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Combining Cognitive Training and Brain Stimulation: A Feasibility Study

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Outline

Background
& Rationale

Study
Design

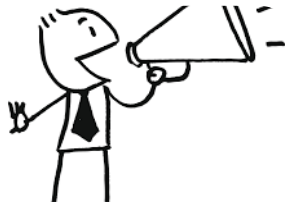
Preliminary
Findings

Next Steps



What is 'cognitive' or 'neuropsychological' functioning?

Thinking Skills



Attention



Processing speed



Working memory



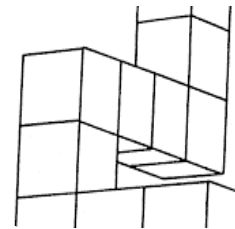
Learning



Memory



Language



Visuospatial abilities



Executive functioning



Cognitive functioning in mental health conditions

Schizophrenia

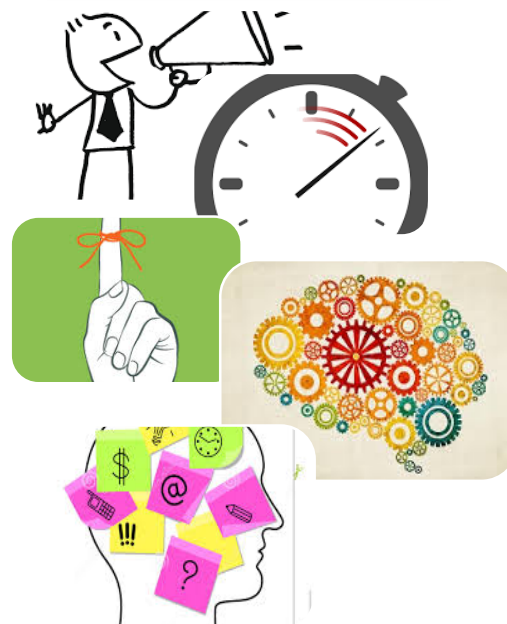
Up to 66%

Bipolar Disorder

Up to 60%

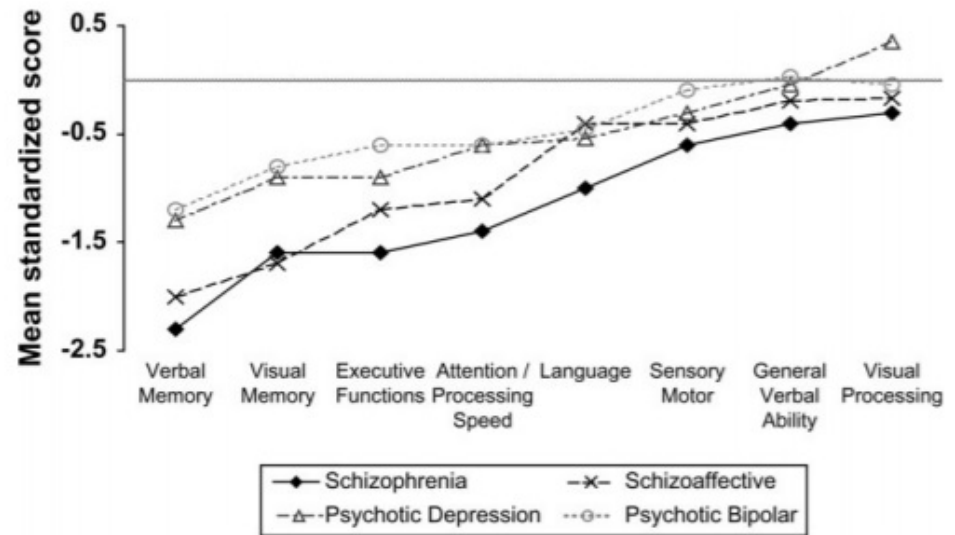
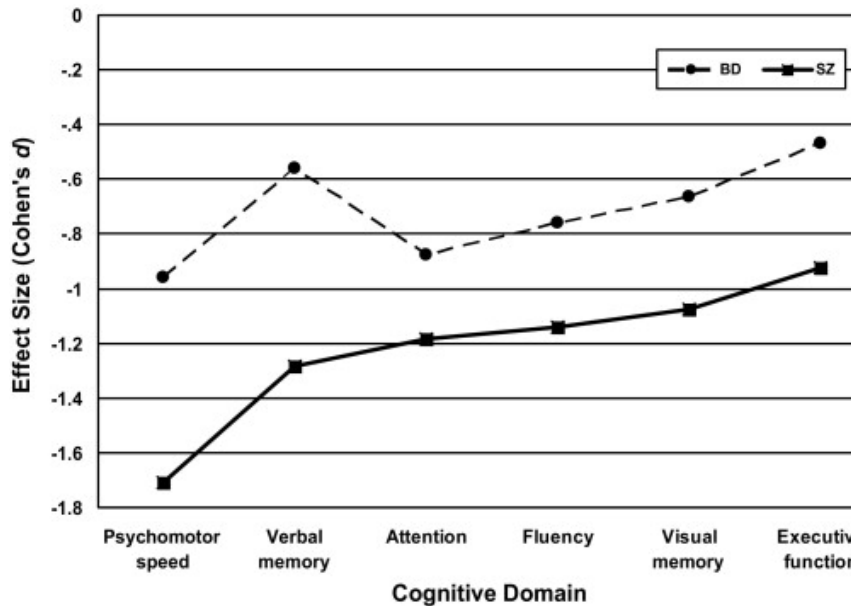
Major Depression

10-50%





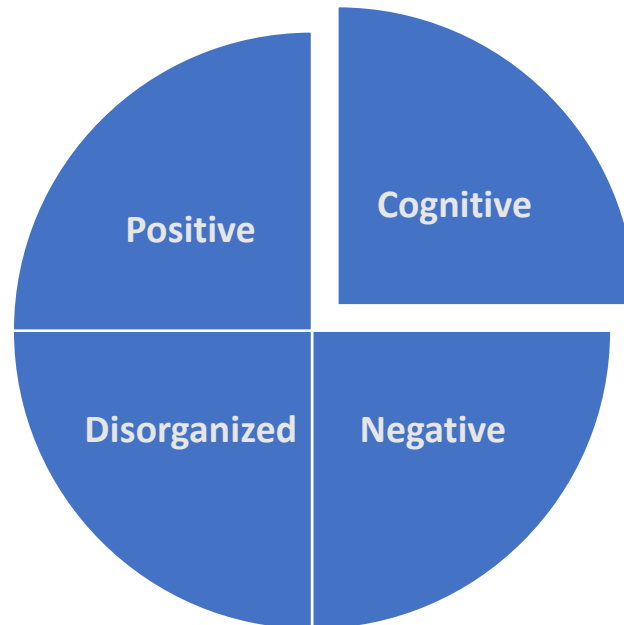
Cognitive functioning in mental health conditions





Making the case for cognitive impairment

- At least for schizophrenia, there is growing evidence that it is a cognitive disorder that produces psychiatric symptoms
 - Deficits show up early, and among those who have not had antipsychotics





Why does cognitive impairment matter?

- Cognitive deficits interfere with community functioning, even more than symptoms
- Contributes to chronic problems like difficulty getting & keeping a job, maintaining social relationships, etc.
- Creates barriers to benefitting from psychiatric rehabilitation & recovery programs





What do we do about it?

- Rise of cognitive training or remediation
 - “Brain training” originally developed for those who suffered neurological injuries
 - Later adapted for use with people with mental health conditions

Cognitive remediation is a behavioral training intervention targeting cognitive deficit (attention, memory, executive function, social cognition, or metacognition), using scientific principles of learning, with the ultimate goal of improving functional outcomes.

Cognitive Remediation Experts Workshop



Types and methods galore



Computer-based



Individual

Therapist led



Outcome of Interest?



Group

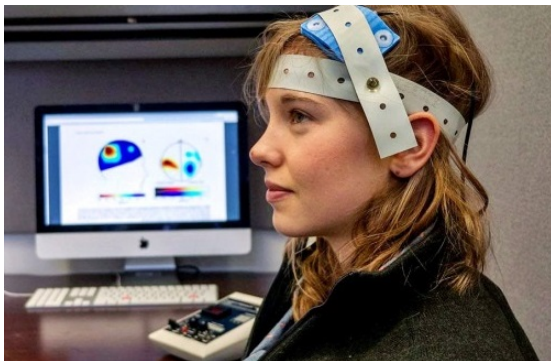


Mechanism?



The evidence: good, could be better

- In large meta-analyses, cognitive remediation has shown ‘medium’ effects on cognitive abilities and everyday functioning
- So how can we do better?
- Can we identify a ‘cognitive enhancer’ to boost training?





The study: Combining computerized cognitive training and tDCS

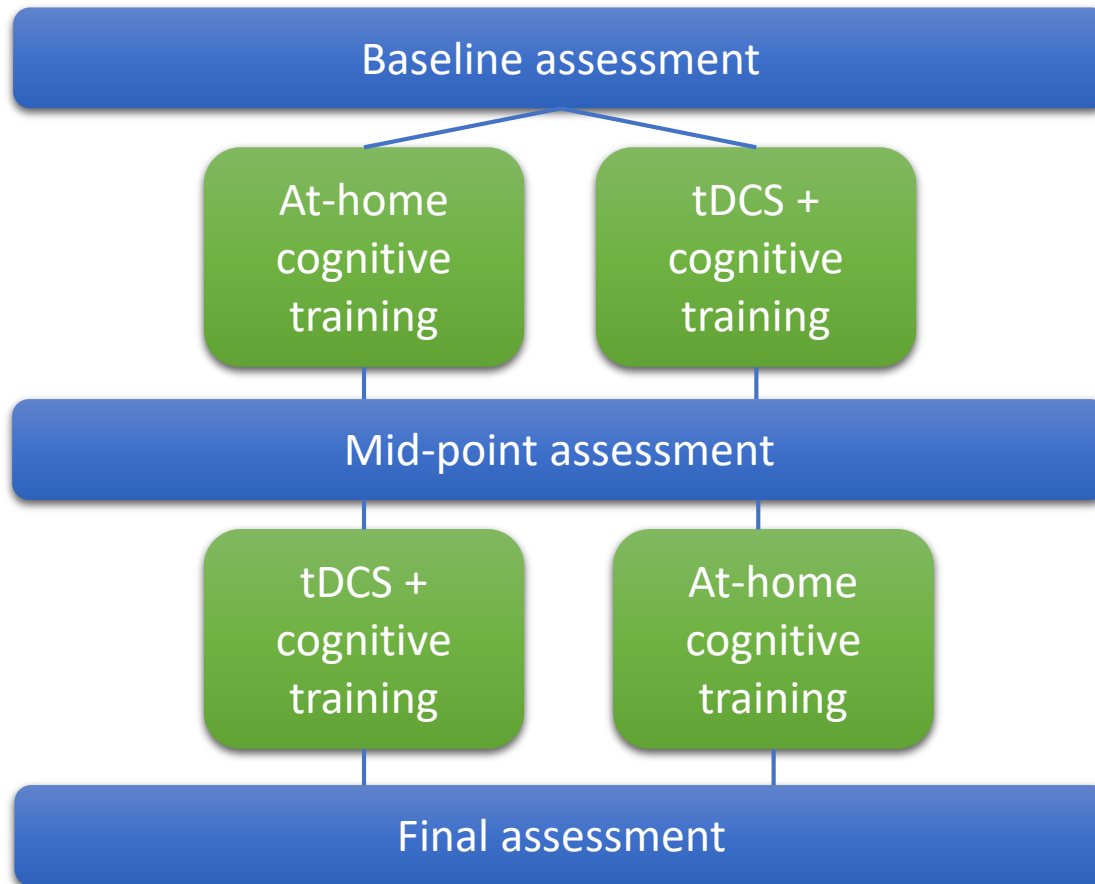
To test whether combining a type of non-invasive brain stimulation with cognitive exercises is feasible and helpful in improving a type of memory skill among people who experience mental health symptoms and difficulty with those memory skills

Age 18-65

Diagnosed with schizophrenia, schizoaffective disorder, or bipolar disorder

Low performance on working memory tasks

Participant flow

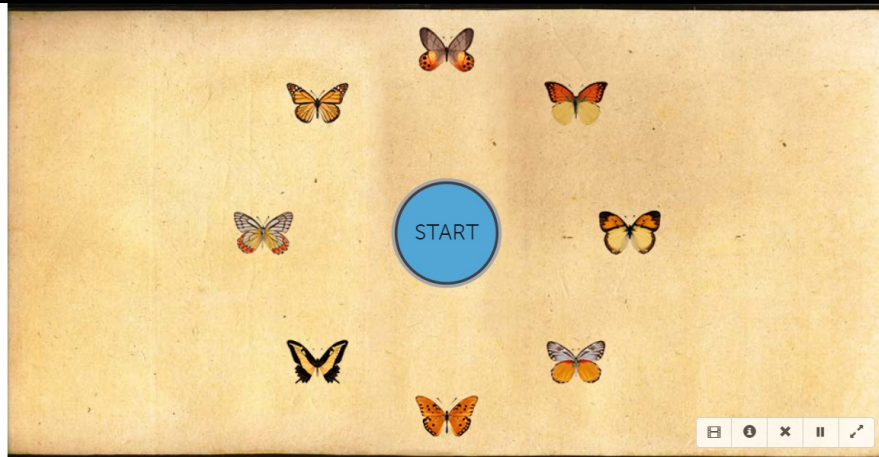






Computerized cognitive exercises

- Commercially available web-based program
- Tasks selected to specifically target working memory

Three butterflies will appear one at a time. Two will match. Remember the locations of the matching butterflies. Click START to continue instructions.

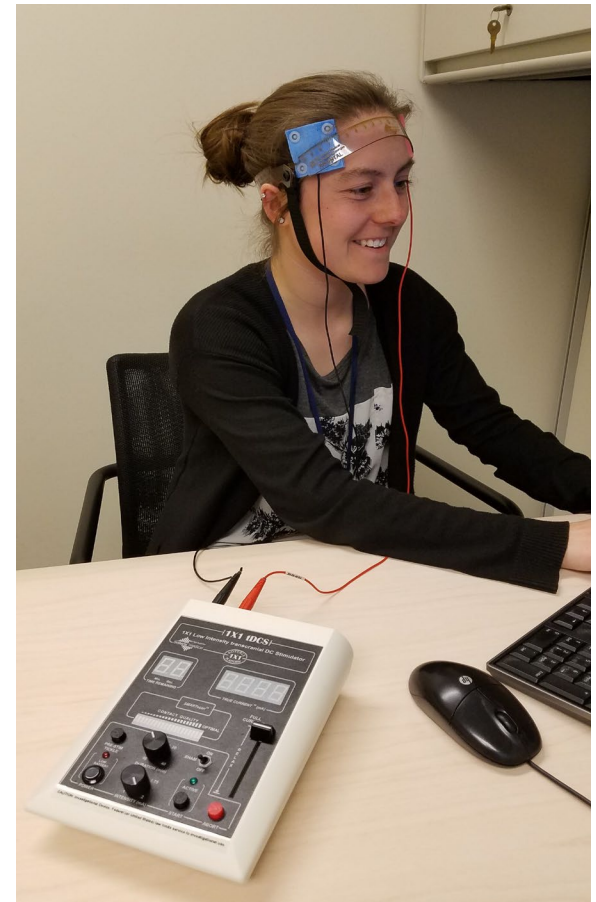
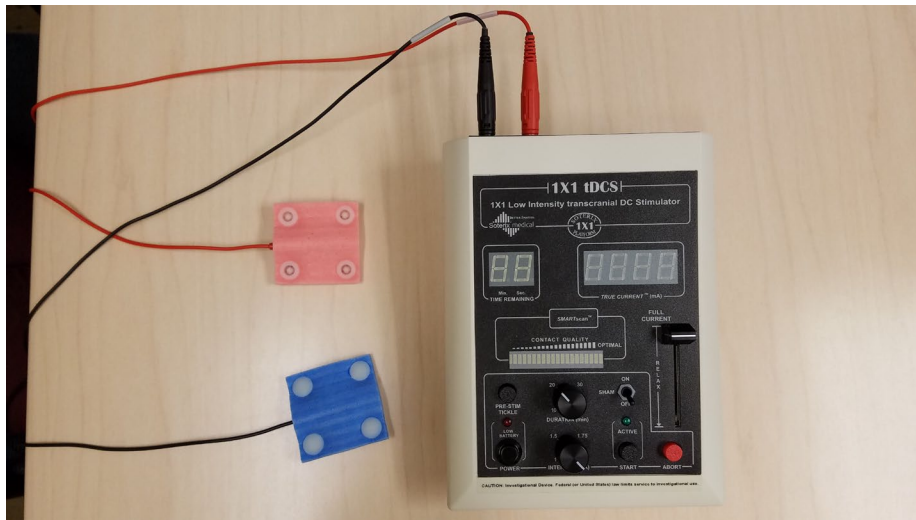


If you're ready to begin training, click Start. Need more help? Watch a tutorial video (click ) or repeat the instructions (click .



Transcranial Direct Current Stimulation

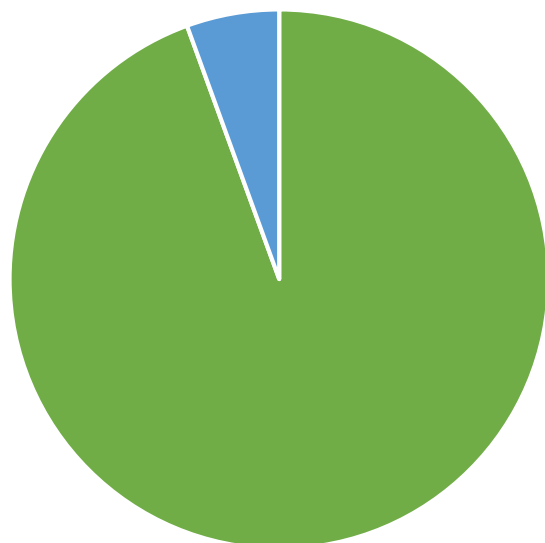
- Involves attaching two electrodes to the scalp, one “excitatory” and one “inhibitory”, and passing a small electrical current between them to stimulate brain activity





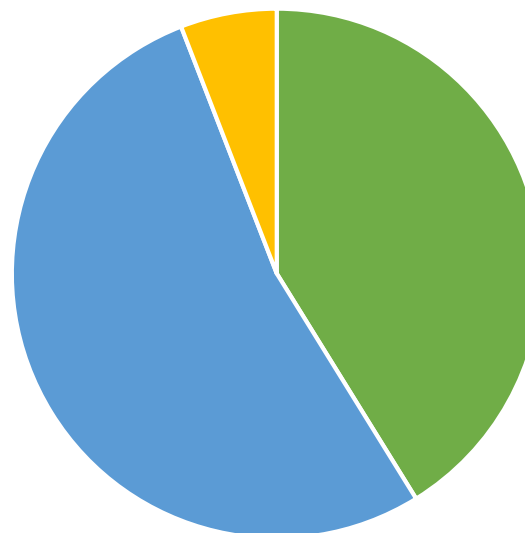
Enrollment

Consented



■ Yes ■ No

Confirmed Eligible



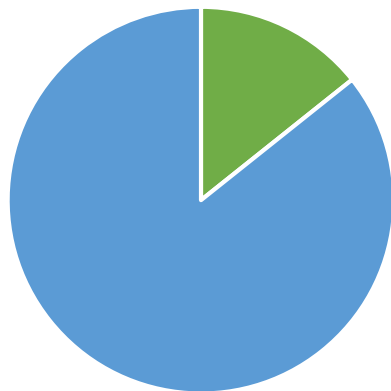
■ Yes ■ No - cognitive ■ No - diagnosis



Participant Characteristics (n=7)

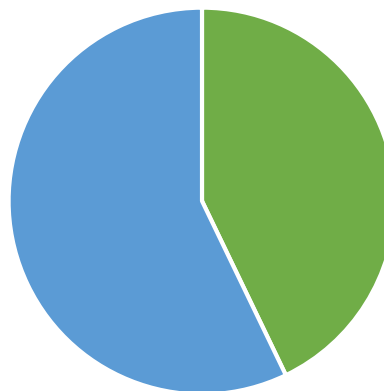
- 48 years old (range 27-62)
- 15 years education (range 12-18)

Gender



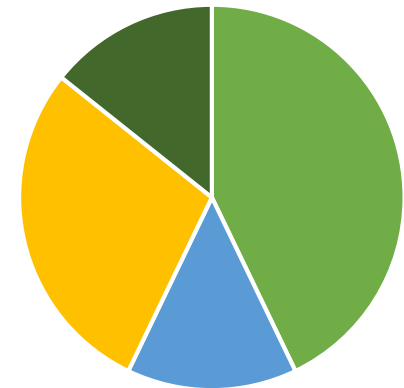
■ Male ■ Female

Race/Ethnicity



■ Caucasian ■ AA

Diagnosis

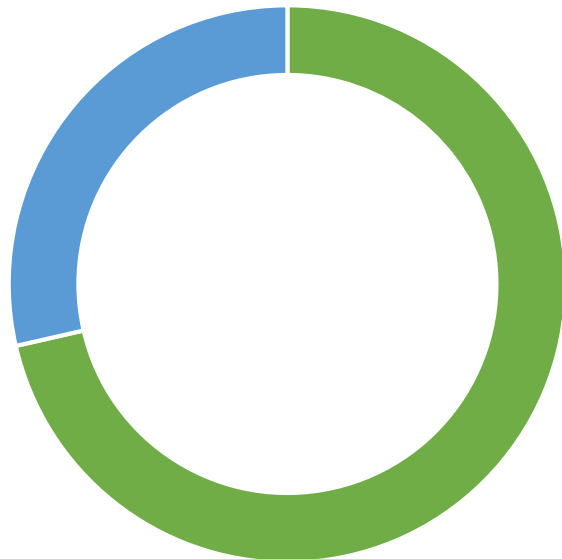


■ SZ ■ SAD ■ BP I ■ BP II



Retention

Study Completion Rate



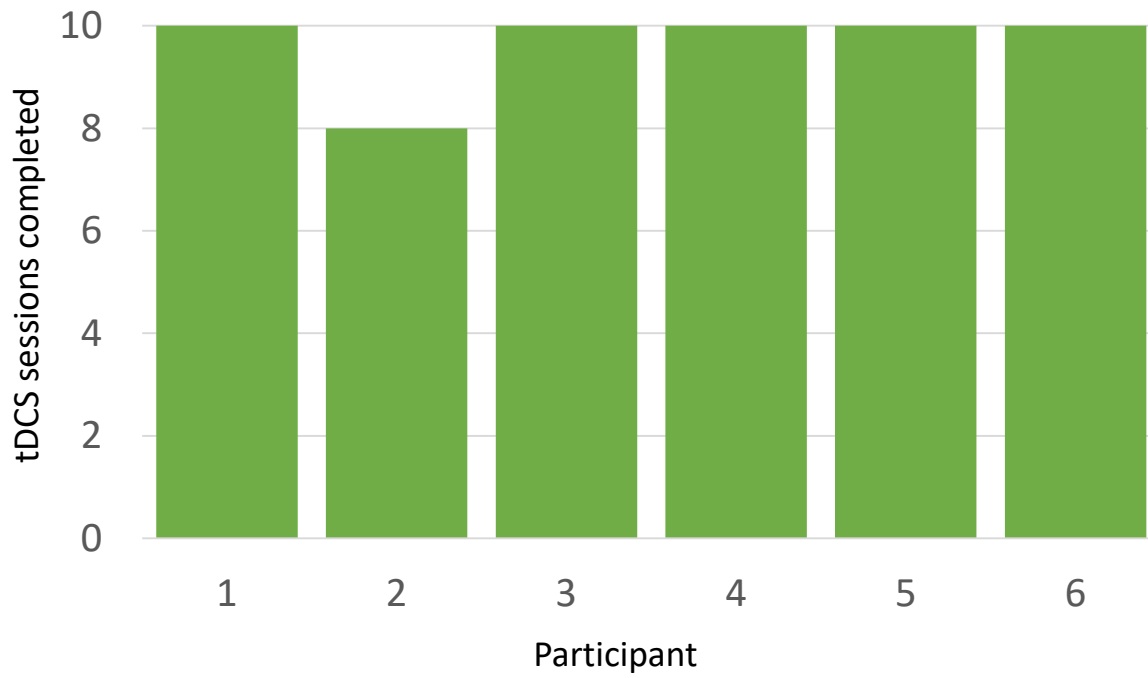
■ Completed ■ In Progress

0

Withdrawals
Missed assessments



tDCS experience



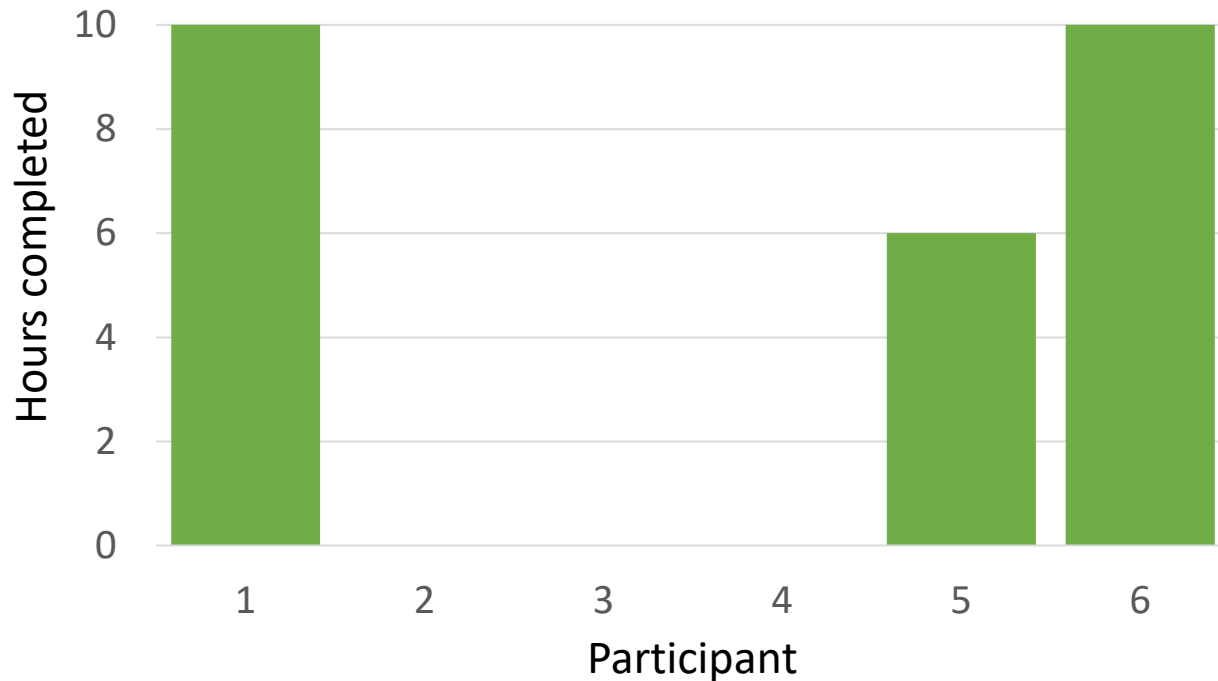
0
Sessions stopped

1
Current reduction



At-home cognitive training experience

- More challenging than expected!
- Barriers: time and symptoms





What we have learned so far

- Will people sign up for this treatment?
 - YES!
- Can they actually come to the clinic and complete tDCS?
 - YES!
- Can they complete the at-home cognitive training?
 - MAYBE NOT...



Next steps

- Design changes
 - Remove requirement for cognitive impairment?
 - Remove at-home training component?
 - Add 'sham' stimulation as a control condition
 - Add one-month follow-up
- Funding!



How can you learn more?

- American Psychological Association, Division 12 (Society of Clinical Psychology)
 - <https://www.div12.org/treatment/cognitive-remediation-for-schizophrenia/>
- Cure Alliance for Mental Illness
 - <http://curealliance.org/research-focus-cognitive-impairment-in-schizophrenia/>
- Cogsmart.com
- Dealing with Cognitive Dysfunction: Handbook for Family and Friends
 - https://www.omh.ny.gov/omhweb/cogdys_manual/cogdys_hndbk.pdf
- Clinicaltrials.gov NCT03338673



Thank you!

- Contact: czburton@med.umich.edu





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2. You can also evaluate the session on your computer. Go to: www.nami.org/sessioneval, select the session and click “Rate This Session.”