95% CI)** | ***p*** | ***b* (95% CI)**  | ***p*** | ***b* (95% CI)**  | ***p*** |
| **Psychomotor Speed/Attention (****n=12,248)** |
| No PTSD | Ref | Ref | Ref | Ref | Ref | Ref |
| Remitted PTSD | -0.02 (-0.06, 0.02) | 0.25 | -0.04 (-0.07, 0.003) | 0.07 | -0.04 (-0.07, 0.003) | 0.07 |
| Unresolved PTSD | -0.10 (-0.14, -0.06) | <0.01 | -0.10 (-0.14, -0.06) | <0.01 | -0.10 (-0.14, -0.06) | <0.01 |
| **Learning/Working Memory (n=12,263)** |
| No PTSD | Ref | Ref | Ref | Ref | Ref | Ref |
| Remitted PTSD | 0.01 (-0.02, 0.05) | 0.38 | -0.0001 (-0.03, 0.03) | 0.99 | 0.001 (-0.03, 0.03) | 0.93 |
| Unresolved PTSD | -0.10 (-0.13, -0.06) | <0.01 | -0.10 (-0.13, -0.07) | <0.01 | -0.09 (-0.13, -0.06) | <0.01 |

Beta coefficients of PTSD groups from linear regression models are shown, representing the difference in baseline Cogstate composites compared to trauma-exposed women with no PTSD.

Model 0: no covariates.

Model 1: age at baseline cognitive assessment, race/ethnicity, parental education, participant education.

Model 2: Model 1 + body mass index, smoking status, alcohol use, physical activity, diet quality.

**Table S3.** Association between PTSD status (3 levels) and rate of change in Cogstate composite scores

|  |  |  |  |
| --- | --- | --- | --- |
|  | **Model 0** | **Model 1** | **Model 2** |
| ***b* (95% CI)** | ***p*** | ***b* (95% CI)**  | ***p*** | ***b* (95% CI)**  | ***p*** |
| **Psychomotor Speed/Attention (n=12,248)** |
| No PTSD | Ref | Ref | Ref | Ref | Ref | Ref |
| Remitted PTSD | -0.01 (-0.04, 0.02) | 0.42 | -0.01 (-0.04, 0.01) | 0.39 | -0.01 (-0.04, 0.01) | 0.39 |
| Unresolved PTSD | -0.01 (-0.04, 0.01) | 0.36 | -0.01 (-0.04, 0.01) | 0.32 | -0.01 (-0.04, 0.01) | 0.31 |
| **Learning/Working Memory (n=12,263)** |
| No PTSD | Ref | Ref | Ref | Ref | Ref | Ref |
| Remitted PTSD | -0.02 (-0.05, 0.0005) | 0.06 | -0.02 (-0.05, -0.007) | 0.04 | -0.02 (-0.05, -0.009) | 0.04 |
| Unresolved PTSD | -0.03 (-0.06, -0.01) | 0.01 | -0.03 (-0.06, -0.01) | 0.01 | -0.03 (-0.06, -0.01) | 0.01 |

Beta coefficients of the time\*PTSD interaction terms from the linear mixed-effects models are shown, representing the difference in one-year change in Cogstate composites compared to trauma-exposed women with no PTSD.

Model 0: no covariates.

Model 1: age at baseline cognitive assessment, race/ethnicity, parental education, participant education.

Model 2: Model 1 + body mass index, smoking status, alcohol use, physical activity, diet quality.

**Table S4.** Association between PTSD symptom severity and rate of change in Cogstate composite scores

|  |  |  |  |
| --- | --- | --- | --- |
|  | **Model 0** | **Model 1** | **Model 2** |
| ***b* (95% CI)** | ***p*** | ***b* (95% CI)**  | ***p*** | ***b* (95% CI)**  | ***p*** |
| **Remitted PTSD symptoms (n=4,472)a** |
| Psychomotor speed / attention | -0.0002 (-0.01, 0.01) | 0.97 | -0.0002 (-0.01, 0.01) | 0.98 | -0.0002 (-0.01, 0.01) | 0.97 |
| Learning / working memory | -0.01 (-0.02, -0.004) | 0.01 | -0.01 (-0.02, -0.005) | 0.01 | -0.01 (-0.02, -0.003) | 0.01 |
| **Unresolved PTSD symptoms (n=3,781)b** |
| Psychomotor speed / attention | -0.002 (-0.01, 0.01) | 0.76 | -0.003 (-0.02, 0.01) | 0.69 | -0.003 (-0.02, 0.01) | 0.67 |
| Learning / working memory | -0.01 (-0.02, 0.01) | 0.34 | -0.01 (-0.02, 0.01) | 0.31 | -0.01 (-0.02, 0.01) | 0.31 |

Beta coefficients of PTSD groups from linear mixed-effects models are shown, representing the difference in in one-year change in Cogstate composites for every unit increase in symptom severity.

Model 0: no covariates.

Model 1: age at baseline cognitive assessment, race/ethnicity, parental education, participant education.

Model 2: Model 1 + body mass index, smoking status, alcohol use, physical activity, diet quality.

aAnalysis was restricted to women with remitted PTSD symptoms as of 2008. Lifetime PTSD symptom severity was modeled as the predictor.

bAnalysis was restricted to women with unresolved PTSD symptoms as of 2008. Past-month PTSD symptom severity was modeled as the predictor.

**Table S5.** Association between PTSD status and Cogstate composite scores at baseline, adjusted for depression

|  |  |  |  |
| --- | --- | --- | --- |
|  | **N (%)** | **Model-1** | **Model-2** |
| ***b* (95% CI)** | ***p*** | ***b* (95% CI)**  | ***p*** |
| **Psychomotor Speed/Attention (n=12,248)** |
| No PTSD sx | 4,009 (32.7%) | Ref | Ref | Ref | Ref |
| Remitted 1-3 PTSD sx | 3,342 (27.3%) | -0.03 (-0.07, 0.01) | 0.12 | -0.03 (-0.07, 0.01) | 0.12 |
| Remitted 4-7 PTSD sx | 1,121 (9.2%) | -0.03 (-0.09, 0.03) | 0.40 | -0.03 (-0.09, 0.03) | 0.39 |
| Unresolved 1-3 PTSD sx | 2,996 (24.5%) | -0.07 (-0.11, -0.02) | <0.01 | -0.07 (-0.12, -0.03) | <0.01 |
| Unresolved 4-7 PTSD sx | 780 (6.4%) | -0.08 (-0.16, -0.00) | 0.05 | -0.08 (-0.16, -0.00) | 0.04 |
| **Learning/Working Memory (n=12,263)** |
| No PTSD sx | 4,015 (32.7%) | Ref | Ref | Ref | Ref |
| Remitted 1-3 PTSD sx | 3,343 (27.3%) | 0.01 (-0.02, 0.04) | 0.52 | 0.01 (-0.02, 0.04) | 0.50 |
| Remitted 4-7 PTSD sx | 1,124 (9.2%) | -0.00 (-0.05, 0.04) | 0.90 | 0.00 (-0.05, 0.05) | 0.97 |
| Unresolved 1-3 PTSD sx | 2,997 (24.4%) | -0.04 (-0.07, -0.00) | 0.05 | -0.04 (-0.07, 0.00) | 0.05 |
| Unresolved 4-7 PTSD sx | 784 (6.4%) | -0.09 (-0.15, -0.02) | 0.01 | -0.08 (-0.14, -0.02) | 0.01 |

Beta coefficients of PTSD groups from linear regression models are shown, representing the difference in baseline Cogstate composites compared to trauma-exposed women with no PTSD.

Model 1: age at baseline cognitive assessment, race/ethnicity, parental education, participant education, depressive symptoms in 2008 and any diagnosis of depression during 2003-2007

Model 2: Model 1 + body mass index, smoking status, alcohol use, physical activity, diet quality

**Table S6.** Association between PTSD status and rate of change in Cogstate composite scores, adjusted for depression

|  |  |  |  |
| --- | --- | --- | --- |
|  | **N (%)** | **Adjusted for depression a** | **Adjusted for depression + time\*depression interactions b** |
| ***b* (95% CI)**  | ***p*** | ***b* (95% CI)** | ***p*** |
| **Psychomotor Speed/Attention (n=12,248)** |
| No PTSD sx | 4,009 (32.7%) | Ref | Ref | Ref | Ref |
| Remitted 1-3 PTSD sx | 3,342 (27.3%) | -0.02 (-0.05, 0.01) | 0.21 | -0.02 (-0.05, 0.01) | 0.23 |
| Remitted 4-7 PTSD sx | 1,121 (9.2%) | 0.01 (-0.03, 0.05) | 0.71 | 0.01 (-0.03, 0.05) | 0.57 |
| Unresolved 1-3 PTSD sx | 2,996 (24.5%) | -0.01 (-0.04, 0.02) | 0.36 | -0.01 (-0.04, 0.02) | 0.70 |
| Unresolved 4-7 PTSD sx | 780 (6.4%) | -0.02 (-0.06, 0.03) | 0.49 | 0 (-0.05, 0.05) | 0.99 |
| **Learning/Working Memory (n=12,263)** |
| No PTSD sx | 4,015 (32.7%) | Ref | Ref | Ref | Ref |
| Remitted 1-3 PTSD sx | 3,343 (27.3%) | -0.01 (-0.04, 0.01) | 0.40 | -0.01 (-0.04, 0.01) | 0.41 |
| Remitted 4-7 PTSD sx | 1,124 (9.2%) | -0.06 (-0.10, -0.03) | <0.01 | -0.06 (-0.10, -0.03) | <0.01 |
| Unresolved 1-3 PTSD sx | 2,997 (24.4%) | -0.03 (-0.05, -0.00) | 0.04 | -0.02 (-0.05, 0.01) | 0.14 |
| Unresolved 4-7 PTSD sx | 784 (6.4%) | -0.05 (-0.09, -0.01) | 0.01 | -0.04 (-0.08, 0.01) | 0.12 |

Beta coefficients of the time\*PTSD interaction terms from the linear mixed-effects models are shown, representing the difference in one-year change in Cogstate composite compared to trauma-exposed women with no PTSD. Models were adjusted for age at baseline cognitive assessment, race/ethnicity, parental education, participant education, body mass index, smoking status, alcohol use, physical activity, diet quality, depressive symptoms in 2008 and any diagnosis of depression during 2003-2007

a Only included main effects of depression variables.

b Main effects of depression variables and their interaction with time were included. The interaction terms were not significant (p>0.05).

**Table S7.** Association between PTSD status and rate of change in Cogstate composite scores, adjusted for practice effects

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|   | **Categorical PE** | **Continuous PE** | **Square root PE** | **Binary PE** |
| b (95% CI) | p | b (95% CI) | p | b (95% CI) | p | b (95% CI) | p |
| **Psychomotor Speed/Attention (n=12,248)** |  |
| No PTSD sx | Ref | Ref | Ref | Ref | Ref | Ref | Ref | Ref |
| Remitted 1-3 PTSD sx | -0.01 (-0.04, 0.01) | 0.33 | -0.02 (-0.05, 0.01) | 0.21 | -0.01 (-0.04, 0.01) | 0.31 | -0.01 (-0.04, 0.01) | 0.34 |
| Remitted 4-7 PTSD sx | 0.02 (-0.02, 0.05) | 0.45 | 0.01 (-0.03, 0.05) | 0.70 | 0.01 (-0.03, 0.05) | 0.48 | 0.01 (-0.03, 0.05) | 0.47 |
| Unresolved 1-3 PTSD sx | -0.01 (-0.04, 0.02) | 0.59 | -0.01 (-0.04, 0.02) | 0.37 | -0.01 (-0.04, 0.02) | 0.57 | -0.01 (-0.04, 0.02) | 0.57 |
| Unresolved 4-7 PTSD sx | -0.01 (-0.06, 0.03) | 0.61 | -0.02 (-0.06, 0.03) | 0.48 | -0.01 (-0.06, 0.03) | 0.59 | -0.01 (-0.06, 0.03) | 0.61 |
| **Learning/Working Memory (n=12,263)** |  |
| No PTSD sx | Ref | Ref | Ref | Ref | Ref | Ref | Ref | Ref |
| Remitted 1-3 PTSD sx | -0.01 (-0.03, 0.02) | 0.48 | -0.01 (-0.04, 0.01) | 0.36 | -0.01 (-0.03, 0.02) | 0.55 | -0.01 (-0.03, 0.02) | 0.50 |
| Remitted 4-7 PTSD sx | -0.06 (-0.09, -0.02) | <0.01 | -0.06 (-0.10, -0.03) | <0.01 | -0.06 (-0.09, -0.02) | <0.01 | -0.06 (-0.09, -0.02) | <0.01 |
| Unresolved 1-3 PTSD sx | -0.02 (-0.05, 0.00) | 0.08 | -0.03 (-0.05, -0.00) | 0.05 | -0.02 (-0.05, 0.00) | 0.10 | -0.02 (-0.05, 0.00) | 0.07 |
| Unresolved 4-7 PTSD sx | -0.05 (-0.09, -0.01) | 0.02 | -0.05 (-0.10, -0.01) | 0.01 | -0.05 (-0.09, -0.01) | 0.02 | -0.05 (-0.09, -0.01) | 0.02 |

Beta coefficients of the time\*PTSD interaction terms from the linear mixed-effects models are shown, representing the difference in one-year change in Cogstate composite compared to trauma-exposed women with no PTSD. Models were adjusted for age at baseline cognitive assessment, race/ethnicity, parental education, participant education, body mass index, smoking status, alcohol use, physical activity, diet quality, and practice effects (PE). Categorical PE: models were adjusted for the number of prior tests taken (range=0 to 4), modeled as a categorical variable. Continuous PE: models were adjusted for the number of prior tests taken, modeled as a continuous variable. Square root PE: models were adjusted for the square root of the number of prior tests, modeled ad a continuous variable. Binary PE: models were adjusted for a binary indicator of baseline versus post-baseline assessments.

**Table S8.** Association between PTSD status and Cogstate composite scores at baseline, using alternative imputation methods

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|   | **Group-specific mode** | **Hot-deck imputation** | **Missing indicator** | **Single imputation** |
| b (95% CI) | p | b (95% CI) | p | b (95% CI) | p | b (95% CI) | p |
| **Psychomotor Speed/Attention (n=12,248)** |  |
| No PTSD sx | Ref | Ref | Ref | Ref | Ref | Ref | Ref | Ref |
| Remitted 1-3 PTSD sx | -0.04 (-0.08, 0.01) | 0.09 | -0.04 (-0.08, 0.01) | 0.09 | -0.04 (-0.08, 0.00) | 0.08 | -0.04 (-0.08, 0.01) | 0.09 |
| Remitted 4-7 PTSD sx | -0.03 (-0.09, 0.03) | 0.27 | -0.03 (-0.09, 0.03) | 0.26 | -0.04 (-0.10, 0.02) | 0.24 | -0.04 (-0.10, 0.02) | 0.24 |
| Unresolved 1-3 PTSD sx | -0.10 (-0.14, -0.05) | <0.01 | -0.09 (-0.14, -0.05) | <0.01 | -0.09 (-0.14, -0.05) | <0.01 | -0.09 (-0.14, -0.05) | <0.01 |
| Unresolved 4-7 PTSD sx | -0.14 (-0.21, -0.07) | <0.01 | -0.14 (-0.21, -0.07) | <0.01 | -0.14 (-0.21, -0.07) | <0.01 | -0.14 (-0.21, -0.07) | <0.01 |
| **Learning/Working Memory (n=12,263)** |  |
| No PTSD sx | Ref | Ref | Ref | Ref | Ref | Ref | Ref | Ref |
| Remitted 1-3 PTSD sx | 0.01 (-0.03, 0.04) | 0.69 | 0.01 (-0.03, 0.04) | 0.70 | 0.01 (-0.03, 0.04) | 0.71 | 0.01 (-0.03, 0.04) | 0.65 |
| Remitted 4-7 PTSD sx | -0.02 (-0.06, 0.03) | 0.54 | -0.02 (-0.06, 0.03) | 0.54 | -0.01 (-0.06, 0.03) | 0.56 | -0.02 (-0.06, 0.03) | 0.52 |
| Unresolved 1-3 PTSD sx | -0.07 (-0.11, -0.04) | <0.01 | -0.07 (-0.11, -0.04) | <0.01 | -0.07 (-0.11, -0.04) | <0.01 | -0.07 (-0.11, -0.04) | <0.01 |
| Unresolved 4-7 PTSD sx | -0.17 (-0.23, -0.12) | <0.01 | -0.17 (-0.23, -0.12) | <0.01 | -0.17 (-0.22, -0.11) | <0.01 | -0.17 (-0.23, -0.12) | <0.01 |

Beta coefficients of PTSD groups from linear regression models are shown, representing the difference in baseline Cogstate composites compared to trauma-exposed women with no PTSD. Models were adjusted for age at baseline cognitive assessment, race/ethnicity, parental education, participant education, body mass index, smoking status, alcohol use, physical activity, diet quality.

**Table S9.** Association between PTSD status and rate of change in Cogstate composite scores, using alternative imputation methods

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|   | **Group-specific mode** | **Hot-deck imputation** | **Missing indicator** | **Single imputation** |
| b (95% CI) | p | b (95% CI) | p | b (95% CI) | p | b (95% CI) | p |
| **Psychomotor Speed/Attention (n=12,248)** |  |
| No PTSD sx | Ref | Ref | Ref | Ref | Ref | Ref | Ref | Ref |
| Remitted 1-3 PTSD sx | -0.02 (-0.05, 0.01) | 0.21 | -0.02 (-0.05, 0.01) | 0.21 | -0.02 (-0.05, 0.01) | 0.22 | -0.02 (-0.05, 0.01) | 0.21 |
| Remitted 4-7 PTSD sx | 0.01 (-0.03, 0.05) | 0.71 | 0.01 (-0.03, 0.05) | 0.71 | 0.01 (-0.03, 0.05) | 0.71 | 0.01 (-0.03, 0.05) | 0.70 |
| Unresolved 1-3 PTSD sx | -0.01 (-0.04, 0.02) | 0.36 | -0.01 (-0.04, 0.02) | 0.36 | -0.01 (-0.04, 0.02) | 0.36 | -0.01 (-0.04, 0.02) | 0.35 |
| Unresolved 4-7 PTSD sx | -0.02 (-0.06, 0.03) | 0.49 | -0.02 (-0.06, 0.03) | 0.49 | -0.02 (-0.06, 0.03) | 0.50 | -0.02 (-0.06, 0.03) | 0.50 |
| **Learning/Working Memory (n=12,263)** |  |
| No PTSD sx | Ref | Ref | Ref | Ref | Ref | Ref | Ref | Ref |
| Remitted 1-3 PTSD sx | -0.01 (-0.04, 0.01) | 0.40 | -0.01 (-0.04, 0.01) | 0.40 | -0.01 (-0.04, 0.01) | 0.41 | -0.01 (-0.04, 0.01) | 0.39 |
| Remitted 4-7 PTSD sx | -0.06 (-0.10, -0.03) | <0.01 | -0.06 (-0.10, -0.03) | <0.01 | -0.06 (-0.10, -0.03) | <0.01 | -0.06 (-0.10, -0.03) | <0.01 |
| Unresolved 1-3 PTSD sx | -0.03 (-0.05, -0.00) | 0.04 | -0.03 (-0.05, -0.00) | 0.04 | -0.03 (-0.05, -0.00) | 0.04 | -0.03 (-0.05, -0.00) | 0.04 |
| Unresolved 4-7 PTSD sx | -0.05 (-0.09, -0.01) | 0.01 | -0.05 (-0.09, -0.01) | 0.01 | -0.05 (-0.09, -0.01) | 0.01 | -0.05 (-0.09, -0.01) | 0.01 |

Beta coefficients of the time\*PTSD interaction terms from the linear mixed-effects models are shown, representing the difference in one-year change in Cogstate composites compared to trauma-exposed women with no PTSD. Models were adjusted for age at baseline cognitive assessment, race/ethnicity, parental education, participant education, body mass index, smoking status, alcohol use, physical activity, diet quality.

**Table S10.** Participant characteristics in the PTSD cohort and in Cogstate

|  |  | **PTSD cohort** | **Cogstate** **analytical sample** |
| --- | --- | --- | --- |
|  |  | (n=44,573)a | (n=12,270) |
| **PTSD status, %(n)** |  |  |
| No PTSD sx | 34.6 (15416) | 32.7 (4017) |
|  Remitted 1-3 PTSD sx | 24.4 (10854) | 27.3 (3347) |
|  Remitted 4-7 PTSD sx | 8.7 (3896) | 9.2 (1125) |
|  Unresolved 1-3 PTSD sx | 24.9 (11100) | 24.4 (2997) |
|  Unresolved 4-7 PTSD sx | 7.4 (3307) | 6.4 (784) |
| **Age at PTSD assessment (years)** | 53.9 (4.6) | 53.9 (4.6) |
| **Age at worst trauma (years)** | 30.2 (14.3) | 29.7 (14.3) |
| **Years since worst trauma** | 23.7 (14.5) | 24.2 (14.5) |
| **Racial identity,** **Non-Hispanic White %(n)** | 95.0 (41796) | 95.9 (11640) |
| **Parental education, %(n)** |
|  | High school | 51.5 (21923) | 49.4 (5925) |
|  | Some college | 24.7 (10501) | 25.3 (3035) |
|  | College plus | 23.8 (10108) | 25.2 (3023) |
| **Participant education, %(n)** |
|  | Associate’s  | 23.8 (5439) | 22.8 (2115) |
|  | Bachelor’s | 40.6 (9285) | 40.3 (3741) |
|  | Master’s | 30.4 (6957) | 31.5 (2923) |
|  | Doctorate | 5.3 (1212) | 5.4 (500) |
| **Body mass index (kg/m2)** | 27.4 (6.4) | 27.3 (6.3) |
| **Smoking status, %(n)** |
|  | Never | 64.7 (28798) | 65.3 (8006) |
|  | Past | 29.0 (12926) | 29.8 (3659) |
|  | Current | 6.3 (2803) | 4.9 (597) |
| **Alcohol intake, %(n)** |
|  | None | 33.7 (14018) | 31.7 (3698) |
|  | 0-20 grams/day | 59.3 (24662) | 61.0 (7132) |
|  | 20+ grams/day | 7.1 (2936) | 7.3 (854) |
| **Physical activity (MET hrs/wk)** | 23.8 (29.8) | 24 (28.4) |
| **Diet quality on the Alternate Healthy Eating Index b** | 57.6 (12) | 58.3 (12) |
| **Depressive symptoms (CES-D) c** | 6.3 (5.2) | 6.0 (5.0) |
| **Diagnosed depression d, %(n)** | 23.3 (10395) | 23.4 (2876) |
| **Hypertension e, %(n)** | 30.4 (13545) | 28.8 (3529) |
| **Diabetes e, %(n)** | 5.7 (2554) | 4.4 (545) |
| **Myocardial infarction e, %(n)** | 1.2 (541) | 1.1 (133) |
| **Stroke e, %(n)** | 1.3 (571) | 1.1 (129) |

Values are means (SD) for continuous variables or percentages (N) for categorical variables. Values of categorical variables may not sum to 100% due to rounding or missing data. MET = metabolic equivalent of task. sx =symptoms.

a Women who reported any trauma exposure in the 2008 PTSD survey.

b Alternate Healthy Eating Index without alcohol consumption was used in the analysis; higher scores reflect better diet quality (possible range=0–100).

c Center for Epidemiologic Studies Depression (CES-D) scale, short form (possible range=0–30).

d History of clinician-diagnosed depression reported at the 2003-2013 questionnaires.

e History of clinician-diagnosed health conditions reported at the 1989-2013 questionnaires.

**Table S11.** Association between PTSD status and cognition, weighted by the probability of selection into Cogstate

|  |  |  |  |
| --- | --- | --- | --- |
|  | **N (%)** | **Cross-sectional a** | **Longitudinal b** |
| ***b* (95% CI)** | ***p*** | ***b* (95% CI)**  | ***p*** |
| **Psychomotor Speed/Attention (n=12,248)** |
| No PTSD sx | 4,009 (32.7%) | Ref | Ref | Ref | Ref |
| Remitted 1-3 PTSD sx | 3,342 (27.3%) | -0.04 (-0.08, 0.00) | 0.05 | -0.02 (-0.05, 0.01) | 0.19 |
| Remitted 4-7 PTSD sx | 1,121 (9.2%) | -0.04 (-0.10, 0.02) | 0.16 | 0.01 (-0.03, 0.05) | 0.55 |
| Unresolved 1-3 PTSD sx | 2,996 (24.5%) | -0.10 (-0.14, -0.06) | <0.01 | -0.02 (-0.04, 0.01) | 0.26 |
| Unresolved 4-7 PTSD sx | 780 (6.4%) | -0.14 (-0.20, -0.07) | <0.01 | -0.02 (-0.07, 0.03) | 0.40 |
| **Learning/Working Memory (n=12,263)** |
| No PTSD sx | 4,015 (32.7%) | Ref | Ref | Ref | Ref |
| Remitted 1-3 PTSD sx | 3,343 (27.3%) | 0.00 (-0.03, 0.04) | 0.78 | -0.01 (-0.04, 0.01) | 0.36 |
| Remitted 4-7 PTSD sx | 1,124 (9.2%) | -0.02 (-0.07, 0.03) | 0.47 | -0.06 (-0.10, -0.03) | <0.01 |
| Unresolved 1-3 PTSD sx | 2,997 (24.4%) | -0.08 (-0.11, -0.05) | <0.01 | -0.02 (-0.05, 0.00) | 0.06 |
| Unresolved 4-7 PTSD sx | 784 (6.4%) | -0.17 (-0.22, -0.12) | <0.01 | -0.06 (-0.11, -0.02) | 0.01 |

Models were adjusted for age at baseline cognitive assessment, race/ethnicity, parental education, participant education, body mass index, smoking status, alcohol use, physical activity, diet quality

a Beta coefficients of PTSD groups from linear regressions are shown, representing the difference in baseline Cogstate composites compared to trauma-exposed women with no PTSD.

b Beta coefficients of the time\*PTSD interaction terms from the linear mixed-effects models are shown, representing the difference in one-year change in Cogstate composite compared to trauma-exposed women with no PTSD.

**Table S12.** Participant characteristics by the number of completed cognitive assessments (n=12,270).

|  |  | **Number of completed assessments** |
| --- | --- | --- |
|  |  | 1(n=4,333) | 2(n=3,727) | 3(n=2,557) | 4(n=1,028) | 5(n=625) |
| **PTSD status, %(n)** |  |  |  |  |  |
| No PTSD sx | 32.7 (1416) | 34.2 (1276) | 32.3 (827) | 31.5 (324) | 27.8 (174) |
|  Remitted 1-3 PTSD sx | 26.8 (1162) | 27.2 (1012) | 27.5 (702) | 28.6 (294) | 28.3 (177) |
|  Remitted 4-7 PTSD sx | 9.4 (406) | 8.5 (316) | 9.6 (246) | 8.9 (92) | 10.4 (65) |
|  Unresolved 1-3 PTSD sx | 24.5 (1061) | 23.4 (873) | 25.4 (649) | 24.5 (252) | 25.9 (162) |
|  Unresolved 4-7 PTSD sx | 6.6 (288) | 6.7 (250) | 5.2 (133) | 6.4 (66) | 7.5 (47) |
| **Age at baseline**  | 60.8 (4.5) | 61.1 (4.5) | 61.2 (4.5) | 61.3 (4.7) | 61.4 (4.6) |
| **Age at worst trauma (years)** | 29.6 (14.1) | 29.4 (14.3) | 30.3 (14.3) | 29.8 (14.9) | 29.4 (14.9) |
| **Years since worst trauma** | 23.9 (14.3) | 24.5 (14.6) | 23.9 (14.5) | 24.3 (14.8) | 25.1 (15) |
| **Racial identity,** **Non-Hispanic White %(n)** | 95.5 (4091) | 95.7 (3534) | 96.0 (2427) | 96.9 (984) | 96.8 (604) |
| **Parental education, %(n)** |
|  | High school | 47.8 (2011) | 49.6 (1807) | 51.2 (1282) | 50.7 (511) | 51.1 (314) |
|  | Some college | 26.3 (1106) | 24.9 (908) | 25.1 (629) | 24.8 (250) | 23.1 (142) |
|  | College plus | 26.0 (1094) | 25.5 (930) | 23.7 (593) | 24.5 (247) | 25.9 (159) |
| **Participant education, %(n)** |
|  | Associate’s  | 21.5 (622) | 22.7 (656) | 23.3 (488) | 24.7 (213) | 25.3 (136) |
|  | Bachelor’s | 39.7 (1150) | 40.0 (1159) | 41.4 (866) | 40.4 (348) | 40.5 (218) |
|  | Master’s | 33.2 (960) | 31.9 (922) | 29.7 (622) | 30.2 (260) | 29.6 (159) |
|  | Doctorate | 5.6 (163) | 5.4 (157) | 5.5 (115) | 4.6 (40) | 4.6 (25) |
| **Body mass index (kg/m2)** | 27.4 (6.3) | 27.3 (6.3) | 27 (6.1) | 27.6 (6.8) | 27 (6) |
| **Smoking status, %(n)** |
|  | Never | 65.4 (2832) | 65.0 (2421) | 64.9 (1659) | 67.4 (693) | 64.2 (401) |
|  | Past | 29.8 (1289) | 29.6 (1103) | 30.7 (784) | 28.3 (291) | 30.7 (192) |
|  | Current | 4.8 (208) | 5.4 (200) | 4.4 (113) | 4.3 (44) | 5.1 (32) |
| **Alcohol intake, %(n)** |
|  | None | 31.2 (1284) | 30.6 (1090) | 32.7 (798) | 33.1 (323) | 34.1 (203) |
|  | 0-20 grams/day | 61.1 (2512) | 62.6 (2230) | 59.4 (1451) | 60.6 (591) | 58.5 (348) |
|  | 20+ grams/day | 7.6 (314) | 6.8 (241) | 7.9 (193) | 6.4 (62) | 7.4 (44) |
| **Physical activity (MET hrs/wk)** | 24.1 (30.8) | 23.9 (27.5) | 23.8 (26.7) | 23.1 (24) | 26.3 (30.9) |
| **Diet quality on the Alternate Healthy Eating Index a** | 58.2 (12.2) | 58.4 (12) | 58.2 (11.8) | 57.9 (11.7) | 58.4 (12.3) |
| **Depressive symptoms****(CES-D) b** | 6.1 (5) | 6.1 (5) | 5.9 (4.9) | 6.1 (5) | 5.9 (4.8) |
| **Diagnosed depression c, %(n)** | 24.0 (1042) | 23.0 (858) | 22.3 (571) | 26.0 (267) | 22.1 (138) |
| **Hypertension d, %(n)** | 29.4 (1274) | 28.3 (1054) | 27.8 (712) | 30.4 (312) | 28.3 (177) |
| **Diabetes d, %(n)** | 5.1 (223) | 4.1 (154) | 4.3 (111) | 3.7 (38) | 3.0 (19) |
| **Myocardial infarction d, %(n)** | 0.8 (35) | 1.1 (40) | 1.6 (41) | 1.0 (10) | 1.1 (7) |
| **Stroke d, %(n)** | 1.2 (52) | 0.7 (27) | 1.2 (31) | 1.3 (13) | 1.0 (6) |

Values are means (SD) for continuous variables or percentages (N) for categorical variables. Values of categorical variables may not sum to 100% due to rounding or missing data. MET = metabolic equivalent of task. sx =symptoms.

a Alternate Healthy Eating Index without alcohol consumption was used in the analysis; higher scores reflect better diet quality (possible range=0–100).

b Center for Epidemiologic Studies Depression (CES-D) scale, short form (possible range=0–30).

c History of clinician-diagnosed depression reported at the 2003-2013 questionnaires.

d History of clinician-diagnosed health conditions reported at the 1989-2013 questionnaires.

**Table S13.** Association between PTSD status and rate of change in Cogstate composite scores, weighted by the probability of remaining in the study

|  |  |  |  |
| --- | --- | --- | --- |
|  | **N (%)** | **Model-1** | **Model-2** |
| ***b* (95% CI)**  | ***p*** | ***b* (95% CI)** | ***p*** |
| **Psychomotor Speed/Attention (n=12,248)** |
| No PTSD sx | 4,009 (32.7%) | Ref | Ref | Ref | Ref |
| Remitted 1-3 PTSD sx | 3,342 (27.3%) | -0.01 (-0.04, 0.02) | 0.45 | -0.01 (-0.04, 0.02) | 0.46 |
| Remitted 4-7 PTSD sx | 1,121 (9.2%) | 0.00 (-0.04, 0.05) | 0.83 | 0.00 (-0.04, 0.05) | 0.82 |
| Unresolved 1-3 PTSD sx | 2,996 (24.5%) | -0.01 (-0.04, 0.02) | 0.52 | -0.01 (-0.04, 0.02) | 0.52 |
| Unresolved 4-7 PTSD sx | 780 (6.4%) | -0.01 (-0.06, 0.05) | 0.81 | -0.01 (-0.06, 0.05) | 0.81 |
| **Learning/Working Memory (n=12,263)** |
| No PTSD sx | 4,015 (32.7%) | Ref | Ref | Ref | Ref |
| Remitted 1-3 PTSD sx | 3,343 (27.3%) | -0.01 (-0.04, 0.02) | 0.44 | -0.01 (-0.04, 0.02) | 0.43 |
| Remitted 4-7 PTSD sx | 1,124 (9.2%) | -0.06 (-0.09, -0.02) | <0.01 | -0.06 (-0.09, -0.02) | <0.01 |
| Unresolved 1-3 PTSD sx | 2,997 (24.4%) | -0.02 (-0.05, 0.01) | 0.14 | -0.02 (-0.05, 0.01) | 0.14 |
| Unresolved 4-7 PTSD sx | 784 (6.4%) | -0.05 (-0.10, -0.00) | 0.04 | -0.05 (-0.10, -0.00) | 0.04 |

Beta coefficients of the time\*PTSD interaction terms from the linear mixed-effects models are shown, representing the difference in one-year change in Cogstate composites compared to trauma-exposed women with no PTSD.

Model 1: age at baseline cognitive assessment, race/ethnicity, parental education, participant education

Model 2: Model 1 + body mass index, smoking status, alcohol use, physical activity, diet quality

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**Figure S1**. Beta coefficients for the association of PTSD status (5 levels) in 2008 with baseline cognition and the rate of cognitive change assessed six years later. Beta coefficients are from models adjusted for age at baseline cognitive assessment, race/ethnicity, parental education, and participant education. Error bars represent 95% confidence intervals. sx = symptoms.



**Figure S2**. Cognitive function comparing women who remained in the study (blue) to women who dropped out (red), within each follow-up track.



**Figure S3**. Probability of completing each cognitive assessment by PTSD for women in the biannual (A) and annual (B) follow-up tracks.