

## Data supplement

Table DS1 Neuropsychological outcome variables			
Variable	Mode of administration	Function	Possible score range
Trailmaking, B–A <sup>a</sup>	Paper and pencil; timed	Working memory; cognitive flexibility	N/A
Neurobehavioral Evaluation System (3rd edn) <sup>37</sup>			
CPT commission errors (log-transformed)	Computer	Sustained attention	N/A
CPT omission errors (log-transformed)	Computer	Cognitive inhibition	N/A
Wechsler Memory Scale (3rd edn) <sup>38</sup>			
Verbal paired associates, learning trials, total correct	Oral	Verbal learning	0–32
Verbal paired associates, % retention	Oral	Verbal memory	0–100
Wechsler Memory Scale <sup>39</sup>			
Visual reproductions, immediate recall	Paper and pencil	Visual short-term memory	0–14
Visual reproductions, % retention	Paper and pencil	Visual memory	0–100
Automated Neurobehavioral Assessment Metric <sup>40</sup>			
Simple reaction time, throughput <sup>b</sup>	Computer	Reaction time efficiency	N/A
Code substitution learning, throughput <sup>b</sup>	Computer	Efficiency, incidental learning	N/A
Code substitution delay, throughput <sup>b</sup>	Computer	Efficiency, incidental memory	N/A
Match to sample, throughput <sup>b</sup>	Computer	Efficiency, short-term visual recognition memory	N/A
Math processing, throughput <sup>b</sup>	Computer	Efficiency, working memory	N/A
Running memory throughput <sup>b</sup>	Computer	Efficiency, working memory	N/A

N/A, not applicable; CPT, Continuous Performance Test.  
a. Log-transformed difference score of time in seconds to complete Trails B–time in seconds to complete Trails A.  
b. Throughput scores reflect efficiency (i.e. speed in the context of accuracy).

## Additional references

- 37 Letz R. *NES3 User's Manual*. Neurobehavioral Systems, 2000.
- 38 Wechsler DA. *Wechsler Memory Scale* (3rd edn). Psychological Corporation, 1997.
- 39 Wechsler DA. A standardized memory scale for clinical use. *J Psychol* 1945; **19**: 87–95.
- 40 Reeves D, Kane R, Elsmore T, Winter K, Bleiberg J. *ANAM 2001 User's Manual: Clinical and Research Modules*. National Cognitive Recovery Foundation, 2002.

Table DS2 Sample characteristics and traumatic brain injury (TBI) attributes<sup>a</sup>

	Full sample ( <i>n</i> = 760)	TBI+ group ( <i>n</i> = 68)	TBI- group ( <i>n</i> = 692)	<i>P</i>
Age at pre-deployment: years, mean (s.d.)	25.05 (5.19)	24.64 (5.03)	25.09 (5.21)	0.49
Ethnic minority, <i>n</i> (%)	326 (42.9)	28 (41.2)	298 (43.1)	0.76
Women, <i>n</i> (%)	60 (7.9)	1 (1.5)	59 (8.5)	0.02
Education, pre-deployment: years, mean (s.d.)	12.46 (1.28)	12.31 (1.22)	12.48 (1.28)	0.29
Time in army, pre-deployment: years, mean (s.d.)	4.02 (4.16)	3.79 (4.05)	4.04 (4.19)	0.63
Rank, pre-deployment (enlisted), <i>n</i> (%)	743 (97.9)	67 (98.5)	676 (97.8)	0.70
Junior enlisted (E1–E4)	548 (72.2)	47 (69.1)	501 (72.5)	
Non-commissioned officers (E5–E9)	195 (25.7)	20 (29.4)	175 (25.3)	
Officers (commissioned or warrant)	16 (2.1)	1 (1.5)	15 (2.1)	
Previous operational deployment, pre-deployment, <i>n</i> (%)	84 (11.2)	10 (14.9)	74 (10.9)	0.32
Since 2001	21 (2.8)	1 (1.5)	20 (2.9)	
Operation Iraqi Freedom/Operation Enduring Freedom	11 (1.5)	0	11 (1.6)	
Married, pre-deployment, <i>n</i> (%)	352 (46.3)	31 (45.6)	321 (46.4)	0.90
Prescribed psychoactive or anticonvulsant medication use, pre-deployment, past 48 h, <i>n</i> (%)	15 (2.0)	1 (1.5)	14 (2.0)	0.76
Psychiatric history, pre-deployment (lifetime), <i>n</i> (%)	45 (6.0)	2 (2.9)	43 (6.3)	0.21
Alcohol use disorder history, pre-deployment (lifetime), <i>n</i> (%)	31 (4.1)	5 (7.4)	26 (3.8)	0.16
DRRI combat experiences summary score, mean (s.d.)	18.5 (10.7)	23.3 (10.0)	18.0 (10.6)	<0.0001
PCL-C summary score, mean (s.d.)				
Pre-deployment	28.7 (12.1)	31.0 (13.0)	28.5 (12.0)	0.11
Post-deployment	32.0 (13.0)	37.7 (12.3)	31.4 (12.9)	<0.0001
PTSD screen positive, mean (s.d.)				
Pre-deployment	58 (7.7)	10 (14.7)	48 (7.0)	0.02
Post-deployment	84 (11.1)	12 (17.6)	72 (10.4)	0.07
CES-D summary score, post-deployment, mean (s.d.)	7.1 (5.2)	8.6 (5.2)	7.0 (5.1)	0.02
CES-D screen positive, post-deployment, <i>n</i> (%)	135 (17.8)	21 (31.3)	114 (16.6)	0.003
TBI with > 15 min LOC history, pre-deployment, <i>n</i> (%)	39 (5.2)	7 (10.3)	32 (4.7)	0.04
Index TBI attributes, <sup>b</sup> <i>n</i> (%)				
> 1 pre- to post-deployment TBI	–	5 (7.3)	–	–
LOC, < 1 min	–	33 (48.5)	–	–
LOC, 1–30 min	–	26 (38.2)	–	–
LOC, > 30 min	–	7 (10.3)	–	–
LOC, not sure of duration	–	2 (2.9)	–	–
Can remember injury event	–	18 (26.5)	–	–
Post-traumatic amnesia, < 1 h	–	56 (82.4)	–	–
Post-traumatic amnesia, 1–24 h	–	6 (8.8)	–	–
Post-traumatic amnesia, 1–7 days	–	2 (2.9)	–	–
Post-traumatic amnesia, > 70 days	–	4 (5.9)	–	–

DRRI, Deployment Risk and Resilience Inventory; PCL-C, PTSD Checklist, Civilian Version; PTSD, post-traumatic stress disorder; CES-D, Center for Epidemiological Studies Depression Scale (9-item version); LOC, loss of consciousness.

a. The sample size varies slightly across observations due to missing data. Unadjusted *P*-values are reported for Fischer's exact test, when appropriate. Traumatic brain injury for the pre- to post-deployment interval is TBI resulting in loss of consciousness of any duration. Post-traumatic amnesia indicates reduced ability to learn and remember new information.

b. Percentages stated are for the TBI+ sample only (*n* = 68).

**Table Ds3** Results of hierarchical regression analyses examining associations of inter-session traumatic brain injury (TBI), post-deployment PCL-C summary scores (Model 1) and post-deployment CES-D summary scores (Model 2) with functional and neuropsychological performance outcomes<sup>a</sup>

Outcome variable	Model 1				Model 2					
	TBI (unadjusted for PTSD or depression symptom severity)		TBI adjusted for PCL-C summary scores		PCL-C summary scores adjusted for TBI		TBI adjusted for CES-D summary scores		CES-D summary scores adjusted for TBI	
	B (95% CI)	P	B (95% CI)	P	B (95% CI)	P	B (95% CI)	P	B (95% CI)	P
Functional outcomes										
MOS-CF	-0.02 (-0.08 to 0.05)	0.61	0.05 (-0.01 to 0.10)	0.11	-0.51 (-0.56 to -0.45)	<0.001	0.02 (-0.03 to 0.07)	0.44	-0.53 (-0.58 to -0.47)	<0.001
VR-12 – physical symptoms	-0.12 (-0.19 to -0.06)	<0.001	-0.10 (-0.17 to -0.03)	0.003	-0.17 (-0.24 to -0.10)	<0.001	-0.11 (-0.18 to -0.04)	0.001	-0.14 (-0.20 to -0.08)	<0.001
Attention, working memory, executive Trailmaking, B-A	0.03 (-0.04 to 0.07)	0.46	0.02 (-0.05 to 0.09)	0.51	0.02 (-0.05 to 0.09)	0.65	0.03 (-0.04 to 0.07)	0.46	-0.004 (-0.073 to 0.065)	0.91
CPT commission errors (log-transformed)	-0.03 (-0.10 to 0.04)	0.40	-0.03 (-0.10 to 0.03)	0.34	0.03 (-0.04 to 0.10)	0.35	-0.03 (-0.10 to 0.03)	0.34	0.05 (-0.02 to 0.11)	0.18
CPT omission errors (log-transformed)	0.03 (-0.04 to 0.10)	0.38	0.02 (-0.05 to 0.09)	0.58	0.08 (0.01 to 0.15)	0.02	0.03 (-0.04 to 0.10)	0.46	0.06 (-0.01 to 0.13)	0.11
Learning and memory										
Verbal paired associates, learning trials, total correct	-0.01 (-0.07 to 0.04)	0.62	-0.01 (-0.06 to 0.05)	0.87	-0.07 (-0.13 to -0.02)	0.01	-0.01 (-0.07 to 0.05)	0.79	-0.08 (-0.14 to -0.02)	0.005
Verbal paired associates, % retention	-0.002 (-0.071 to 0.067)	0.95	-0.001 (-0.072 to 0.070)	0.97	-0.01 (-0.08 to 0.06)	0.83	0.001 (-0.072 to 0.070)	0.99	-0.03 (-0.11 to 0.04)	0.36
Visual reproductions, immediate recall	-0.05 (-0.12 to 0.01)	0.09	-0.04 (-0.10 to 0.02)	0.18	-0.09 (-0.15 to -0.03)	0.005	-0.05 (-0.12 to 0.01)	0.14	-0.09 (-0.15 to -0.03)	0.005
Visual reproductions, % retention	-0.08 (-0.15 to -0.01)	0.03	-0.07 (-0.14 to 0.00)	0.05	-0.07 (-0.14 to 0.00)	0.05	-0.08 (-0.15 to -0.01)	0.03	-0.05 (-0.12 to 0.03)	0.22
Simple reaction time										
ANAM simple reaction time, throughput	0.03 (-0.04 to 0.09)	0.39	0.04 (-0.02 to 0.11)	0.19	-0.11 (-0.18 to -0.04)	0.001	0.04 (-0.03 to 0.10)	0.25	-0.11 (-0.18 to -0.05)	0.001
Cognitive efficiency										
ANAM code substitution, learning throughput	0.02 (-0.03 to 0.07)	0.47	0.03 (-0.02 to 0.08)	0.24	-0.09 (-0.14 to -0.04)	0.001	0.03 (-0.02 to 0.07)	0.32	-0.09 (-0.13 to -0.04)	0.001
ANAM code substitution, delay throughput	-0.003 (-0.054 to 0.048)	0.92	0.01 (-0.04 to 0.06)	0.68	-0.11 (-0.16 to -0.06)	<0.001	0.01 (-0.05 to 0.06)	0.86	-0.09 (-0.14 to -0.04)	<0.001
ANAM match to sample, throughput	0.03 (-0.03 to 0.08)	0.38	0.03 (-0.03 to 0.09)	0.27	-0.05 (-0.11 to 0.01)	0.07	0.03 (-0.03 to 0.08)	0.34	-0.03 (-0.09 to 0.03)	0.27
ANAM math processing, throughput	-0.03 (-0.08 to 0.03)	0.35	-0.02 (-0.08 to 0.04)	0.45	-0.04 (-0.09 to 0.02)	0.19	-0.02 (-0.07 to 0.03)	0.47	-0.07 (-0.12 to -0.02)	0.01
ANAM running memory, throughput	0.003 (-0.054 to 0.060)	0.90	0.01 (-0.07 to 0.05)	0.77	-0.04 (-0.10 to 0.02)	0.19	0.01 (-0.05 to 0.06)	0.83	-0.04 (-0.09 to 0.02)	0.20

PCL-C, PTSD Checklist, Civilian Version; PTSD, post-traumatic stress disorder; CES-D, Center for Epidemiological Studies Depression Scale (9-item version); MOS-CF, Medical Outcomes Survey Cognitive Functioning subscale; VR-12, Veterans RAND 12-Item Health Survey; CPT, Continuous Performance Test; ANAM, Automated Neurobehavioral Assessment Metric.  
 a. All analyses are adjusted for pre-deployment age and education, average number of alcohol drinks per week for the previous month at post-deployment assessment, duration of the pre- to post-deployment interval and the pre-deployment value of the outcome variable. B is the standardised parameter estimate. Higher PCL-C and CES-D summary scores indicate more severe PTSD and depression symptoms respectively. Lower, more negative Bs indicate that the variable of interest (TBI, PTSD symptom severity, depression severity) is associated with lower functioning or poorer performance on neuropsychological tasks. Unadjusted P-values are presented. Bonferroni-adjusted significance is P<0.025 for analyses involving functioning variables and P<0.004 for analyses involving neuropsychological performance variables.