Compensatory Cognitive Training and CogSMART for Veterans with Neuropsychiatric Conditions

Elizabeth W Twamley, PhD
Director, Clinical Research Unit, Center of Excellence for Stress and Mental Health, VA San Diego Healthcare System
VA Rehabilitation Research and Development Research Career Scientist
Professor of Psychiatry, UC San Diego

etwamley@health.ucsd.edu | www.cogsmart.com | smartlab.ucsd.edu
elizabeth.twamley@va.gov

VISN 20 MIRECC December 15, 2021
Disclosures

• None

Photo courtesy of Carl Schy
Learning Objectives

At the end of this presentation, learners will be able to:
1. Describe compensatory and restorative interventions to improve cognition in Veterans with neuropsychiatric disorders.
3. Describe how to link cognitive strategies with individual rehabilitation goals.
CogSMART app (www.cogsmart.com)

- Free web-based app
- 12 modules
- Each module includes text, videos, and practice exercises
- Videos also available on CogSMART YouTube channel
App user data

Will you try using a calendar?
- Yes
- No
- Already Use

Will you try writing things down?
- Yes
- No
- Already Use
Review of rationale and development of CogSMART/CCT

Results from previous studies

CogSMART/CCT overview
Who What When Where Why

THE BACKGROUND
Neuropsychiatric disorders have cognitive consequences

• All psychiatric disorders are brain disorders
  • Bipolar disorder
  • Major depression
  • PTSD
• Any psychiatric illness robs the brain of resources as the brain works to keep symptoms under control
• Acquired brain injury (TBI, stroke)
• Mild cognitive impairment (MCI) and dementia

Rock et al., 2014, Psychol Med; Bora et al., 2013, Psychol Med; Bora, 2018, J Affect Disord; Schuitevoerder et al., 2013, J Anxiety Disord
Why focus on treatment of cognitive impairments?

Psychiatric and neurological disorders
- Reduced neural efficiency

Cognitive impairment
- Attention
- Processing speed
- Learning
- Memory
- Executive functioning

Poor role functioning
- Independent living
- Working
- Education
- Social relationships

Low quality of life
- Decreased wellness
- Disability
- Poor community integration
- Dissatisfaction with role functioning

- Underappreciation of cognitive impairments and their downstream effects on functioning and quality of life
- Cognitive impairments limit recovery and treatment response
- Psychiatric service users may need cognitive support skills to engage in and benefit from treatment and reach their mental health recovery goals
<table>
<thead>
<tr>
<th>RCTs show positive effects on:</th>
<th>San Diego Trials</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Cognitive performance</td>
<td>• People with psychosis / psychosis with severe negative symptoms</td>
</tr>
<tr>
<td>• Psychiatric and post-concussive symptoms</td>
<td>• People with any severe mental illness</td>
</tr>
<tr>
<td>• Quality of life</td>
<td>• Youth with prodromal psychosis</td>
</tr>
<tr>
<td></td>
<td>• Young adults with autism</td>
</tr>
<tr>
<td></td>
<td>• Older people with hoarding disorder</td>
</tr>
<tr>
<td></td>
<td>• Veterans with TBI / PTSD+TBI</td>
</tr>
<tr>
<td></td>
<td>• Homeless Veterans with mental health conditions</td>
</tr>
<tr>
<td></td>
<td>• Older Veterans with MCI</td>
</tr>
<tr>
<td></td>
<td>• Veterans with Parkinson’s Disease</td>
</tr>
<tr>
<td></td>
<td>International trials in Oslo, Reykjavik, Montpellier, Ottawa, China</td>
</tr>
</tbody>
</table>

Translations now available: Spanish, Portuguese, Japanese, Icelandic, Norwegian, French, Arabic, Hindi, Chinese

CogSMART/CCT manuals downloaded >5000 times from cogsmart.com; used in many VA, DoD, and community facilities

CogSMART web-based app went live in June 2018
800 downloads in 3 months

Next steps: Implementation science
Integration with robotics
Theoretical approaches to cognitive training

Restorative

- “Bottom up” processing
- Restore functioning of neural circuitry underlying impaired cognition
- Typically computerized, hierarchical, drill and practice approaches
- Portable, relatively easy to administer
- Generalizable?

Compensatory

- “Top down” processing
- Not intended to restore, but rather work around or compensate for cognitive impairment
- Typically group- or individual-based strategy training
- Real world applicability and generalizability
- Cost? Provider intensive?
Cognitive Symptom Management and Rehabilitation Therapy (CogSMART) and Compensatory Cognitive Training (CCT)

- Different from restorative “brain training” interventions
- Not intended to restore, but rather work around or compensate for cognitive impairment
- Typically group- or individual-based strategy training
- Real world applicability and generalizability

Cognitive compensation

- “Working around” deficits by reducing cognitive demands or handling them differently

Habit learning

- Habits are particularly resistant to forgetting
- Uses intact neostriatal pathways rather than declarative memory

Bayley et al., 2005; Knowlton et al., 1996; Keri et al., 2005; Clare et al., 1993
Restorative and other approaches to cognitive training

lumosity

BrainTrain®
CHANGING THE WAY PEOPLE THINK

COGMED

happyneuron

brainHQ
from Posit Science
Restorative brain games

• A $3.3 billion industry in 2020
• Controversial claims: Training for 10-15 minutes 3-4x/week helps users achieve “full potential in every aspect of life”
• Popular media: “Brain training for 10 hours has lasting benefits up to 10 years”
• Plentiful evidence for “near transfer”
• Less compelling evidence for “far transfer”
• Effectiveness hotly debated by scientists
One advertisement
Why use the compensatory approach?

- The cause of the cognitive impairments is not important
- Compensatory strategies help people work around cognitive impairments and have the potential to induce brain plasticity
- It is recovery-oriented in its focus on linking strategy use to goals and roles in the community
- Everyone uses compensatory strategies; it’s not “therapy”
- Habits and routines are powerful
- Evidence of improvement in cognition as well as generalization to functional outcomes
CogSMART/CCT interventions

- Once a week for 8-12 weeks, individual/group
- Manualized, low-tech, practical, portable
- Individualized approach elicits real-world cognitive problems and links strategies taught to the person’s rehabilitation goals
- Homework is assigned weekly

- There is also a free, self-guided CogSMART app
CogSMART/CCT domains

- Prospective Memory
- Learning and Memory
- Conversational and Task Attention
- Executive Functioning / Cognitive Flexibility

- Why these 4?
  - Important for everyday functioning and quality of life
  - Modifiable
  - A good fit for Veterans with TBI and/or PTSD?
## CogSMART/CCT modules

<table>
<thead>
<tr>
<th>Cognitive Ability</th>
<th>Compensatory Strategies</th>
</tr>
</thead>
<tbody>
<tr>
<td>Prospective memory</td>
<td>Using calendars and reminders in the environment, linking tasks</td>
</tr>
<tr>
<td>Conversational and task attention</td>
<td>Conversation skills, using ‘self-talk’ to stay focused during tasks</td>
</tr>
<tr>
<td>Verbal learning and memory</td>
<td>Reducing info (e.g., writing things down), making info meaningful, name-learning skills</td>
</tr>
<tr>
<td>Executive functioning / Cognitive flexibility</td>
<td>Brainstorming, 6-step problem-solving method, planning to meet goals/deadlines</td>
</tr>
</tbody>
</table>
Results from Previous Studies

THE SCIENCE
CogSMART/CCT for TBI RCTs

- Postconcussive symptoms (d = 0.97, 0.64)
- Prospective memory (d = 0.72, 0.55)
- Quality of life (d = 1.0 @ 12 mos)

Small to medium effects on:
- Attention (Digit Span, $\eta^2 = 0.048$)
- Learning (HVLT-R, $\eta^2 = 0.054$)
- Exec (letter fluency, $\eta^2 = 0.076$)
Neuroimaging results in mild TBI sample

CCT-associated reduction of activation in bilateral parietal and occipital cortex during an event-based prospective memory task.

CCT may improve neural efficiency for processing event-based information. (Simmons et al., 2013, Society for Neuroscience)
Clinical Problem: Providers unprepared to treat Veterans with PTSD+TBI

• Which treatment should occur first?
• Should they occur simultaneously? Could they even be integrated?
• Should we adapt PTSD treatments for Veterans who may have TBI-related cognitive impairments?
Enhanced Cognitive Rehabilitation to Treat Veterans with Comorbid TBI and PTSD (SMART-CPT; Jak et al., 2019)

- SMART-CPT is cognitive processing therapy (CPT) with some additions to address cognitive impairments
  - CogSMART compensatory strategies for organization, attention, memory, planning
  - Visually enhanced worksheets
  - Within-session summaries
- SMART-CPT takes 15 hours completed in 12 weeks vs. 24 hours for CPT and CogSMART separately
- Ensures that Veterans get treatment and increases efficiency for both Veteran and clinic
SMART-CPT Methods and Results

- 100 Veterans with PTSD+TBI
- RCT of SMART-CPT vs. standard CPT; assessments at baseline, 12 weeks, and 24 weeks
- Results: equivalent PTSD symptom outcomes, plus objective cognitive improvement in the SMART-CPT group
What about CogSMART/CCT for PTSD?

- Maya O’Neil, PhD (Portland VA) is conducting an RCT... stay tuned
Techniques You Can Use

THE TREATMENT
Session format

- Review homework from previous session and discuss generalization to everyday life, job search, or job performance
- Introduce new skills and establish rationale
- Practice skills
- Assign homework
6. **Think about your goals for the course**

1. What are one or two **problems with cognition or thinking** that affect you most (e.g., problems remembering things, focusing, poor organization)?

2. What **important life areas do these problems interfere with** the most (e.g., work, family relationships, managing your affairs, taking care of your health)?

3. Identify one or two **important life goals** you would like to work toward during this course (e.g., returning to work or school, being more reliable at work, helping out more at home, remembering medications and appointments).
Goals are #1

• Get to know goals really well and link strategies to goals very clearly

• Elicit goals to get buy-in
  • Living, learning, working, socializing
  • Financial? Health?
  • Specific, Measurable, Achievable, Relevant, Time-bound (SMART goals)
Overt linkage of strategies to goals

4. **How memory strategies can help with long-term goals**

Think back to those life goals that you wrote down on page 8. How will the learning and memory strategies we’ve covered help you achieve those goals?

________________________________________________________________________

________________________________________________________________________

________________________________________________________________________

________________________________________________________________________

________________________________________________________________________

________________________________________________________________________
How are cognitive strategies linked to goals?

• Using a calendar efficiently will help you plan your job search activities or work/school assignments, go to work/class on time, call your best friend on their birthday, pay the rent on time, and generally get things done.

• Using conversational attention skills will help your relationships with your family members, friends, partners, or bosses by making sure that other people feel heard and understood; these skills will also help you remember your conversations better.

• Learning and memory strategies can help you learn and remember new information at home, work, and school.

• Executive functioning strategies can help you with planning, prioritizing, problem-solving, and thinking flexibly. These skills are important in managing your tasks in life, whether they involve work, school, relationships, health, finances, or living independently.
Who benefits from CogSMART/CCT?

• Few identified predictors of response
• PTSD/depression/substance use symptoms do not moderate response (Pagulayan et al., 2017)
• In another study, improvement was correlated with worse baseline scores on measures of cognitive performance, symptom severity, functional capacity, and self-rated quality of life, cognitive problems, and strategy use
  • People who have worse cognition and more severe illness burden may improve more
• Race, ethnicity, gender, age, years of education, and other demographic factors do not appear to predict response
Identifying good candidates for CogSMART/CCT

• Veterans with functional goals, who have some cognitive impairments/declines, and are interested in improving attention, memory, organization
• Assume all people with psychiatric illness have some cognitive weaknesses, some decline, or are not using all the strategies available
• Build insight regarding links between cognitive functioning and goal attainment
Things I tell clinicians

• Be flexible; the manual is a guide
  • You can devote more time to areas of greater concern or relevance, and less time on strategies already used well
  • Feel free to add your own examples or strategies!
• Use motivational interviewing techniques to elicit buy-in
• Have people SHOW you what they can do
• Be ready to teach voice commands / reminders / calendar on iPhone and Android
• Brainstorm with service users and clinicians to choose and implement strategies or create your own
• If people are willing, have them try the app: www.cogsmart.com
• And/or show videos from CogSMART channel on YouTube
Things I tell service users

• You may already use some of these strategies or even a lot of them

  • We will work toward making the strategies work as best they can, in the service of your goals, and making them automatic and habitual

  • Even elite athletes get coaching to improve; even if you know how to use a strategy, chances are good that you can still improve

• You don’t have to use all the strategies; learn them all, and then see which ones work best for you
How people use strategies

I love the overlearning strategy to remember names. I made flashcards for each new person I met at my AA meetings. On the back of the card, I’ll write down their phone number and personal details. I’m meeting more people and socializing with them. I’m having a social life outside of my addiction for the first time in two and a half years.

Self talk is a learning tool. It’s not like talking back to voices. If you do it for instructions or a task, it’s normal.

Paraphrasing makes my conversations more interesting. Normally I would just say, ‘Is that right?’ but now I’m a more active participant.

My calendar helps me to mark off my morning pills – I can check to see that I took them.

I went from not checking my sugars daily (maybe every other day or I would skip a few days) to checking every day or twice a day. I write my sugar levels down in my calendar.

[The calendar] gives me peace of mind. I make notes to myself about ordering prescriptions and household duties.
CogSMART Veteran service users say...

- When asked if they would recommend the intervention to others in the same situation, 100% of Veteran service users answered “yes”
- “Made my daily life less stressful”
- “Excellent tools for managing daily life”
- “It has established a routine that helps me daily”
- “I am now more organized”
- “This by far has been one of my best therapies”
- “It has taken a lot of pressure off my wife because she doesn’t have to keep up with my schedule and it has given me confidence to go to school”
- “It helped me with fixing my credit, staying on top of class work, and applying for competitive jobs”
Conclusions

• CogSMART/CCT interventions can be useful to people with different causes of cognitive impairments
• Improvements found in cognitive performance, functional capacity, post-concussive and psychiatric symptoms, and quality of life
• CogSMART/CCT techniques do not “train to the test,” suggesting that these strategies generalize to actual cognitive performance and downstream effects
• Solutions to brain-based problems may be simpler than we think
  • Strategies that successful people use every day
  • Skills we assume everyone has, but they don’t
Thank you to BBRF/NARSAD, NIMH, DoD, VA, NSF, IBM, and the best collaborators, trainees, and staff on the planet.

All manuals available free of charge at www.cogsmart.com

Links to reports on randomized controlled trials: smartlab.ucsd.edu


