Supplementary Material

Quantifying and Examining Reserve in Symptomatic Former National Football League Players

Supplementary Table 1. Standardized regression coefficients of covariates age, race, CHII, and APOE and neuropsychological and neuropsychiatric tests

Neuropsychiatric & Neuropsychological Tests	Age			95% CI		Race			95% CI		CHII			95% CI		APOE ε4 status			95% CI	
	β	T	p^2	Lower Bound	Upper Bound	β	T	p^2	Lower Bound	Upper Bound	β	T	p^2	Lower Bound	Upper Bound	β	T	p^2	Lower Bound	Upper Bound
TMT Part A[1]	-0.20	-1.97	0.09	-0.40	0.00	-0.31	-3.03	**0.01**	-0.52	-0.11	-0.04	-0.43	0.78	-0.25	0.16	-0.18	-1.75	0.58	-0.38	0.02
TMT Part B[1]	-0.37	-3.79	**<0.01**	-0.57	-0.18	-0.31	-3.02	**0.01**	-0.51	-0.10	0.07	0.65	0.78	-0.13	0.26	-0.01	-0.13	0.97	-0.21	0.18
NAB List Learning Long Delay Recall	-0.32	-3.15	**0.01**	-0.53	-0.12	-0.25	-2.44	**0.03**	-0.46	-0.05	0.05	0.49	0.78	-0.15	0.26	-0.03	-0.25	0.97	-0.23	0.18
COWAT	-0.12	-1.10	0.32	-0.33	0.10	-0.23	-2.14	0.05	-0.45	-0.02	-0.03	-0.25	0.80	-0.24	0.19	0.05	0.46	0.97	-0.16	0.26
Animal Fluency	-0.20	-1.88	0.09	-0.41	0.01	-0.27	-2.54	**0.03**	-0.49	-0.06	-0.10	-0.92	0.78	-0.31	0.11	0.00	0.04	0.97	-0.20	0.21
BRIEF-A BRI	-0.06	-0.54	0.59	-0.27	0.16	-0.16	-1.42	0.18	-0.37	0.06	0.15	1.35	0.78	-0.07	0.36	0.11	1.01	0.74	-0.10	0.32
BDI-II	-0.22	-2.04	0.09	-0.43	-0.01	0.06	0.51	0.61	-0.16	0.27	0.06	0.53	0.78	-0.16	0.27	0.15	1.38	0.60	-0.06	0.36

TMT, Trail Making Test; NAB, Neuropsychological Assessment Battery; COWAT, Controlled Oral Word Association Test; BRIEF-A BRI, Behavior Rating Inventory of Executive Functioning – Adult Version Behavioral Regulation Index; BDI-II, Beck Depression Inventory-II; CHII, Cumulative Head Impact Index; *APOE*, Apolipoprotein E.
[1] TMT Parts A and B were reverse coded to correct directionality (i.e., lower scores represented worse performance); [2] Statistical significance was defined by a false discovery rate adjusted p-value <0.05.

Supplementary Table 2. Standardized regression coefficients of reserve proxies WRAT-4 and education and neuropsychological and neuropsychiatric tests

Neuropsychiatric & Neuropsychological Tests	WRAT-4					Years of Education					Occupational Attainment					Estimated Intracranial Volume				
	β	T	p^2	95% CI Lower Bound	95% CI Upper Bound	β	T	p^2	95% CI Lower Bound	95% CI Upper Bound	β	T	p^2	95% CI Lower Bound	95% CI Upper Bound	β	T	p^2	95% CI Lower Bound	95% CI Upper Bound
TMT Part A[1]	0.25	2.48	**0.04**	0.05	0.46	0.05	0.50	0.99	-0.15	0.25	-0.11	-1.06	0.66	-0.30	0.09	-0.03	-0.23	0.83	-0.25	0.19
TMT Part B[1]	0.07	0.71	0.48	-0.13	0.28	0.00	-0.01	0.99	-0.20	0.19	-0.12	-1.20	0.66	-0.31	0.08	0.08	0.75	0.79	-0.13	0.30
NAB List Learning Long Delay Recall	0.27	2.54	**0.04**	0.06	0.48	-0.01	-0.09	0.99	-0.21	0.19	-0.09	-0.92	0.66	-0.29	0.11	0.05	0.46	0.83	-0.17	0.27
COWAT	0.38	3.54	**<0.01**	0.17	0.59	0.00	0.04	0.99	-0.21	0.22	0.09	0.85	0.66	-0.12	0.30	-0.02	-0.21	0.83	-0.26	0.21
Animal Fluency	0.24	2.20	**0.04**	0.02	0.46	-0.09	-0.89	0.93	-0.30	0.11	-0.08	-0.72	0.66	-0.28	0.13	-0.15	-1.30	0.46	-0.37	0.08
BRIEF-A BRI	-0.26	-2.29	**0.04**	-0.48	-0.03	0.16	1.57	0.85	-0.04	0.37	-0.02	-0.17	0.86	-0.23	0.19	0.20	1.72	0.31	-0.03	0.43
BDI-II	-0.12	-1.10	0.32	-0.35	0.10	0.09	0.85	0.93	-0.12	0.30	-0.03	-0.30	0.86	-0.24	0.18	0.29	2.61	0.08	0.07	0.51

TMT, Trail Making Test; NAB, Neuropsychological Assessment Battery; COWAT, Controlled Oral Word Association Test; BRIEF-A BRI, Behavior Rating Inventory of Executive Functioning – Adult Version Behavioral Regulation Index; BDI-II, Beck Depression Inventory-II; WRAT-4, WRAT-4, The Wide Range Achievement Test-4.
[1] TMT Parts A and B were reverse coded to correct directionality (i.e., lower scores represented worse performance); [2] Statistical significance was defined by a false discovery rate adjusted p-value <0.05. Age, racial identity, CHII, and *APOE* genotype were included as covariates.

Supplementary Figure 1. Leave-one-out residuals versus original residuals