Intensive Cognitive Communication Rehabilitation (ICCR) Program for Young Adults With Acquired Brain Injury

Boston University
College of Health & Rehabilitation Sciences: Sargent College
Department of Speech, Language & Hearing Sciences
Aphasia Research Laboratory
Boston, MA

Natalie Gilmore, Katrina Ross, and Swathi Kiran

Boston University, College of Health and Rehabilitation Sciences: Sargent College, Boston, MA

BACKGROUND

- Acquired Brain Injury (ABI) due to stroke or TBI typically results in chronic cognitive-communication impairments.[1-3]
- Young adults (YAs) commonly experience ABI,[5,6] which often negatively impacts their academic success.
- Cognitive Rehabilitation (CR) is the gold standard treatment.[1]
  - Optimal CR includes:
    - Impairment-based and functional approaches[1,7]
    - Principles of neural plasticity: a) intensity, b) age, c) repetition, and d) salience[8]
    - Metacognitive strategy training and counseling[1,9,10]
- None of the existing CR programs[11-14] for YAs with ABI currently incorporate elements of optimal CR in the academic setting or with the primary goal of enrolling in higher education.

CURRENT STUDY

Aim: To test the efficacy of a novel intensive cognitive-communication rehabilitation (ICCR) program, which simulates a college semester, for YAs with ABI interested in higher education

Research Questions:

Do participants…

- *RQ1.* show changes in cognitive-linguistic skills as a result of this novel intervention program?
- *RQ2.* demonstrate the ability to acquire novel skills necessary for success in a functional environment?
- *RQ3.* progress toward personal and therapeutic goals over the course of treatment?
- *RQ4.* exhibit changes at the activity and participation levels, as well as changes to their quality of life, as a result of this program?

METHODS

Participants

		P1	P2	P3	P4	C1	C2
Etiology		TBI	CVA	TBI	TBI	CVA	TBI
Age		21	29	25	34	31	23
Sex		M	M	M	M	F	F
Education (years)		12	15	10	16	14	12
Months Post Onset		49	70	96	97	59	38
WAB-R	LQ	56.8	73.2	71.8	24.0	85.3	90.7
	CQ	65.2	77.2	73.9	33.8	88.3	90.3
	AQ	61.9	80.4	66.1	18.8	84.6	91.3
RBANS - Index		45.0	64.0	46.0	48.0	76.0	52.0

Enrollment

Fall 2016
- Experimental : P1, P2, P3
- Control: C1

Spring 2017
- Experimental : P1, P2, P3, P4
- Control: C1, C2

Summer 2017
- Experimental : P1, P2, P3

P=experimental participant; C=control participant (i.e., no treatment)

Pre- and Post-assessment

- Western Aphasia Battery-Revised (WAB-R)
- Repeatable Battery for the Assessment of Neuropsychological Status Update (RBANS Update)
- Scales of Cognitive and Communicative Ability for Neurorehabilitation (SCCAN)
- Discourse Comprehension Test (DCT)
- Child and Adolescent Scale of Participation (CASP)
- TBI-QOL & Neuro-QOL Subtests

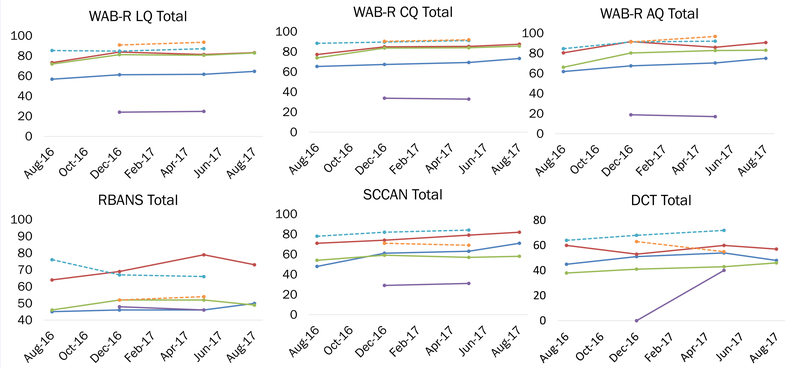
Treatment

- 12 week simulated semesters (fall, spring, and summer)

	Monday	Tuesday	Wednesday	Thursday
10:00				
11:00	PSYCHOLOGY	BIOLOGY	PSYCHOLOGY	BIOLOGY
12:00				
1:00	Lunch	Lunch	Lunch	Lunch
2:00	US HISTORY	FINANCE	US HISTORY	FINANCE
3:00	TECH TRAINING	Individual SLP	TECH TRAINING	TECH TRAINING

RESULTS

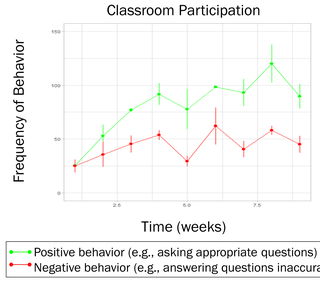
- *RQ1.* Did experimental participants show significant improvements in cognitive-linguistic function?



- Experimental participants showed significant gains* on standardized measures of cognitive-linguistic skills; controls did not !

P1: WAB-R ($\chi2$ (3) = 14.25, p = 0.003), RBANS ($\chi2$ (3) = 29.07, p < 0.001), and SCCAN ($\chi2$ (3) = 30.13, p < 0.001)
P2: WAB-R ($\chi2$ (3) = 23.63, p < 0.001), RBANS ($\chi2$ (3) = 15.94, p < 0.001), and SCCAN ($\chi2$ (3) = 15.65, p = 0.001
P3: WAB-R ($\chi2$ (3) = 20.87, p < 0.001)
P4: DCT ($\chi2$ (1) = 40.0, p < 0.001)
* Significance tests were conducted using item-level data for all tests for all time points (not plotted).

- *RQ2.* Did experimental participants acquire skills necessary for success in the classroom?



- Participants' were more positively engaged in the classroom at the end of Semester 3!
- The frequency of positive behaviors (e.g., answering questions accurately) increased at a greater rate over time than the frequency of negative behaviors (e.g., answering questions inaccurately) (Time-by-behavior interaction effect: (F (1, 51) =11.25, p < .01); negative < positive behaviors: β = -5.85, SE = 1.74, t(1,51) = -3.34, p < 0.01).

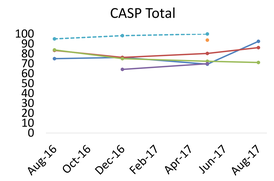
- *RQ3.* Did experimental participants make progress in individual speech-language-cognitive therapy?

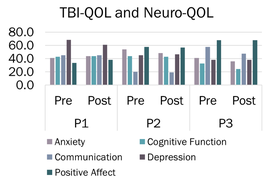
Speech-language-cognitive therapy individual goals for experimental participants

	Initial Goal Areas	Final Goal Areas
P1 (August 2016 - August 2017)	1. Selective attention in a non-distracting environment with minimal cues 2. Concrete problem solving with moderate cues and extra time	1. Alternating/divided attention in a mildly distracting environment with minimal cues 2. Mixed concrete-abstract problem solving with minimal-moderate cues and extra time
P2 (August 2016 - August 2017)	1. Concrete problem solving 2. Organization and cognitive flexibility in concrete, discrete scenarios with maximal cues	1. Multi-step functional problem solving with moderate cues 2. Organization and cognitive flexibility in functional situations with moderate-maximal cues
P3 (August 2016 - August 2017)	1. 1-5 minute sustained attention in a minimally distracting environment with moderate-maximal cues 2. Basic concrete problem solving with maximal cues and extra time	1. 10 minute sustained and selective attention in a classroom environment with minimal cues 2. Minimally-moderately complex concrete problem solving with moderate-maximal cues and extra time
P4 (January - May 2016)	1. Use total communication on 3 occasions to repair breakdowns given maximal cues 2. Identify basic familiar pictures by name from a field of 3	1. Use total communication on 4-5 occasions to repair breakdowns given moderate cues Identify basic familiar pictures by name from a field of 4

Complexity of therapy goals increased over time!

- *RQ4.* Did they show changes in their participation and QOL?





- All experimental participants transitioned from a score of 0 ("unable to participate") in the School domain to a score of 65 or greater.
- P1, P2, and P4 all exhibited increases in their total CASP scores, as did C1, though P3 exhibited a decrease.
- All three experimental participants showed gains in at least one domain and decreases in at least one domain.
- Decreases may have been due to increased insight into deficits or response shift

DISCUSSION

- Experimental participants in ICCR improved significantly in ≥1 cognitive-linguistic skill; controls did not.
- All experimental participants increased the complexity of their SLP goals.
- All Semester 3 participants (n=3) exhibited more positive classroom behaviors over time.
  - The classroom provided context for learning and generalization of skills and strategies.
  - ICCR encouraged use of adaptations and accommodations.
  - P2 has returned to college to finish his associate's degree.
- All participants reported some increased participation and quality of life.
  - All reported increased participation in the School domain.
  - P1, P2, and P4 increased total Life Participation scores.
  - P1, P2, and P3 increased in ≥1 QOL domain.

CONCLUSIONS

- There is a gap for YAs with ABI who want to return to higher education, and ICCR is a first step to closing that gap.
- The majority of participants demonstrated significant gains in standardized tests, classroom performance, SLP goals, life participation and QOL.
- This study provides initial support for the effectiveness of ICCR as a form of CR for YAs with ABI.
  - An intensive program based on principles of experience-dependent plasticity that incorporated classroom lectures, metacognitive strategy instruction, individual therapy and technology-based training resulted in gains for YAs with chronic ABI.

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