Academically-focused cognitive rehabilitation supports cognitive-linguistic recovery in college-bound adults with brain injury

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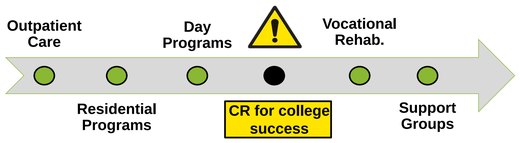
BACKGROUND

- Young adults are a frequently-affected and growing population to suffer acquired brain injury (ABI).[1,2]
- Skills important for success in college (e.g., attention, language) are often impaired after ABI, making participation difficult.[3,4]
- Limited cognitive rehabilitation (CR) services for young adults with ABI interested in college are available within the current continuum of care.[5,6]



- Gold standard CR suggests targeting multiple cognitive-linguistic domains in everyday contexts with a combination of restorative and compensatory approaches in individual and group settings.[7]
- Principles of neuroplasticity also emphasize the importance of repetition, intensity, specificity, salience and age for cognitive rehabilitation and recovery.[8,9]
- Drawing on this evidence base, intensive cognitive-communication rehabilitation (ICCR) provides classroom-style lectures, strategy instruction, individual rehabilitation and technology training as a ramp to college success.
- Initial findings[10] suggest that ICCR (*n* = 4) supports return to college by promoting significant gains in cognitive-linguistic function, life participation and quality of life.

PRIMARY AIM

- Do young adults with ABI demonstrate significant improvements in cognitive-linguistic function over the course of multiple 12-week semesters of ICCR?

METHODS

Demographic Information							
	Age	**MPO**	**Etiology**	**Sex**	**Edu. Level**	**Pre-tx WAB**	**Pre-tx RBANS**
ICCR students (n=12)	25.9 (3.9)	58.3 (33.1)	TBI = 7 Stroke = 4 Tumor = 1	M = 9 F = 3	14.0 (1.4)	74.2 (21.2)	52.5 (9.7)
Control participants (n=6)	25.4 (3.9)	60.8 (45.4)	TBI = 4 Stroke = 2	M = 2 F = 4	12.8 (0.9)	89.5 (9.1)	60.3 (10.7)

Note: Mean (SD); MPO = months post onset; Edu. Level = Education level; Tx = treatment; Pre-tx WAB = Aphasia Quotient (out of 100; higher score = less severe); Pre-tx RBANS = Total Index Score (Standard Score: Mean = 85; SD = 10)

Selected Assessments

- Western Aphasia Battery - Revised (WAB)[11]
- Repeatable Battery for the Assessment of Neuropsychological Status (RBANS)[12]
- Scales of Cognitive and Communicative Ability for Neurorehabilitation (SCCAN)[13]
- Discourse Comprehension Test[14]

METHODS (cont'd)

ICCR Program

Sample Weekly Treatment Schedule					Other Activities
	Monday	**Tuesday**	**Thursday**	**Friday**	
10:00	**Economics Lecture**	**Biology Lecture**	**Economics Lecture**	**Biology Lecture**	**Take quizzes & cumulative exams**
11:00	**Review**	**Review**	**Review**	**Review**	
12:00	**Practice Quiz ?'s**	**Practice Quiz ?'s**	**Practice Quiz ?'s**	**Practice Quiz ?'s**	**Receive individual SLT targeting discrete skills & strategy training**
1:00	***Lunch***	***Lunch***	***Lunch***	***Lunch***	
2:00	**Statistics**	**English Literature**	**Statistics**	**English Literature**	**Attend sessions about college transition process**
3:00	**Tech**	**Tech**	**Tech**	**Tech**	

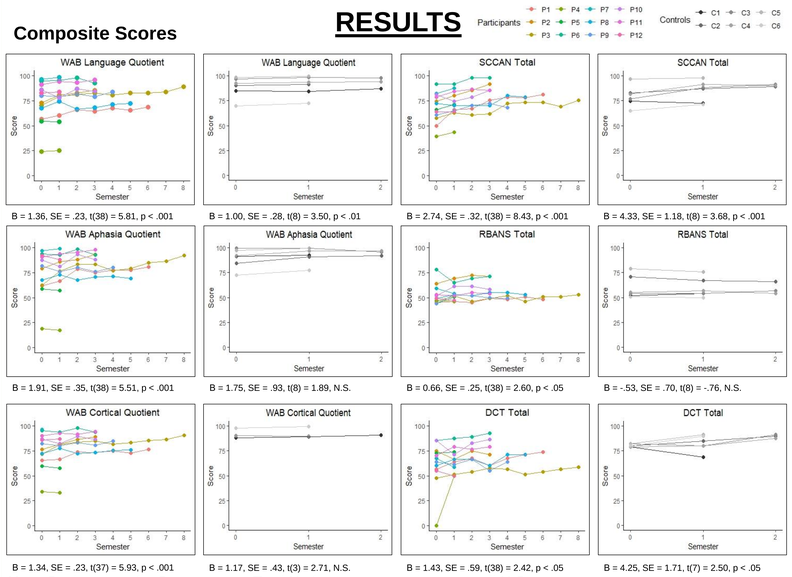
Note: ~300 hours/semester; Typically 6 students in the class; May attend multiple semesters of the program until they are ready to transition to post-secondary education

Data Analysis

- Linear mixed effects regression models were performed separately for each participant group and assessment measure:
  - Dependent variable: Accuracy on the assessment measure
  - Independent variables:
    - Fixed factors: Semester & Total N of semesters (covariate)
    - Random factor: Participant (intercept)

RESULTS

Composite Scores



Note: Statistics are for Semester, not Total N of semesters as they were all N.S.

Domain Scores

Assessment	Domain	ICCR students	Active Controls
WAB	Spontaneous Speech	✓	✓
	Repetition	✓	
	Naming & Word Finding	✓	
	Writing	✓	
	Constructional, Visuospatial, Calculation	✓	
RBANS	Immediate Memory	✓	
	Visuospatial/Constructional	✓	
SCCAN	Oral Expression	✓	
	Orientation	✓	✓
	Memory	✓	✓
	Attention	✓	✓
	Problem Solving	✓	
DCT	Reading	✓	

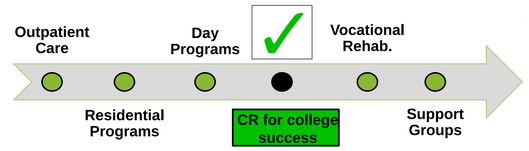
Note: Checkmark = statistically significant change over time

Summary
- ICCR students' scores on both linguistic and non-linguistic domains over time (13 subtests).
- Control participants' scores improved on only four subtests.

DISCUSSION

- On all six cognitive-linguistic assessments, ICCR students' scores significantly improved as the number of semesters in ICCR increased, indicating a cumulative benefit of the program.
- ICCR students also demonstrated significant longitudinal gains across a range of cognitive-linguistic domains (e.g., attention, memory, naming).
- Overall, fewer significant changes were observed in the active deferred treatment controls over time, suggesting ICCR resulted in the experimental participants' gains.
- This study expands and confirms our previous work[10] supporting the efficacy of ICCR for improving cognitive-linguistic functions important for college success.
- Further, it builds upon the growing evidence base showing the benefits of intensive rehabilitation for improving cognitive-linguistic function in individuals with ABI.[15]
- As this program's structure incorporates principles of neuroplasticity,[8] future work should examine the brain reorganization underpinning these longitudinal gains.

CONCLUSIONS



- ICCR is a first step in filling the gap in CR services for young adults with ABI interested in college.

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