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# Cognitive Rehabilitation Post Acquired Brain Injury – How Evidence is informing Clinical Practice and Outcomes


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KY BI Summit – March 01, 2024

# Learning Objectives

1. Participants will identify scientific evidence and resources for determination of treatment options for individuals with acquired cognitive differences post brain injury.
2. Participants will state the foundational principles of cognitive assessment and intervention conducted by the rehabilitation clinical team
3. Participants will demonstrate active decision making for individualized treatment formulation resulting in optimized client engagement, new learning and generalization of skills in salient and contextualized environments



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# Foundational Principles of Assessment and Treatment of Cognition in The ABI population

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Foundational Principles


## Cognitive Rehabilitation

"minimize the functional impact of injury-related cognitive and behavioral impairments in order to maximize safety, independence, and quality of life"

Achieved through **BOTH** remediating or via developing and training compensatory strategies

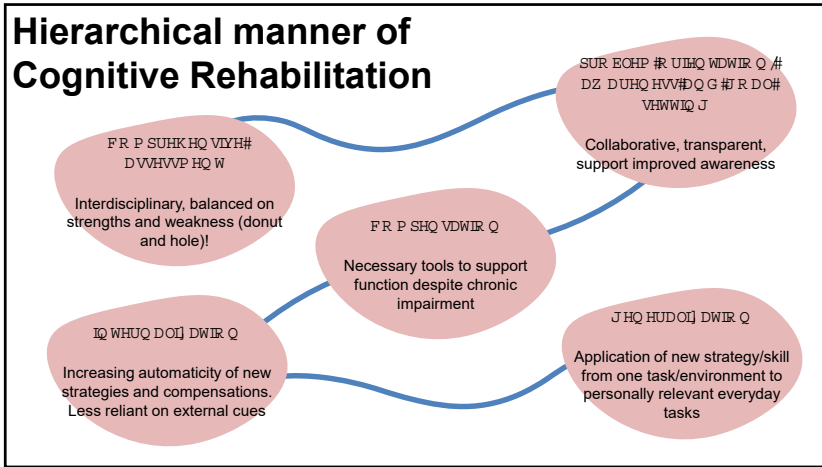
**ALWAYS** progresses in a hierarchical manner

**ALWAYS** individualized toward goals and interests of person served



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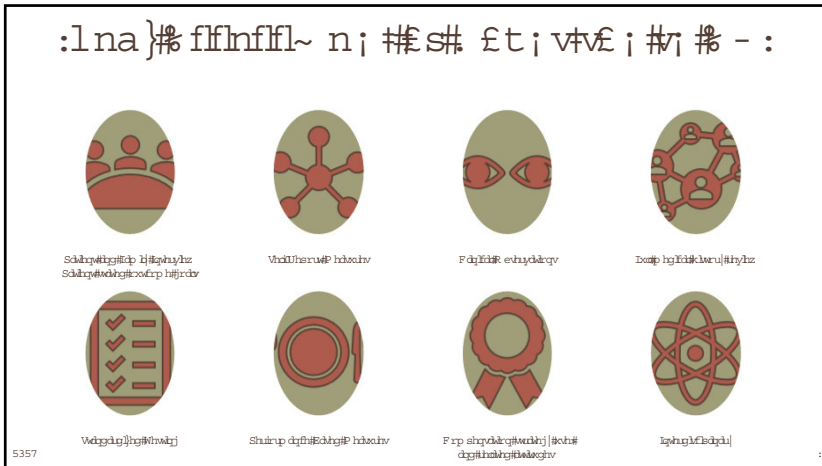
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### Assessment Considerations

Purposes	Approaches (best combined)
Establishing a diagnoses Estimating a prognosis Determining course of rehabilitation; clinical decision making Screening to identify needs Monitoring of treatment progress Evaluating outcomes <b>Psychoeducation</b> Objective feedback to improve awareness and engagement	Psychometric Flexible process-oriented approach Performance based approaches Ecological validity

Cognitive Rehabilitation Manual, 2nd Edition & Textbook (2022); pgs 347-348

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### Cognitive Rehabilitation is NOT:

- Sole reliance on, or over-generalization of standardized testing;
- Failure to consider individual differences... without consideration of "In whose brain?"
- Failure to consider relevant medical, cultural, linguistic.....factors

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## Cicerone et al., 2000, 2005, 2011 & 2019


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- Number of Original published reports of cognitive rehabilitation
- Fully evaluated and classified

LEVEL OF CLASSIFICATION

- Class I/IIa:
  - N = 107
- Class II
  - N = 68
- Class III
  - N = 312


EVIDENCE



5357 F r j g k h l U k d e B d a r q

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## Evidence for CR Treatment & Accommodations



**SYSTEMATIC REVIEW**

**Evidence-Based Cognitive Rehabilitation: Systematic Review of the Literature From 2009 Through 2014**

Keith D. Cicerone, PhD,<sup>1,2</sup> Yelena Goldin, PhD,<sup>1,3</sup> Keith Ganci, PhD,<sup>4</sup> Amy Rosenbaum, PhD,<sup>5</sup> Jennifer V. Wethe, PhD,<sup>6</sup> Donna M. Langenbahn, PhD,<sup>4,6</sup> James F. Malec, PhD,<sup>1,3</sup> Thomas F. Bergquist, PhD,<sup>7</sup> Kristine Kingsley, PsyD,<sup>1,8</sup> Drew Nagele, PsyD,<sup>1,4</sup> Lance Trexler, PhD,<sup>1,3</sup> Michael Fraas, PhD,<sup>1</sup> Yelena Bogdanova, PhD,<sup>1,3</sup> J. Preston Harley, PhD<sup>9</sup>

**Table 1** Definition of levels of recommendations

**Practice Standards:** Based on at least 1 well designed class I study with an adequate sample, with support from class II or class III evidence, that directly addresses the effectiveness of the treatment in question, providing substantive evidence of effectiveness to support a recommendation that the treatment be specifically considered for people with acquired neurocognitive impairments and disability.

**Practice Guidelines:** Based on 1 or more class I studies with methodological limitations, or well designed class II studies with adequate samples, that directly address the effectiveness of the treatment in question, providing evidence of probable effectiveness to support a recommendation that the treatment be specifically considered for people with acquired neurocognitive impairments and disability.

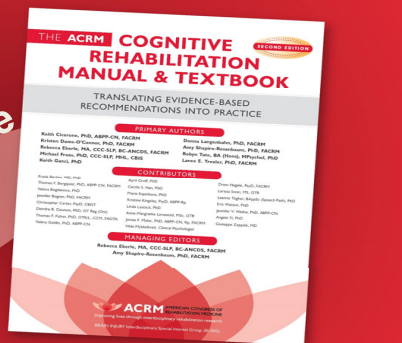
**Practice Options:** Based on class II or class III studies that directly address the effectiveness of the treatment in question, providing evidence of possible effectiveness to support a recommendation that the treatment be specifically considered for people with acquired neurocognitive impairments and disability.

- Translated into Practice Standards, Practice Guidelines and Practice Options for treatment of:
  - Attention Deficits
  - Visuo-perceptual Deficits
  - Memory Deficits
  - Communication and Social Cognition
  - Executive Function Deficits

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# Treatment Protocols; Sample Cases




F r j g k h l U k d e B d a r q # d x p # f g # g # l a r q # # i n { v e r m # 5355, # F r j g k h l U k d e B d a r q # # k d s l r U r n g e d x p

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## Evidence for CR Treatment & Accommodations



**ORIGINAL ARTICLES**

**INCOG 2.0 Guidelines for Cognitive Rehabilitation Following Traumatic Brain Injury: What's Changed From 2014 to Now?**

Bayles, Mark Theodore MD, PhD, Jansen, Shantica MS, Keeney, Andrew MS, JKSA, Bridge, Peter PhD, Trickett, Leanne PhD, Blagoff, Deborah PhD, Kna, Aileen MS, PhD, Rickabaugh, Eileen MS, Turkeltaub, Lori S, PhD, Berg-Cosmo, Tracey, Robert MS, Fricke, Kennedy, Mary PhD, CCC SLP, Marshall, Shawn MS, MSW, FRCPC, Farnford, Jenise PhD, JG, MA Clinical neuropsychology

©2019 Taylor & Francis, Mark RD, Farnford, Jenise MS, PhD

Journal of Head Trauma Rehabilitation 38(2) 1-6, January/February 2019, DOI 10.1001/HTR.0000000000000019

**TABLE 1 - INCOG level of evidence-grading system**

A: Recommendation supported by at least 1 meta-analysis, systematic review, or randomized controlled trial of appropriate size with relevant control group.

B: Recommendation supported by cohort studies that at minimum have a comparison group (includes small randomized controlled trials) and well-designed single case experimental designs.

C: Recommendation supported primarily by expert opinion based on their experience though uncontrolled case studies or series may also be included here.

- INCOG (International Cognition) expert panel of clinicians/researchers
- Original Articles for primary domains:
  - Part I: Posttraumatic Amnesia
  - Part II: Attention and Information Processing Speed
  - Part III: Executive Functions
  - Part IV: Cognitive-Communication & Social Cognition Disorders
  - Part V: Memory

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## External Versus Internal Strategies

**External**

Those external to the patient; e.g., use of notebooks, electronic devices, cue cards...

LTG of external strategies is to enable patient to compensate for their impairments **INDEPENDENTLY** by using aids.

**Internal**

- Any self-generated procedure whose purpose is to enhance conscious control over thoughts behaviors or emotions.
- LTG of internal strategies is to enable patient to become so familiar/adept with process they can use it globally and without external assistance

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## Examples of recommended BI-ISIG Strategies

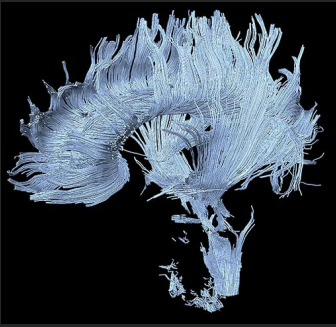
External Strategies	Internal Strategies
<ul style="list-style-type: none"> <li>Memory - memory book training, Errorless Learning, Spaced Retrieval, Chaining</li> <li>Executive function – formal problem solving procedures (GPDR with worksheets, external cueing and prompting)</li> <li>Hemispatial Neglect – Lighthouse Strategy with use of visual aid and external cueing</li> </ul>	<p>Memory – Association techniques (visual imagery), Organization/Elaboration techniques (mnemonics, PQRSST)</p> <p>Attention – Metacognitive strategy training (N-back procedures, Time Pressure Management Training)</p> <p>Executive Functioning – Metacognitive strategy training (self monitoring, self-regulation), formal problem-solving strategies (ex: GPDR)</p> <p>Hemispatial Neglect – visual imagery training (ex: Lighthouse Strategy)</p>

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## Metacognition

- “Thinking about thinking”
- Self-aware, self observing and correcting
- Metacognitive Strategy training (MST) “involves the cueing, structure and execution involved in the learning strategy components and implementation... the internalization of strategy steps to enhance awareness and control over one’s behaviors and cognitive functions”



Cognitive Rehabilitation Manual and Textbook 2<sup>nd</sup> Ed., 2022; pg. 86.

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Sohlberg & Mateer, 2001

## Stages of Cognitive Rehabilitation

Stage of Treatment:	Goals:	Type of Strategies Used:
<b>Acquisition</b>	<ol style="list-style-type: none"> <li>teach purpose and procedures of treatment model</li> <li>help patient recognize and accept deficits and benefits of treatment</li> </ol>	External
<b>Application</b>	<ol style="list-style-type: none"> <li>improve effectiveness &amp; independence in compensating for deficits</li> <li>promote internalization of strategies</li> </ol>	1. External 2. Internal
<b>Adaptation</b>	<ol style="list-style-type: none"> <li>promote transfer of training to tasks including those that are less structured, more novel, complex, and/or distracting</li> <li>promote generalization of skills from the structured therapy setting to less structured environments such as home, community, and work</li> </ol>	1. External and Internal 2. External and Internal

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## Therapeutic Alliance = CR Foundation

<p>UHVHDUF K #ED VHG</p> <ul style="list-style-type: none"> <li>○ Trusting and supportive therapeutic relationship = greater engagement, receptivity to feedback and desire to make change</li> <li>○ Strong emotional bond may reduce impact of depressive symptoms</li> <li>○ Predictor of patient level of awareness</li> </ul>	<p>IQ J UHG IHQ WV</p> <ul style="list-style-type: none"> <li>○ Patient's belief that the therapist understands their condition</li> <li>○ Active listening, conveying empathy and use of motivational interviewing</li> <li>○ Engaging the client in the therapeutic process – decision making; giving control where able</li> <li>○ Providing emotional support</li> <li>○ Employing a team approach</li> </ul>	<p>R X WFR P HV</p> <ul style="list-style-type: none"> <li>○ Greater individualization of strategies and tasks due to client's input and engagement</li> <li>○ Increased client self-awareness</li> <li>○ Increased likelihood of goal attainment, due to internal locus of control</li> </ul>
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## Cognitive Rehabilitation Interventions for Executive Functioning

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## Executive Functioning

**Those *integrative* cognitive processes that determine *goal-directed* and purposeful behavior and are superordinate in the orderly execution of daily life functions**

Cognitive Rehabilitation Manual, 2nd Edition & Textbook (2022); pg. 81.



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### What are the Executive Functions?

- Awareness
- Initiation
- Task persistence
- Self-Monitoring
- Organization
- Attention Regulation
- Working Memory
- Behavior Regulation
- Response Inhibition
- Generative thinking
- Flexibility
- Planning
- Higher order reasoning & problem solving

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**Executive Functions and Brain Dysfunction**

- **Cognitively**
  - Problems with awareness, anticipating problems, analyzing situations, planning solutions, executing those solutions, maintaining a flexible approach to tasks, and monitoring themselves.
- **Behaviorally-**
  - fail to think before they act, impulsivity or disinhibition, initiation deficits, hyperverboesity, poor emotional control and cognitive inflexibility.

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Jeffay, E., Ponsford, J., Harnett, A., et al., (2023). *Journal of Head Trauma Rehabilitation*. 38:1, 52-64.

**INCOG 2.0 Guidelines: Part III Executive Functions**

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**INCOG 2.0 Part III Guideline Recommendations**

- EXEC #1a/1b: Implement strategies that encourage monitoring of performance and feedback; implement self-awareness training. (grade A)
- EXEC #2: Metacognitive strategy instruction (e.g., GMT, Plan-do-check-review, and prediction performance). This is optimized when the person has self-awareness and treatment can be contextualized. (grade A)
- EXEC #3: Strategies to improve reasoning skills. (grade A)
- EXEC #4: Group based interventions for remediation of executive and problem-solving deficits. (grade A)

Jeffay, E., Ponsford, J., Harnett, A., et al., (2023). *Journal of Head Trauma Rehabilitation*. 38:1, pg. 55

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**Guideline Recommendations**

- EXEC #5: Rhythmical/music therapy. (grade A)
- EXEC #6: Virtual Reality. Clinicians consider the use of virtual reality programs, in addition to in-person visits to provide timely and equitable access to care. (grade A)
- EXEC #7: telerehabilitation-delivered metacognitive strategy training. (grade C)
- EXEC #4 telerehabilitation-delivered group-based treatment. (grade C)

Jeffay, E., Ponsford, J., Harnett, A., et al., (2023). *Journal of Head Trauma Rehabilitation*. 38:1, pg. 56.

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### Recommendations for EF

- **Practice Standard:**
  - Metacognitive strategy training (self-monitoring and self-regulation) is recommended for the treatment of mild-moderate deficits in executive functioning after TBI, including impairments in emotional self-regulation, during post-acute rehabilitation after TBI. Metacognitive strategy training may incorporate formal protocols for problem solving and goal management, and their application to everyday situations and functional activities during post-acute rehabilitation after TBI.

Cicerone, K. et al., 2019

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### Recommendations for EF

**2 Guidelines:**

- (1) Meta cognitive strategy training into occupation-based Tx for functional skills for patients with mild-moderate deficits in EF.
- (2) Explicit (verbal/video) performance feedback offered as a formal component of metacognitive strategy training for impaired self-awareness.

Cicerone, K. et al., 2019

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### Recommendations for EF

Cicerone, K. et al., 2019

**3 options:**

- (1) For patients with severe cognitive (executive) deficits, including limitations of emergent awareness and independent use of compensatory strategies, the use of skill-specific training including errorless learning may be considered to promote performance of specifically trained functional tasks, with no expectation of transfer to untrained activities.
- (2) Metacognitive strategy training may be considered as a component of occupation-based treatment during acute rehabilitation to reduce functional disability.
- (3) Group-based interventions may be considered for remediation of mild-moderate deficits in executive functioning (including deficits in awareness, problem-solving, goal management, and emotional regulation) during post-acute rehabilitation after TBI.

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## A General Algorithm for Treatment of Executive Dysfunction

Cognitive Rehabilitation Manual, 2nd Edition & Textbook (2022); pgs. 86-87.

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Crosson et al, 1989

## Model of Awareness

Anticipatory  
Emergent  
Intellectual

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GOAL: What do I want to accomplish?

PLAN: How am I going to accomplish my goal?

MATERIALS/EQUIPMENT                      STEPS/ASSIGNMENTS

PREDICTION: How well will I do?   How much will I get done?

DO: What problems did I find? What solutions?

REVIEW: How did I do?

Self-rating

1   2   3   4   5   6   7   8   9   10

Other rating

1   2   3   4   5   6   7   8   9   10

WHAT WORKED? WHAT DIDN'T WORK?

WHAT WILL I TRY DIFFERENTLY NEXT TIME?

Cognitive Rehabilitation Manual, 2nd Edition & Textbook (2022), pg. 30.

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## Goal Management Training Stages

Sample Task

Levine, B., Robertson, I.A., Clare, et. al. (2000)

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# Cognitive Rehabilitation Interventions for Attention


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Cognitive Rehabilitation Manual and Textbook, 2022; page 163

## Attention


-  Foundational skill that supports all other cognitive skills
-  Requisite for acquisition and processing of information
-  Even subtle changes impact function
-  Not a unitary construct ----- multidimensional and comprising distinct and interrelated subprocesses


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Sohlberg, M.M. & Mateer, C.A., 2001

## Hierarchy of Attention



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Ponsford, J., Velikonja, D., Janzen, S., et al., (2023). *Journal of Head Trauma Rehabilitation*. 38:1, 38-51.

## INCOG 2.0 Guidelines: Part II Attention and Information Processing Speed

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### INCOG 2.0 Part II Guideline Recommendations

- Attention #1: Screen for and address factors that impact attention, including hearing, vision, fatigue, sleep-wake disturbance, anxiety.... (grade C)
- Attention #2: MST using functional everyday activities, especially for those with mild-moderate attention deficits.(grade A)
- Attention #3: Computer-based de-contextualized attentional tasks NOT recommended... lack of demonstrated impact on everyday attention functioning (grade B)
- Attention #4: Dual task training on tasks similar to those trained. (grade A)
- Attention #5: Training with periodic random auditory alerting tones is not recommended for addressing attentional deficits. (grade B)

Ponsford, J., Velikonja, D., Janzen, S., et al., (2023). *Journal of Head Trauma Rehabilitation*. 38:1, pg. 41

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**Guideline Recommendations**

- Attention #6: Training in mindfulness-based meditation techniques is not recommended for remediation of attention deficits. (grade A)
- Attention #7: Alterations to the environment and tasks may be used to reduce the impact of attentional deficits on ADLs. (grade C)
- Attention #8: The use of repetitive transcranial magnetic stimulation (rTMS) and transcranial direct current stimulation (tDCS) is not recommended to ameliorate attention following TBI. (grade B)
  - Pharmacological Management for attention/information processing speed (See article for detailed recs)
- Attention #9: Methylphenidate {detailed recs} (grade A)
- Attention #10: Amantadine (limitations/detailed recs.) (grade A)
- Attention #11: traditional Chinese medicine {detailed recs} (grade A)

Ponsford, J.,Velikonja, D., Janzen, S., et al., (2023). *Journal of Head Trauma Rehabilitation*. 38:1, pg. 41-42.

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**Recommendations for Attention**

- **Practice Standard:**
  - Implement both direct attention training and metacognitive strategy training to increase task performance and promote generalization to daily functioning in post-acute.

Cicerone, K. et al., 2019

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**Recommendations for Attention**

- **Practice Guideline:**
  - Implement both direct attention training and metacognitive strategy training to increase task performance and promote generalization to daily functioning in post-acute.

Cicerone, K. et al., 2019

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**Recommendations for Attention**

- **Practice Guideline:**
  - Direct attention training for specific “modular” impairments in working memory, including the use of computer-based interventions should be considered to enhance both cognitive and functional outcomes during postacute rehabilitation.

Cicerone, K. et al., 2019

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## Metacognitive Strategy Toolbox

- Self-Pacing
- Verbal Mediation
- Self-Monitoring
- Emotional Regulation
- Rehearsal
- Share Attentional Resources



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Winkens et al., 2009

## Time Pressure Management

1. Compensatory strategy
2. Client learns to regulate the flow input/information
3. Aims to assist with management of everyday tasks through use of attention strategies and improvements in performance speed.
4. Designed to assist for mental slowness – uses techniques use in EF, memory and attention.

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Context	Analyze	Plan	Handle	Monitor	Notes	% acc (#/20)	Date
At cafe to work/meet friend	5 4 3 2 1 -	5 4 3 2 1 -	5 4 3 2 1 -	5 4 3 2 1 -			
Hosting a party/meal	5 4 3 2 1 -	5 4 3 2 1 -	5 4 3 2 1 -	5 4 3 2 1 -			
Grocery shopping	5 4 3 2 1 -	5 4 3 2 1 -	5 4 3 2 1 -	5 4 3 2 1 -			
Job interview	5 4 3 2 1 -	5 4 3 2 1 -	5 4 3 2 1 -	5 4 3 2 1 -			
Scheduling to meet a friend	5 4 3 2 1 -	5 4 3 2 1 -	5 4 3 2 1 -	5 4 3 2 1 -			
going to a bible study	5 4 3 2 1 -	5 4 3 2 1 -	5 4 3 2 1 -	5 4 3 2 1 -			
Boys & Girls Club event	5 4 3 2 1 -	5 4 3 2 1 -	5 4 3 2 1 -	5 4 3 2 1 -			
	5 4 3 2 1 -	5 4 3 2 1 -	5 4 3 2 1 -	5 4 3 2 1 -			
	5 4 3 2 1 -	5 4 3 2 1 -	5 4 3 2 1 -	5 4 3 2 1 -			
	5 4 3 2 1 -	5 4 3 2 1 -	5 4 3 2 1 -	5 4 3 2 1 -			
	5 4 3 2 1 -	5 4 3 2 1 -	5 4 3 2 1 -	5 4 3 2 1 -			

5: Independent  
 4: generous pause  
 3: indirect cue/suggest to move to next step

2: visual cue to next step  
 1: verbal cue to next step  
 -- model

Courtesy of: Becca Reeder, BA, Graduate Clinician

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### Time Pressure Management, or "let me give myself enough time"

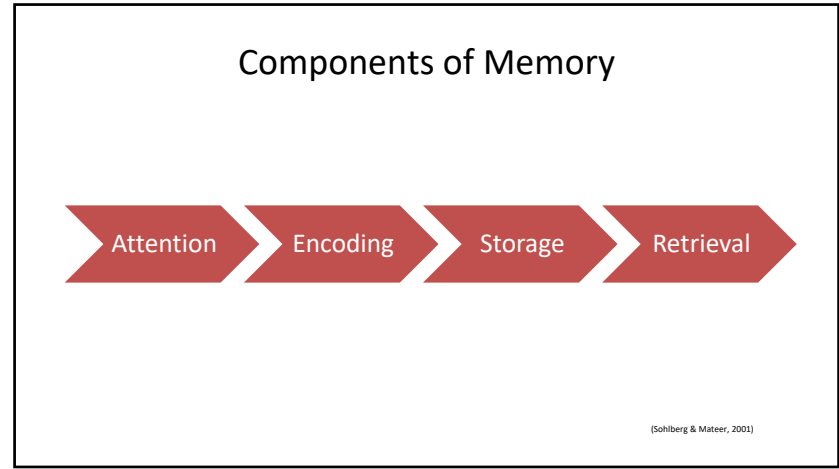
- 1. Analyze time pressure**
  - "Could I run out of time to finish this task?"
  - "Could I be overwhelmed or distracted?"
- 2. Prevent time pressure**
  - Identify steps that can be performed before actually starting the task
  - E.g., reading the recipe thoroughly before starting to cook
- 3. Handling time pressure**
  - Make an emergency plan for anything unexpected
  - E.g., what will you do if the phone rings while you're cooking?
- 4. Monitor performance**
  - What went well?
  - What was difficult?
  - Did any emergency plans work?

Kim Grunde

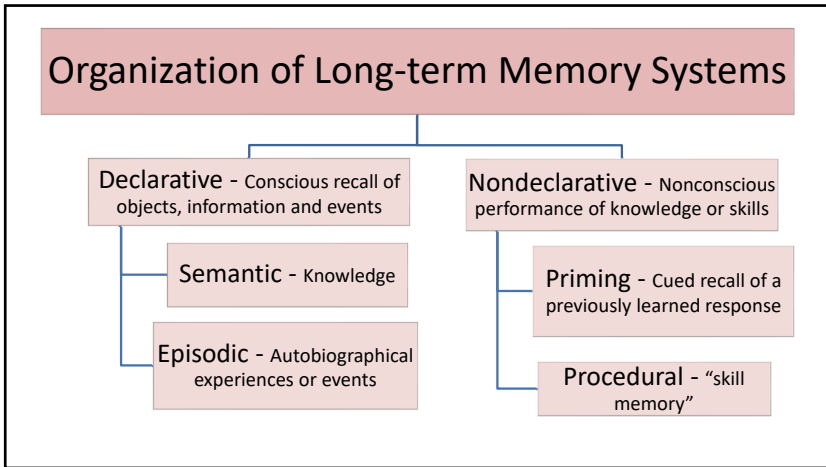
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# Cognitive Rehabilitation Interventions for Memory and New Learning


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- ### Other Types of Memory
- **Prospective**
    - Part of executive functions
    - Remembering to remember
  - **Source memory**
    - Context in which something was learned
- 

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Ponsford, J., Trevena-Peters, J., Janzen, S., et al., (2023). *Journal of Head Trauma Rehabilitation*. 38:1, 24-37

# INCOG 2.0 Guidelines: Part I Posttraumatic Amnesia

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### INCOG 2.0 Part II Guideline Recommendations

- PTA #1: PTA assessment should be performed daily using the Westmead Post-traumatic Amnesia Scale until resolution of PTA (grade B)
- PTA #2: To manage and minimize agitation and confusion associated with PTA, individuals with TBI should remain in a secure and supervised environment, ideally the hospital until they have emerged from PTA. (grade C)
  - 12 tips are recommended to assist with the agitation and confusion
- PTA #3: Physical therapists should make efforts to provide therapy to patients with PTA, while flexibly adapting session length, intensity and location based on the degree of agitation, cognitive impairment, and fatigue of the person with TBI (grade B)

Ponsford, J., Trevena-Peters, J., Janzen, S., et al., (2023). *Journal of Head Trauma Rehabilitation*. 38:1, 27

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### INCOG 2.0 Part II Guideline Recommendations

- PTA #4: Swallowing and communication should be monitored by SLPs; treating team members should use short and simple communication, while keeping repeated orientation and memory questioning to a minimum. (grade C)
- PTA #5: Individuals with TBI in PTA should receive activities of daily living training that is standardized and follows procedure and errorless learning principles. (grade A)
- PTA #6: (Pharmacological Interventions for individual in PTA/posttraumatic delirium. The use of neuroleptics and benzodiazepines to treat agitation or aggression in individuals with TBI should be minimized, as these medications may slow recovery after BI and may have a negative effect on cognition.....(grade C)

Ponsford, J., Trevena-Peters, J., Janzen, S., et al., (2023). *Journal of Head Trauma Rehabilitation*. 38:1, 27

51

Velikonja, D., Ponsford, J., Janzen, S., et al., (2023). *Journal of Head Trauma Rehabilitation*. 38:1, 83-102.

# INCOG 2.0 Guidelines: Part V Memory

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**INCOG 2.0 Part V Guideline Recommendations**

- Memory #1: Teaching internal compensatory strategies for memory impairments... most effective with individuals who have mild-moderate memory impairments; {guidelines provide many examples of EB Tx}. (grade A)
- Memory #2: Environmental supports and reminders {guidelines provide many examples} for memory impairments, especially those with severe memory. (grade A)
- Memory #3: Cognitive skills training across all levels of memory impairment should be strategy focused...to facilitate the functional integration of the strategy being practices into meaningful tasks. There is little evidence of using restorative techniques. (grade B)
- Memory #4: There are key instructional practices that can promote learning. (grade A)
  - Guidelines list 9

Velikonja, D., Ponsford, J., Janzen, S., et al., (2023). *Journal of Head Trauma Rehabilitation*. 38:1, 86-87

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**INCOG 2.0 Part V Guideline Recommendations**

- Memory #5: Group-based intervention for teaching memory strategies... consider reducing heterogeneity in group membership, encourage participation for an adequate number of sessions and teach generalization of learned skills. (grade A)
- Memory #6: Donepezil may be considered for adults who have deficits in memory and are in the chronic stage of recovery. Objective and functional measures should be implemented to assess efficacy. {see details in guidelines}. (grade A)
- Memory #7: Transcranial direct current stimulation (tDCS) should not be used to improve memory outside of the context of a randomized controlled trial. (grade A)
- Memory #8. Methylphenidate and amantadine should not be used to improve memory. (grade A)

Velikonja, D., Ponsford, J., Janzen, S., et al., (2023). *Journal of Head Trauma Rehabilitation*. 38:1, 88

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**Recommendations for Memory**

- **Practice Standards:**
  - **Memory strategy training** is recommended for the improvement of *prospective memory* in people with mild memory impairments after TBI or stroke, including the use of internalized strategies (e.g., visual imagery, association techniques) and external memory compensations (e.g., notebooks, electronic technologies).
  - **Memory strategy training** is recommended for the improvement of *prospective memory* in people with mild memory impairments after TBI or stroke, including the use of internalized strategies (e.g., visual imagery, association techniques) and external memory compensations (e.g., notebooks, electronic technologies).

Cicerone, K. et al., 2019

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**Recommendations for Memory**

- **Practice Guideline:**
  - Use of external compensations with direct application to functional activities is recommended for people with severe memory deficits after TBI or stroke.

Cicerone, K. et al., 2019

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### Recommendations for Memory

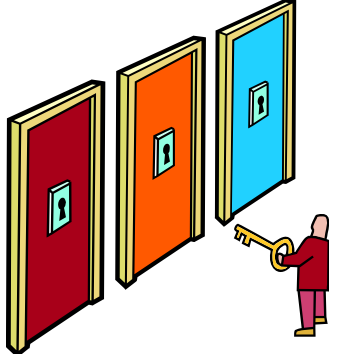
- **Practice Options:**
  - For people with severe memory deficits after TBI, **errorless learning techniques** may be effective for learning specific skills or knowledge, with limited transfer to novel tasks or reduction in overall functional memory problems.
  - **Group-based interventions** may be considered for remediation of mild to moderate memory deficits after TBI or stroke, including the improvement of prospective memory and recall of information used in the performance of everyday tasks.

Cicerone, K. et al., 2019

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### Considerations in Choosing a Strategy

- Severity of impairment
- Nature of the information to be remembered
- Functional, personally meaningful tasks
- Patient should understand, have input into goals and strategies – requires active collaboration



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### Approaches to Rehabilitation of Memory

APPROACHES	TECHNIQUES	
EXTERNAL COMPENSATION	Orientation notebook	Errorless learning, spaced retrieval, chaining
	Electronic device	Cell phone, pager, alarms
	Memory notebook	
MEMORY STRATEGY TRAINING	Association Techniques	Visual-verbal association, visual-verbal schematics, visual peg method, Method of Loci
	Organizational & Elaboration Techniques	First letter mnemonics, semantic clustering, PQRS, use of humor, storytelling

Cognitive Rehabilitation Manual, 2nd Edition & Textbook (2022); Chapter #5

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### Stages in Memory Notebook Training

Acquisition	Application	Adaptation
<p><b>Goal:</b> To learn the names, purpose, &amp; use of each section</p> <p><b>Strategies:</b> Errorless learning, spaced retrieval</p>	<p><b>Goal:</b> To use notebook on functional tasks in clinic</p> <p><b>Strategies:</b> Feedback, cues, repetition</p>	<p><b>Goal:</b> To use notebook in naturalistic settings</p> <p><b>Strategies:</b> Feedback, cues, repetition, updating</p>

(Sohlberg & Mateer, 2001)


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Ehlihardt et al, 2005; Sohlberg et al, 2005

## TEACH-M

1. An “instructional package that facilitates learning and retention of multi-step procedures for persons with severe memory and executive function impairments”
2. Research results support implementation across a wide range of tasks and contexts
3. Produced ecologically valid outcomes in timely fashion


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Ehlihardt et al, 2005; Sohlberg et al, 2005

## TEACH-M Components

- ✓ Task Analysis
- 🧠 Errorless Learning
- 📊 Assessment
- 🔍 Cumulative Review
- 👍 High Rates of Correct Practice
- 🎓 Metacognitive Strategy Training (MST)

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### Summary of TEACH-M Features

- Errorless learning
- Task analysis
- Forward chaining
- 1-task in-depth focus
- Cumulative review
- Stimulus pre-exposure
- Prediction-reflection
- Instructor model/guided practice
- Multiple practice opportunities
- Spaced retrieval
- Carefully faded prompts
- Varied training examples
- Training to criterion


Ehlihardt et al, 2005; Sohlberg et al, 2005

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Cognitive Rehabilitation Manual and Textbook, 2<sup>nd</sup> ed; pgs 147-149

## Application & Adaptation Activities

Activity	Application	Adaptation
Face Name Association	Remembering names of the therapists or other patients	Remembering names of classmates, co-workers
Visual Imagery	Remembering story details recalling locations	Studying for a test, recalling appointments
Verbal Mnemonics	Remembering grocery lists, to-do lists, steps involved in functional activities	Remembering grocery list when shopping, to-do list
Organization Strategy	Organizing details from a short article, remembering mock grocery store list	Encode essential details from lectures or textbook, recall items from grocery list by category
PQRST	Remembering newspaper article or job description	Remembering information from lecture or textbook

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### Prospective Remembering Internal Strategies – Visual Imagery

- Creating a mental image associating a prospective cue with an intended action
  - Education about PM
  - Training in visualizing simple objects and actions
  - Learning visual imagery techniques
  - Applying visual imagery in PM
  - Applying visual imagery in everyday situations

Potvin et. al 2011

- Self-imagination Effect (SIE)
  - Individual imagines the event from his/her own personal perspective with as much detail as possible for 45 seconds

Grilli et. al 2011

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### Memory for Performing Everyday Tasks

Range of functions:

- Learn names/words
- Take telephone notes
- Leave a message
- Learn to use cellular phone, Facebook, other apps
- Learn self-help & health practices
- Plan questions for MD
- Write a letter
- Organize family photos
- Watch/remember TV show or movie
- Read/remember news article, short stories
- Remember dreams

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## Cognitive Rehabilitation Interventions for Social Communication

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### Deficits in Social Communication

- Impact success with:
  - Communicating needs and thoughts
  - Listening and understanding others
  - Giving and interpreting nonverbal communication
  - Regulating emotions in social interactions
  - Following social boundaries and rules
  - Working with others to solve tasks
  - Being able to see another person's perspective
  - Being assertive
- *Hawley & Newman, 2006*

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## Impact into Daily Life

- Fewer employment opportunities
- Poorer QoL, decreased life satisfaction
- Problems in social relationships
- Reduced community integration
- Social isolation
- Higher risk for depression



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## Core Terms



*Social Communication Skills* – (Dahlberg et al. 2007)

- “involve a complex interaction of cognitive abilities, self-monitoring of speech and language skills, awareness of social rules and boundaries, and emotional control”

*Emotional Perception* (Bornhofen & McDonald, 2008a)

- “the accurate decoding and interpretation of visual and aural stimuli that signal one of six emotional states: happiness, sadness, anger, fear disgust & surprise”

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## Terminology

### Communicative-pragmatic deficits

Excessive talkativeness

Poor topic maintenance; tangentiality

Repetitiveness

Conversation execution/maintenance

Comprehend non-literal communication

Insensitivity

“Complex cluster of abilities that allow a person to understand the interlocutor’s intended meaning, starting from the literal meaning of an utterance”

Gabbatore, I., Sacco, K. et al., 2015

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Togher, L., Douglas, J., Turkstra, L., et al., (2023). *Journal of Head Trauma Rehabilitation*. 38:1, 65-82.

## INCOG 2.0 Guidelines: Part IV Cognitive-Communication and Social Cognition Disorders

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**INCOG 2.0 Part IV Guideline Recommendations**

- CC #1: Listed 11 influences on levels of communication competence. (grade B)
- CC #2: Cognitive communication evaluation and rehabilitation program should be culturally responsive and take into acct. 6 factors {listed; include but not limited to native, first and preferred languages, literacy and language proficiency.....}. (grade C)
- CC #3: staff should receive cultural competence training. (grade C)
- CC #4a-f: Person with TBI should be provided with interventions and materials that are both grounded in the principles of cognitive-communication rehabilitation and individualized taking the person's context into account to maximize communication competence. (grade A-C)

Togher, L., Douglas, J., Turkstra, L., et al., (2023). *Journal of Head Trauma Rehabilitation*. 38:1, 69-71.

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**INCOG 2.0 Part IV Guideline Recommendations**

- CC #5: Therapy should be provided in situations appropriate to the context in which the person will live, work, study and socialize. (grade A)
- CC #6: Individuals with severe communication disability following TBI should be provided with proper assessment to determine the appropriate AAC intervention (grade C)
- CC #7: Group therapy should be considered as an appropriate means of remediation... should be aligned with their communication goals. (grade A)
- CC #8. Telerehabilitation is as efficacious, feasible and acceptable for communication partner training, compared to in-person intervention. (grade B)
- Social Cognition #1: Clinicians should consider evaluating aspects of social communication ability including emotion perception, theory of mind (ToM), and emotional empathy; and EB treatments are recommended. (grade A)

Togher, L., Douglas, J., Turkstra, L., et al., (2023). *Journal of Head Trauma Rehabilitation*. 38:1, 71-72.

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**Recommendations for Social Communication**

Intervention	Level of Recommendation
Cognitive-linguistic therapies are recommended during acute and post-acute rehabilitation for language deficits secondary to left hemisphere stroke.	Practice Standard
Specific interventions for functional communication deficits, including pragmatic conversational skills and recognition of emotions from facial expressions, are recommended for social communication skills after TBI.	Practice Standard
Cognitive interventions for specific language impairments such as reading comprehension and language formulation are recommended after left hemisphere stroke or TBI.	Practice Guideline
Treatment intensity should be considered a key factor in the rehabilitation of language skills after left hemisphere stroke.	Practice Guideline
Group based interventions may be considered for remediation of language deficits after left hemisphere stroke and for social-communication deficits after TBI.	Practice Option
Computer-based interventions as an adjunct to clinician-guided treatment may be considered in the remediation of cognitive-linguistic deficits after left hemisphere stroke or TBI. Sole reliance on repeated exposure and practice on computer-based tasks without some involvement and intervention by a therapist is not recommended.	Practice Option

Cicerone, K. et al., 2019

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*J Head Trauma Rehabil*  
Vol. 30, No. 3, pp. E12-E23  
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**A Randomized Controlled Trial of Emotion Recognition Training After Traumatic Brain Injury**

Dawn Neumann, PhD; Duncan R. Babbage, PhD; Barbra Zupan, PhD; Barry Willer, PhD

**Objective:** To examine the effectiveness of 2 affect recognition interventions (Faces and Stories) in people with a traumatic brain injury. **Setting:** Postacute rehabilitation facilities. **Participants:** A total of 203 participants with moderate to severe traumatic brain injury were screened; 71 were eligible and randomized to the Faces ( $n = 24$ ), Stories ( $n = 23$ ), and Control interventions ( $n = 24$ ). Participants were an average of 39.8 years of age and 10.3 years postinjury; 74% of participants were male. **Design:** Randomized controlled trial with immediate, 3-month, and 6-month follow-up posttests. Interventions were 9 hours of computer-based training with a therapist. **Measures:** Diagnostic Assessment of Nonverbal Accuracy 2-Adult Faces; Emotional Inference From Stories Test; Empathy (Interpersonal Reactivity Index); and Irritability and Aggression (Neuropsychiatric Inventory). **Results:** The Faces Intervention did significantly better than the Control Intervention on the Diagnostic Assessment of Nonverbal Accuracy 2-Adult Faces ( $P = .031$ ) posttreatment; no time effect or group interaction was observed. No other significant differences were noted for the Faces Intervention. No significant differences were observed between the Stories and the Control Interventions; however, a significant time effect was found for the Emotional Inference From Stories Test. **Conclusion:** The Faces Intervention effectively improved facial affect recognition in participants with chronic post-traumatic brain injury, and changes were maintained for 6 months. Future work should focus on generalizing this skill to functional behaviors. **Key words:** affect, emotion recognition, randomized controlled trial, traumatic brain injury, treatment

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### Metacognitive Strategies for Self-Monitoring – Self Regulation

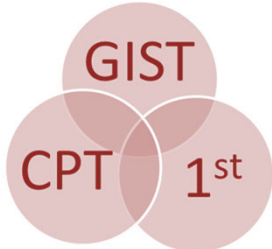
- Metacognition – think about thinking
  - Monitoring own thoughts
  - Using that information to make changes that improve both our thinking and behavior
- Self-monitoring through use of an individualized acronym (e.g. WSTC, WATER... )
  - What am I supposed to be doing? Select a strategy. Try the strategy. Check the strategy
- Evaluating performance, making future changes based on outcome
- Proven effective across cognitive domains

*Sohlberg & Turkstra, 2011*

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## EB Group Intervention Options

- Group Intervention Structured Treatment Program (GIST): For Social Competence
- Improving First Impressions: A step-by-step Social Skills Program
- Cognitive Pragmatic Treatment (CPT)
- All unique and separately designed/researched; have some overlapping concepts and procedures



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### Training Communication Partners

*Behn et al., 2012; Rietdijk et al., 2020; Togher et al., 2013*

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Togher et al, 2014, Sohlberg & Turkstra, 2011

### Community Based-level of participation



1. ADAPTATION STAGE!!!
2. Individualized natural context for therapy = higher likelihood of generalization
3. Individual or group should provide rehearsal opportunities of those communication & social skills appropriate to **where/with whom** they will live, socialize, work or pursue education
4. **WE CANNOT ASSUME THIS GENERALIZATION WILL OCCUR WITHOUT DIRECT OPPORTUNITIES**

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## Generalization Requires Direct Opportunities!

Person needs rehearsal opportunities that require communication and social skills appropriate to **WHERE** and with **WHO** they **LIVE, WORK, PURSUE EDUCATION,** and/or **SOCIALISE**



Sohlberg & Turkstra, 2011; Togher et al. (2014)

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## Final Thoughts Take Aways!

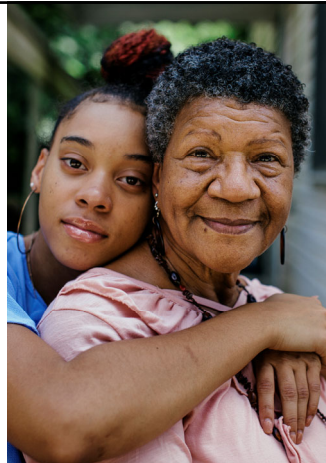


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## Families - Evidence

- *Benefits of engaging families:*
  - Assists with generalization at home and in the community
  - Training as active treatment providers may help reduce behavioral and emotional occurrences; promote cognitive and functional outcomes.
  - Is specific in some EB practices; e.g., GIST CPT



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## Families - Evidence

- *Counseling Families:*
  - Providing counseling and psychoeducation = helps maintain family function
  - Combined family and client group psychoeducation, psychotherapy, compensatory strategy training and stress management (BICS Group, Backhaus, 2010)
- *Liabilities:*
  - **COMPLEX!!** Role changes, increased caregiver burden, strained relationships, interdependencies.....



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### Neurobehavioral and Psychosocial Factors that Influence Process and Outcome

- Patient Variables:
  - Values and Priorities
  - Coping Skills
  - Self-worth and self-efficacy
- Awareness:
  - Anosognosia
  - Domain-specific
  - Brain Injury Knowledge
- Severity and Range of Impairment
- Emotional Reactions
- Premorbid Psychiatric issues
- Family Factors
- History of trauma/adverse childhood events (ACES)

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### Outcomes of Cognitive Rehabilitation

1. Never develops effective awareness to learn to compensate  
*Learns simple routines procedurally*
2. Improved awareness and some learning but depends upon external guidance
3. Can implement external strategies independently but situation or task specific
4. Ultimate: aware and implements strategies – generalizes to other tasks, and contexts.



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### Biggest current challenges to Research of Cognitive Rx

- ❖ Individual differences that impact how services should be provided
- ❖ Complexity of the cognitive and behavioral impairments
- ❖ Impact of the heterogeneity of the presenting cognitive and behavioral impairments on research methods that rely heavily on between group, rather than within-patient differences
- ❖ Implementation of evidence-based treatment into clinical practice



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### Presentation References

- Please see handout titled:
- KY BI Summit Bibliography - Rebecca Eberle



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**Thank You!!**



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