

## Supplemental Material S5. Within-group analyses

### Within-group analyses for the deferred treatment/usual care control group

#### *Full results of subdomain-intercepts only model for the treatment group*

**Model syntax:** cbind(obs\_score, (poss\_score - obs\_score)) ~ Timepoint + SubDomain + Etiology + (1 + Timepoint | ID) + (1 | Item)

**Random effects: Variance (SD)**

Term		Log odds (SE)	Probability	z-value	Significance level	Intercept: ID	Intercept: Item	Slope: Time-by-ID; Corr
Intercept		0.43 (0.49)	0.61	0.88	N.S.	0.93	2.11	0.01
Timepoint		0.12 (0.02)	0.53	5.04	***	(0.97)	(1.45)	(0.10); -0.42
Etiology TBI		-0.48 (0.38)	0.38	-1.27	N.S.			
SubDomain	Auditory							
	Comprehension	2.27 (0.43)	0.91	5.31	***			
	Verbal Expression	1.80 (0.44)	0.86	4.08	***			
	Reading							
	Comprehension	1.64 (0.43)	0.84	3.80	***			
	Written Expression	1.93 (0.50)	0.87	3.89	***			
	Orientation	2.99 (0.60)	0.95	4.95	***			
	Memory	-0.48 (0.43)	0.38	-1.12	N.S.			
	Problem Solving	3.06 (0.45)	0.96	6.76	***			
	Visuospatial/ Constructional	1.11 (0.48)	0.75	2.29	*			
	Upper Limb/Facial/ Instrumental Apraxia	2.61 (0.53)	0.93	4.96	***			

*Note.* Timepoint was coded as a numeric predictor: Pre-treatment = “0”; Post-treatment 1 = “1”; Post-treatment 2 = “2”; Post-treatment 3 = “3.” Etiology (i.e., TBI, non-TBI) was dummy-coded with non-TBI as the reference level. SubDomain was dummy-coded with Attention as the reference level. The correlation value refers to the strength of association between the random slope of timepoint and the random intercept of participant. The negative value reflects participants with lower baseline accuracy have steeper slopes.

**Full results of subdomain- intercepts and slope model for treatment group**

Model syntax: glmer(cbind(obs\_score,(poss\_score-obs\_score)) ~ Timepoint\*

SubDomain + Etiology + (1+Timepoint | ID) + (1 | Item)

**Random effects: Variance (SD)**

Term		Log odds (SE)	Probability	z-value	Significance level	Intercept: ID	Intercept: Item	Slope: Time-by-ID; Corr
Intercept		0.59 (0.48)	0.64	1.23	N.S.	0.92 (0.96)	2.11 (1.45)	0.01 (0.09); -0.37
Timepoint		-0.01 (0.03)	0.50	-0.31	N.S.			
Etiology TBI		-0.49 (0.39)	0.38	-1.25	NS.			
SubDomain	Auditory	2.17 (0.42)	0.90	5.16	***			
	Comprehension							
	Verbal Expression	1.54 (0.43)	0.82	3.56	***			
	Reading	1.51 (0.43)	0.82	3.53	***			
	Comprehension							
	Written Expression	1.73 (0.49)	0.85	3.54	***			
	Orientation	2.68 (0.61)	0.94	4.41	***			
	Memory	-0.68 (0.42)	0.34	-1.62	N.S.			
	Problem Solving	2.81 (0.45)	0.94	6.24	***			
	Visuospatial/ Constructional	0.97 (0.48)	0.73	2.02	*			
	Upper Limb/Facial/ Instrumental Apraxia	2.51 (0.52)	0.92	4.81	***			
Timepoint- by- SubDomain interaction	Auditory	0.07 (0.03)	0.52	2.00	*			
	Comprehension							
	Verbal Expression	0.22 (0.03)	0.55	6.81	***			
	Reading	0.11 (0.04)	0.53	2.99	**			
	Comprehension							
	Written Expression	0.16 (0.04)	0.54	4.06	***			
	Orientation	0.29 (0.15)	0.57	1.92	.05			

Memory	0.17 (0.03)	0.54	4.98	***
Problem Solving	0.23 (0.06)	0.56	3.78	***
Visuospatial/ Constructional	0.11 (0.04)	0.53	2.69	**
Upper Limb/Facial/ Instrumental Apraxia	0.08 (0.06)	0.52	1.30	N.S.

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*Note.* Timepoint was coded as a numeric predictor: Pre-treatment = “0”; Post-treatment 1 = “1”; Post-treatment 2 = “2”; Post-treatment 3 = “3.” Etiology was dummy-coded (i.e., TBI and non-TBI with non-TBI as the reference level). SubDomain was dummy-coded with Attention as the reference level. The correlation value refers to the strength of association between the random slope of timepoint and the random intercept of participant. The negative value reflects participants with lower baseline accuracy have steeper slopes.

## Within-group analyses for the deferred treatment/usual care control group

### *Full results of subdomain-intercepts only model for control group*

<b>Model syntax:</b> cbind(obs_score, (poss_score - obs_score)) ~ Timepoint + SubDomain + Etiology + (1 + Timepoint   ID) + (1   Item)					<b>Random effects: Variance (SD)</b>		
<b>Term</b>	<b>Log odds (SE)</b>	<b>Probability</b>	<b>z-value</b>	<b>Significance level</b>	<b>Intercept: ID</b>	<b>Intercept: Item</b>	<b>Slope: Time-by-ID; Corr</b>
Intercept	0.09 (0.50)	0.52	0.18	N.S.	0.64	1.91	0.03
Timepoint	0.01 (0.07)	0.50	0.09	N.S.	(0.80)	(1.38)	(0.17); -0.56
Etiology TBI	0.36 (0.39)	0.59	0.91	N.S.			
SubDomain Auditory							
Comprehension	0.17 (0.08)	0.54	2.10	*			
Verbal Expression	0.03 (0.07)	0.51	0.50	N.S.			
Reading							
Comprehension	0.005 (0.08)	0.50	0.06	N.S.			
Written Expression	-0.04 (0.09)	0.49	-0.51	N.S.			
Orientation	0.37 (0.35)	0.59	1.05	N.S.			
Memory	0.05 (0.07)	0.51	0.72	N.S.			
Problem Solving	0.23 (0.13)	0.56	1.85	.064			
Visuospatial/							
Constructional	-0.08 (0.09)	0.48	-0.93	N.S.			
Upper Limb/Facial/							
Instrumental Apraxia	-0.12 (0.14)	0.47	-0.84	N.S.			

*Note.* Timepoint was coded as a numeric predictor: Pre-treatment = “0”; Post-treatment 1 = “1”; Post-treatment 2 = “2”; Post-treatment 3 = “3.” Etiology (i.e., TBI, non-TBI) was dummy-coded with non-TBI as the reference level. SubDomain was dummy-coded with Attention as the reference level. The correlation value refers to the strength of association between the random slope of timepoint and the random intercept of participant. The negative value reflects participants with lower baseline accuracy have steeper slopes.

**Full results of subdomain- intercepts and slope model for control group**

Model syntax: glmer(cbind(obs\_score,(poss\_score-obs\_score)) ~ Timepoint\*

SubDomain + Etiology + (1+Timepoint | ID) + (1 | Item)

**Random effects: Variance (SD)**

Term		Log odds (SE)	Probability	z-value	Significance level	Intercept: ID	Intercept: Item	Slope: Time-by-ID; Corr
						0.64 (0.80)	1.91 (1.38)	0.03 (0.17) ; - 0.54
Intercept		0.09 (0.50)		0.18	N.S.			
Timepoint		0.01 (0.07)		0.09	N.S.			
SubDomain	Etiology TBI	0.36 (0.39)		0.91	N.S.			
	Auditory Comprehension	2.61 (0.43)		6.03	***			
	Verbal Expression	2.38 (0.44)		5.38	***			
	Reading Comprehension	2.21 (0.44)		5.03	***			
	Written Expression	2.44 (0.51)		4.82	***			
	Orientation	3.08 (0.65)		4.72	***			
	Memory	-0.33 (0.43)		-0.76	N.S.			
	Problem Solving	2.72 (0.46)		5.92	***			
	Visuospatial/ Constructional	0.74 (0.48)		1.53	N.S.			
	Upper Limb/Facial/ Instrumental Apraxia	3.16 (0.54)		5.90	***			
Timepoint-by-	Auditory Comprehension	0.17 (0.08)		2.10	*			
	Verbal Expression	0.03 (0.07)		0.50	N.S.			

SubDomain interaction	Reading	0.005 (0.08)	0.50	N.S.
	Comprehension			
	Written Expression	-0.04 (0.09)	-0.51	N.S.
	Orientation	0.37 (0.35)	1.05	N.S.
	Memory	0.05 (0.07)	0.72	N.S.
	Problem Solving	0.23 (0.13)	1.85	0.06
	Visuospatial/ Constructional	-0.08 (0.09)	-0.93	N.S.
	Upper Limb/Facial/ Instrumental Apraxia	-0.12 (0.14)	-0.84	N.S.

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*Note.* Timepoint was coded as a numeric predictor: Pre-treatment = “0”; Post-treatment 1 = “1”; Post-treatment 2 = “2”; Post-treatment 3 = “3.” Etiology was dummy-coded (i.e., TBI and non-TBI with non-TBI as the reference level). SubDomain was dummy-coded with Attention as the reference level. The correlation value refers to the strength of association between the random slope of timepoint and the random intercept of participant. The negative value reflects participants with lower baseline accuracy have steeper slopes.

## Code for extracting domain-specific intercepts and slopes for the within-group GLMMs

These contrast matrices were developed based off of methods previously used for conducting multiple pairwise comparisons for categorical predictors (Mirman, 2013, 2014). Each column in the matrices below (created using the “rbind” function in base R) refers to an estimate from the generalized linear mixed effects model, in this case the subdomain model with intercepts and slopes (WG3). Each row reflects the contrast comparison that is being tested. The “1” and “0” values reflect the weight being assigned to each element of the contrast.

For the domain-specific intercept estimates, a “1” is in the intercept column and a “1” is in the subdomain of interest column (e.g., auditory comprehension). Otherwise, all the other elements are “0.” The intercept reflects the estimate for the reference level in subdomain, in this case, attention. The subdomain of interest column reflects the estimate for that subdomain relative to the reference level, attention. Combining them while canceling out other terms in the model provides the intercept value for the subdomain of interest alone (e.g., baseline accuracy for auditory comprehension).

For the domain-specific slope estimates, “1” is in the timepoint estimate column and a “1” is in the subdomain of interest-by-timepoint interaction column. Otherwise, all the other elements are “0.” The timepoint column reflects the estimate for the reference level over time, in this case attention. The subdomain of interest-by-timepoint interaction column reflects the estimate for that subdomain relative to the reference level, attention, over time (e.g., auditory comprehension compared to attention over time). Combining them while canceling out other terms in the model provides the slope value for the subdomain of interest alone (e.g., rate of change for auditory comprehension).

### Domain-specific intercept contrast matrix

```
contrast.matrix.intercept <- rbind(
  `AC`      =c(1,0,1,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0),
  `AP`      =c(1,0,0,1,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0),
  `ME`      =c(1,0,0,0,1,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0),
  `OR`      =c(1,0,0,0,0,1,0,0,0,0,0,0,0,0,0,0,0,0,0,0),
  `PS`      =c(1,0,0,0,0,0,1,0,0,0,0,0,0,0,0,0,0,0,0,0),
  `RC`      =c(1,0,0,0,0,0,0,1,0,0,0,0,0,0,0,0,0,0,0,0),
  `VC`      =c(1,0,0,0,0,0,0,0,1,0,0,0,0,0,0,0,0,0,0,0),
  `VE`      =c(1,0,0,0,0,0,0,0,0,1,0,0,0,0,0,0,0,0,0,0),
  `WR`      =c(1,0,0,0,0,0,0,0,0,0,1,0,0,0,0,0,0,0,0,0))
```

**Key:** AC = auditory comprehension; AP = apraxia; ME = memory; OR = orientation; PS = problem solving; RC = reading comprehension; VC = visuospatial/constructional; VE = verbal expression; WR = written expression

### Code to extract the domain-specific intercepts

```
summary(qlht(m_subdomain, contrast.matrix.intercept))
```

### Domain-specific slope contrast matrix

```
contrast.matrix.slope <- rbind(  
  `timepoint:AC`      =c(0,1,0,0,0,0,0,0,0,0,0,0,1,0,0,0,0,0,0,0,0),  
  `timepoint:AP`      =c(0,1,0,0,0,0,0,0,0,0,0,0,0,1,0,0,0,0,0,0,0),  
  `timepoint:ME`      =c(0,1,0,0,0,0,0,0,0,0,0,0,0,0,1,0,0,0,0,0,0),  
  `timepoint:OR`      =c(0,1,0,0,0,0,0,0,0,0,0,0,0,0,0,1,0,0,0,0,0),  
  `timepoint:PS`      =c(0,1,0,0,0,0,0,0,0,0,0,0,0,0,0,0,1,0,0,0,0),  
  `timepoint:RC`      =c(0,1,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,1,0,0,0),  
  `timepoint:VC`      =c(0,1,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,1,0,0),  
  `timepoint:VE`      =c(0,1,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,1,0),  
  `timepoint:WR`      =c(0,1,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,1))
```

### Code to extract the domain-specific intercepts

```
summary(glht(m_subdomain, contrast.matrix.slope))
```

**Key:** AC = auditory comprehension; AP = apraxia; ME = memory; OR = orientation; PS = problem solving; RC = reading comprehension; VC = visuospatial/constructional; VE = verbal expression; WR = written expression