

Supplementary Table 1. Unadjusted rates of temporal change and their difference (S.E.) between TBI exposure groups. All outcomes—except CDR-SB—are in standardized units. Positive (negative) values for the difference in the rate of change indicate that the TBI present group changes slower (faster) over time compared to the TBI absent group.

	TBI history	No TBI history	Difference	
	Estimate (S.E.)	Estimate (S.E.)	Estimate (S.E.)	t-test (p-value)
Normal cohort				
MMSE (Standardized Units)	-0.01 (0.02)	0.01 (0.02)	-0.02 (0.02)	-0.74 (0.4599)
CDR-SB (Sum of Boxes)	0.00 (0.01)	0.00 (0.01)	0.00 (0.01)	0.20 (0.8383)
Memory (Standardized Units)	0.09 (0.02)	0.04 (0.02)	0.06 (0.03)	2.27 (0.0236)
Attention (Standardized Units)	0.00 (0.01)	0.01 (0.01)	-0.00 (0.01)	-0.16 (0.8699)
Executive Function (Standardized Units)	0.02 (0.01)	0.02 (0.01)	0.00 (0.02)	0.19 (0.8514)
Language (Standardized Units)	0.01 (0.01)	0.01 (0.01)	-0.01 (0.02)	-0.28 (0.7805)
AD cohort				
MMSE (Standardized Units)	-1.58 (0.18)	-1.60 (0.18)	0.03 (0.26)	0.10 (0.9232)
CDR-SB (Sum of Boxes)	0.00 (0.01)	0.00 (0.01)	0.00 (0.00)	0.01 (0.9954)
Memory (Standardized Units)	-0.21 (0.03)	-0.17 (0.03)	-0.04 (0.04)	-1.03 (0.3026)
Attention (Standardized Units)	-0.07 (0.02)	-0.09 (0.02)	0.03 (0.03)	0.92 (0.3601)
Executive Function (Standardized Units)	-0.17 (0.02)	-0.16 (0.02)	-0.01 (0.03)	-0.41 (0.6823)
Language (Standardized Units)	-0.28 (0.04)	-0.21 (0.04)	-0.08 (0.05)	-1.38 (0.1693)

Supplementary Table 2. Rates of temporal change (S.E) and their differences (S.E.) between TBI exposure groups without adjusting for *APOE* $\epsilon 4$. All outcomes – except CDR-SB– are in standardized units. Positive (negative) values for the difference in the rate of change indicate that the TBI present group changes slower (faster) over time compared to the TBI absent group.

	TBI history	No TBI history	Difference	
	Estimate (S.E.)	Estimate (S.E.)	Estimate (S.E.)	t-test (p-value)
Normal cohort				
MMSE (Standardized Units)	-0.05 (0.14)	-0.03 (0.14)	-0.02 (0.02)	-0.87 (0.3864)
CDR-SB (Sum of Boxes)	-0.00 (0.05)	-0.01 (0.05)	0.00 (0.01)	0.25 (0.8019)
Memory (Standardized Units)	0.35 (0.15)	0.29 (0.15)	0.06 (0.02)	2.34 (0.0195)
Attention (Standardized Units)	-0.01 (0.08)	-0.01 (0.08)	-0.00 (0.01)	-0.25 (0.8027)
Executive Function (Standardized Units)	0.13 (0.09)	0.13 (0.09)	0.00 (0.01)	0.15 (0.8823)
Language (Standardized Units)	0.13 (0.12)	0.13 (0.12)	-0.01 (0.02)	-0.28 (0.7789)
AD cohort				
MMSE (Standardized Units)	-4.17 (1.47)	-4.19 (1.47)	0.03 (0.25)	0.10 (0.9220)
CDR-SB (Sum of Boxes)	0.00 (0.01)	0.00 (0.01)	0.00 (0.00)	0.00 (0.9969)
Memory (Standardized Units)	-0.23 (0.24)	-0.19 (0.24)	-0.04 (0.04)	-1.05 (0.2965)
Attention (Standardized Units)	-0.49 (0.20)	-0.53 (0.20)	0.03 (0.03)	1.08 (0.2796)
Executive Function (Standardized Units)	-0.36 (0.17)	-0.35 (0.17)	-0.01 (0.03)	-0.35 (0.7287)
Language (Standardized Units)	-0.93 (0.32)	-0.86 (0.32)	-0.07 (0.05)	-1.31 (0.1915)

Supplementary Table 3. Rates of temporal change (S.E) and their differences (S.E.) between TBI exposure groups by *APOE* $\epsilon 4$ for all the test scores used in the dynamic factor model. All scores are in standardized units. Positive (negative) values for the difference in the rate of change indicate that the TBI present group changes slower (faster) over time compared to the TBI absent group.

	$\epsilon 4 +$				$\epsilon 4 -$			
	TBI history Estimate (S.E.)	No TBI history Estimate (S.E.)	Difference Estimate (S.E.) t-test (p-value)		TBI history Estimate (S.E.)	No TBI history Estimate (S.E.)	Difference Estimate (S.E.) t-test (p-value)	
Normal cohort								
Logical Memory: Immediate	0.35 (0.15)	0.33 (0.15)	-0.01 (0.04)	0.24 (0.8071)	0.42 (0.15)	0.35 (0.15)	0.08 (0.03)	2.70 (0.0071)
Logical Memory: Delayed	0.19 (0.14)	0.18 (0.14)	0.01 (0.04)	0.26 (0.7498)	0.28 (0.14)	0.25 (0.14)	0.03 (0.03)	0.93 (0.7948)
Digit Span Forward: numbers correct	-0.04 (0.14)	-0.07 (0.14)	0.03 (0.04)	0.86 (0.3922)	-0.06 (0.14)	-0.03 (0.14)	-0.04 (0.04)	-1.52 (0.1278)
Digit Span Forward: length	0.08 (0.15)	0.09 (0.15)	-0.01(0.04)	-0.24 (0.8097)	0.10 (0.15)	0.12 (0.15)	-0.03 (0.03)	-1.07 (0.2856)
Digit Span Backward: numbers correct	0.17 (0.14)	0.14 (0.14)	0.03 (0.04)	0.61 (0.5477)	0.16 (0.14)	0.15 (0.14)	0.01 (0.02)	0.19 (0.8530)
Digit Span Backward: length	0.18 (0.15)	0.15 (0.16)	0.03 (0.05)	0.55 (0.5818)	0.14 (0.16)	0.17 (0.16)	-0.02 (0.03)	-0.78 (0.4341)
Trailmaking A	0.55 (0.14)	0.65 (0.14)	-0.06 (0.04)	-1.59 (0.1120)	0.64 (0.14)	0.63 (0.14)	0.00 (0.03)	0.11 (0.9116)
Digit Symbol	0.36 (0.11)	0.35 (0.11)	0.01 (0.03)	0.32 (0.7486)	0.35 (0.11)	0.34 (0.11)	0.02 (0.02)	0.76 (0.4486)
Trailmaking B	0.14 (0.11)	0.13 (0.11)	0.01 (0.03)	0.26 (0.7924)	0.09 (0.11)	0.10 (0.11)	-0.00 (0.02)	-0.16 (0.8712)
Semantic Fluency: Animals	0.16 (0.13)	0.24 (0.14)	-0.08 (0.04)	-2.08 (0.0383)	0.22 (0.14)	0.21 (0.13)	0.02 (0.02)	0.67 (0.4999)
Semantic Fluency: Vegetables	0.25 (0.15)	0.25 (0.15)	-0.00 (0.04)	-0.07 (0.9461)	0.29 (0.15)	0.28 (0.15)	0.01 (0.03)	0.38 (0.7060)
Boston Naming Test	0.05 (0.09)	0.03 (0.09)	0.02 (0.03)	0.76 (0.4471)	0.08 (0.10)	0.07 (0.10)	0.02 (0.02)	0.85 (0.3931)

AD cohort								
Logical Memory: Immediate	-0.24 (0.27)	-0.23 (0.27)	-0.01 (0.05)	-0.15 (0.8815)	-0.26 (0.28)	-0.29 (0.28)	0.03 (0.08)	0.38 (0.7081)
Logical Memory: Delayed	-0.09 (0.18)	-0.06 (0.18)	-0.03 (0.03)	-0.89 (0.3733)	-0.08 (0.18)	-0.03 (0.18)	-0.06 (0.05)	-1.07 (0.2871)
Digit Span Forward: numbers correct	-0.71 (0.34)	-0.64 (0.34)	-0.07 (0.07)	-1.08 (0.2802)	-0.80 (0.35)	-0.85 (0.35)	0.04 (0.10)	0.43 (0.6695)
Digit Span Forward: length	-0.47 (0.43)	-0.39 (0.44)	-0.07 (0.08)	-0.89 (0.3772)	-0.65 (0.45)	-0.71 (0.45)	0.05 (0.13)	0.41 (0.6973)
Digit Span Backward: numbers correct	-0.91 (0.32)	-0.93 (0.32)	0.03 (0.06)	0.44 (0.6590)	-0.84 (0.33)	-1.03 (0.32)	0.20 (0.10)	2.07 (0.0402)
Digit Span Backward: length	-1.42 (0.41)	-1.46 (0.41)	0.04 (0.08)	0.52 (0.6009)	-1.37 (0.42)	-1.48 (0.42)	0.11 (0.12)	0.93 (0.3531)
Trailmaking A	-2.36 (1.06)	-2.22 (1.07)	-0.14 (0.21)	-0.64 (0.5201)	-2.40 (1.11)	-2.60 (1.11)	0.21 (0.32)	0.64 (0.5202)
Digit Symbol	-0.58 (0.38)	-0.65 (0.38)	0.07 (0.07)	0.90 (0.3682)	-0.67 (0.39)	-0.61 (0.39)	-0.06 (0.11)	-0.53 (0.5962)
Trailmaking B	-0.45 (0.85)	-0.55 (0.86)	0.10 (0.15)	0.65 (0.5197)	-0.45 (0.88)	-0.64 (0.89)	0.19 (0.24)	0.79 (0.4319)
Semantic Fluency: Animals	-0.78 (0.30)	-0.69 (0.30)	-0.09 (0.06)	-1.52 (0.1295)	-0.79 (0.31)	-0.79 (0.31)	0.01 (0.09)	0.12 (0.9035)
Semantic Fluency: Vegetables	-0.77 (0.34)	-0.69 (0.34)	-0.08 (0.07)	-1.12 (0.2638)	-0.74 (0.36)	-0.82 (0.35)	0.08 (0.10)	0.81 (0.4192)
Boston Naming Test	-1.69 (0.61)	-1.69 (0.61)	0.02 (0.12)	0.18 (0.8611)	-1.76 (0.63)	-1.72 (0.62)	-0.04 (0.19)	0.8285)

Supplementary Table 4A. Estimates (S.E.) for all covariates included in the linear mixed effect models for the normal cohort. ** denotes significance at 1% and * denotes significance at 5%

Effect	MMSE (standardized units)	CDR-SB (standardized units)	Memory (standardized units)	Attention (standardized units)	Executive Function (standardized units)	Language (standardized units)
TBI with LOC	-0.01 (0.08)	0.02 (0.03)	-0.05 (0.09)	-0.05 (0.09)	-0.00 (0.01)	-0.03 (0.10)
APOE ε4 allele presence	-0.05 (0.09)	0.05 (0.03)	0.04 (0.09)	0.02 (0.05)	-0.01 (0.10)	0.01 (0.11)
Depression in the last 2 years	-0.02 (0.08)	0.05 (0.03)	-0.01 (0.08)	-0.06 (0.05)	-0.06 (0.05)	-0.06 (0.08)
Conversion to MCI or dementia at the last available NACC visit	-0.30 (0.12)*	0.08 (0.04)	-0.39 (0.14)**	0.10 (0.07)	-0.33 (0.14)*	0.03 (0.15)
Sex (Male)	-0.64 (0.08)**	0.04 (0.03)	-0.89 (0.09)**	-0.02 (0.05)	0.26 (0.10)**	-0.08 (0.10)
Education	-0.03 (0.02)	-0.01 (0.01)	0.02 (0.02)	-0.01 (0.01)	-0.04 (0.02)*	-0.00 (0.02)
Age at first visit	-0.01 (0.01)	0.00 (0.00)	0.00 (0.01)	-0.00 (0.00)	0.00 (0.01)	0.00 (0.01)
Time in study x conversion status	0.01 (0.04)	0.02 (0.02)	-0.09 (0.05)	-0.08 (0.03)**	-0.05 (0.03)	-0.07 (0.04)
Time in study x sex (male)	0.03 (0.02)	0.02 (0.01)	-0.02 (0.03)	0.01 (0.02)	-0.01 (0.02)	-0.04 (0.02)
Time in study x education	0.00 (0.01)	-0.00 (0.00)	0.01 (0.01)	0.00 (0.00)	0.01 (0.00)*	0.00 (0.01)
Time in study x age at first visit	-0.001 (0.006)	0.000 (0.000)	-0.006 (0.001)**	0.000 (0.000)	-0.003 (0.001)**	-0.003 (0.001)*

Supplementary Table 4B. Estimates (S.E.) for all covariates included in the linear mixed effect models for the AD cohort. ** denotes significance at 1% and * denotes significance at 5%

Effect	MMSE (standardized units)	CDR-SB (standardized units)	Memory (standardized units)	Attention (standardized units)	Executive Function (standardized units)	Language (standardized units)
TBI with LOC	0.07 (0.43)	-0.07 (0.18)	-0.00 (0.12)	-0.17 (0.08)*	-0.10 (0.11)	0.11 (0.13)
APOE ε4 allele presence	0.06 (0.48)	-0.09 (0.20)	-0.05 (0.13)	0.13 (0.09)	-0.05 (0.12)	0.10 (0.14)
Depression in the last 2 years	-0.62 (0.43)	0.18 (0.15)	0.15 (0.12)	-0.01 (0.08)	0.09 (0.11)	0.09 (0.12)
Sex (Male)	-0.41 (0.46)	-0.17 (0.19)	-0.47 (0.12)**	0.07 (0.09)	0.05 (0.12)	-0.18 (0.14)
Education	0.08 (0.08)	-0.04 (0.03)**	-0.09 (0.02)**	-0.01 (0.02)	-0.03 (0.02)	-0.07 (0.02)**
Age at first visit (or age of dementia onset)	-0.01 (0.02)	0.04 (0.01)	0.00 (0.01)	0.02 (0.01)**	0.01 (0.01)	0.01 (0.01)
Time in study x sex (male)	-0.11 (0.27)	0.03 (0.18)	-0.02 (0.04)	-0.00 (0.03)	0.02 (0.03)	0.07 (0.06)
Time in study x education	-0.05 (0.05)	-0.02 (0.03)	-0.01 (0.01)	0.01 (0.01)	-0.01 (0.01)	-0.01 (0.01)
Time in study x age at first visit (or age of dementia onset)	0.043 (0.017)*	-0.008 (0.012)	0.003 (0.003)	0.005 (0.002)*	0.004 (0.002)	0.011 (0.003)**