

Assessment and Intervention: Executive Functions

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Disclosures

I am a full-time employee at The University of Tulsa

KSHA is providing an honorarium for my participation today

I am a Certified Brain Injury Specialist Trainer through the ACBIS/BIAA

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Learning Objectives

1. identify formal and informal assessment tools for evaluating executive function skills
2. describe evidence-based interventions for executive dysfunction following traumatic brain injury
3. decide on the appropriate intervention to address executive dysfunction in case examples

What are executive functions?

“The group of complex mental processes and cognitive abilities

- (such as working memory, impulse inhibition, and reasoning)

that control the skills

- (such as organizing tasks, remembering details, managing time, and solving problems)

required for goal-directed behavior.”



But what SPECIFICALLY are these executive functions?

Planning/ initiation

- Planning/goal formulation
- Initiation and allocation of attention resources
- Impulse control

Maintenance/ flexibility

- Behavior maintenance
- Cognitive flexibility

Regulation and effective performance

- Self-awareness of strengths and weaknesses
- Self-regulation based on goals
- Effective performance



And how do they relate to metacognition and self-monitoring?

Self-monitoring

- Is what I'm building matching what the instructions say it should look like so far
- It's an evaluation DURING the activity that provides internal feedback

Executive functions

- Implement a strategy?
- Decide whether to retrace steps, ask a friend to come help, start over, or just grab an extra screw from the tool box and make it work

Self monitoring + executive strategies= self-regulation of behavior

Over time, experiences help mold metacognitive beliefs



Functionally, what do breakdowns in executive function look like for your patients?

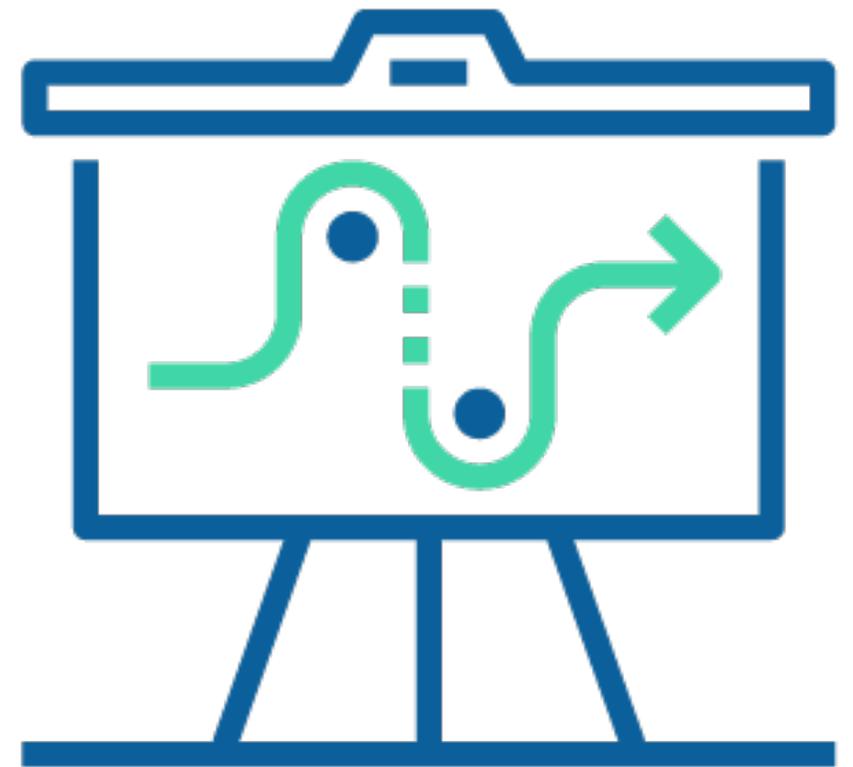


Note: We are going to discuss executive functions through the lens of TBI, but deficits are not unique to TBI!

Why the focus on dysexecutive symptoms?

Deficits in executive functions are predictive of

- Reduced response to therapy
- Worse outcomes for patients (greater disability, lower community integration, decreased rates of return to work)
- Worse outcomes for caregivers (higher caregiver burden)

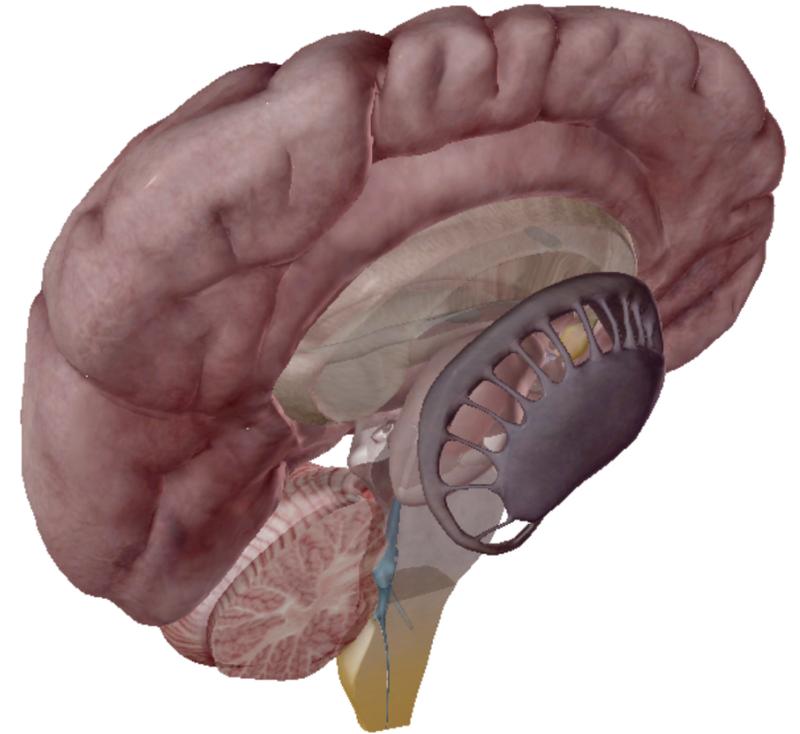


Frontal lobe syndrome?

Executive function deficits often linked to lesions in the frontal lobe, particularly prefrontal cortex

We have abandoned frontal lobe syndrome because...

- dysfunction can also be seen with damage to thalamus, basal ganglia, and white matter pathways connecting frontal lobe to other cortical structures
- frontal lobe damage can also be observed without concomitant executive dysfunction



Awareness

Lack of awareness of deficits= anosognosia

Poor awareness can decrease motivation, cause safety issues, and perhaps interfere with therapeutic gains

Lack of awareness can protect against depression

Self-Knowledge

Similar to intellectual awareness

Understanding of one's own strengths and weaknesses

Online awareness

Similar to emergent awareness and anticipatory awareness

Task and situational dependence

Assessment

Purpose of assessment

Create a strengths and weaknesses profile

Identify patient goals

Guide treatment (remediation, compensation, counseling)

Identify baseline performance to track progress

Note: We are focused on individuals who are post-acute and emerged from PTA

Assessment considerations

Performance on formal executive function assessments may be impacted by other cognitive-communicative, neurobehavioral, and motor deficits

Most formal assessments target executive function as a whole v. targeting specific impairments (that is, they are not specific)

Cannot rely SOLELY on self-report questionnaires (supplement with interviews and with reports by significant others)

Limited ecological validity of many standardized assessments

Why poor ecological validity? Reorganize- better and worse

The testing environment provides structure that supports executive functions

Only a brief snapshot of behavior

Tests may not be sensitive to deficits in individuals' strong premorbid skills

Motivation may be limited during testing

Tests may not allow for the use of compensatory strategies

Standardized Tests

MULTITEST EXECUTIVE FUNCTION BATTERIES

Behavioural Assessment of the Dysexecutive Syndrome (BADS)

Functional Assessment of Verbal Reasoning and Executive Strategies (FAVRES)

Delis–Kaplan Executive Function System (D-KEFS)

EXAMPLES OF TESTS COVERING COMPONENTS OF EF

Stroop Color and Word Test

COWAT

Trail Making Test

Design fluency

Wisconsin Card Sorting Test

Tower of London

Examples of Questionnaires, Rating Scales, and Interviews

Behavior Rating Inventory of Executive Function (BRIEF)

Dysexecutive Questionnaire (DEX)

Brock Adaptive Functioning Questionnaire (BADQ)

Cognitive Failures Questionnaire (CFQ)*

Awareness Questionnaire (AQ)**

Patient Competency Rating Scale (PCRS)**

Self-Awareness of Deficits Interview (SADI)*

Examples of assessments with more ecological validity

Naturalistic Action Test (Schwartz et al., 2002)

- make toast and coffee, gift-wrap a present, and pack a child's lunchbox and school bag
- Looks at completion of each test (accomplishment) and error rates

Executive Function Performance Test (Baum, Morrison, Hahn, & Edwards, 2007)

- make some oatmeal, use the telephone, take some "fake" medication, and pay some "fake" bills
- examines initiation, organization, sequencing, judgment and completion of each task

Executive Function Route-Finding Task (Boyd & Sautter, 1993)

- Find an unfamiliar location without help from clinician
- Task understanding, information seeking, retaining directions, error detection, error correction

Intervention

ENVIRONMENTAL SUPPORTS/ASSISTIVE TECHNOLOGY

METACOGNITIVE STRATEGY INSTRUCTION

Environmental supports and assistive technology for cognition

The purpose is to compensate impose organization externally to compensate for deficits

BUT CAUTION:

THESE NEED TRAINING, TOO!

These are task and situation-specific interventions (that is, we do not expect generalization in any way)



Metacognitive strategy instruction components

- Identify situations in which deficits in executive function lead to breakdowns
- Identify what is driving the breakdown
- Pick the appropriate strategy (examples forthcoming!)
- Model the use of the strategy during the task
- Practice with the client (while verbalizing the strategy)
- Cue as necessary (written or verbal, errorless learning)
- Fade verbalizations
- Consider generalization of strategy

(Sohlberg & Mateer, 2001, pg. 257)



Prediction of performance and review of performance are CRITICAL components, especially for those with awareness deficits.

Goal management training

Works on theory of goal neglect

A manual-based intervention

Brief versions have been shown to be effective in improving task performance for individuals with TBI

Does not appear to improve skills

Best if used in COMBINATION with other interventions

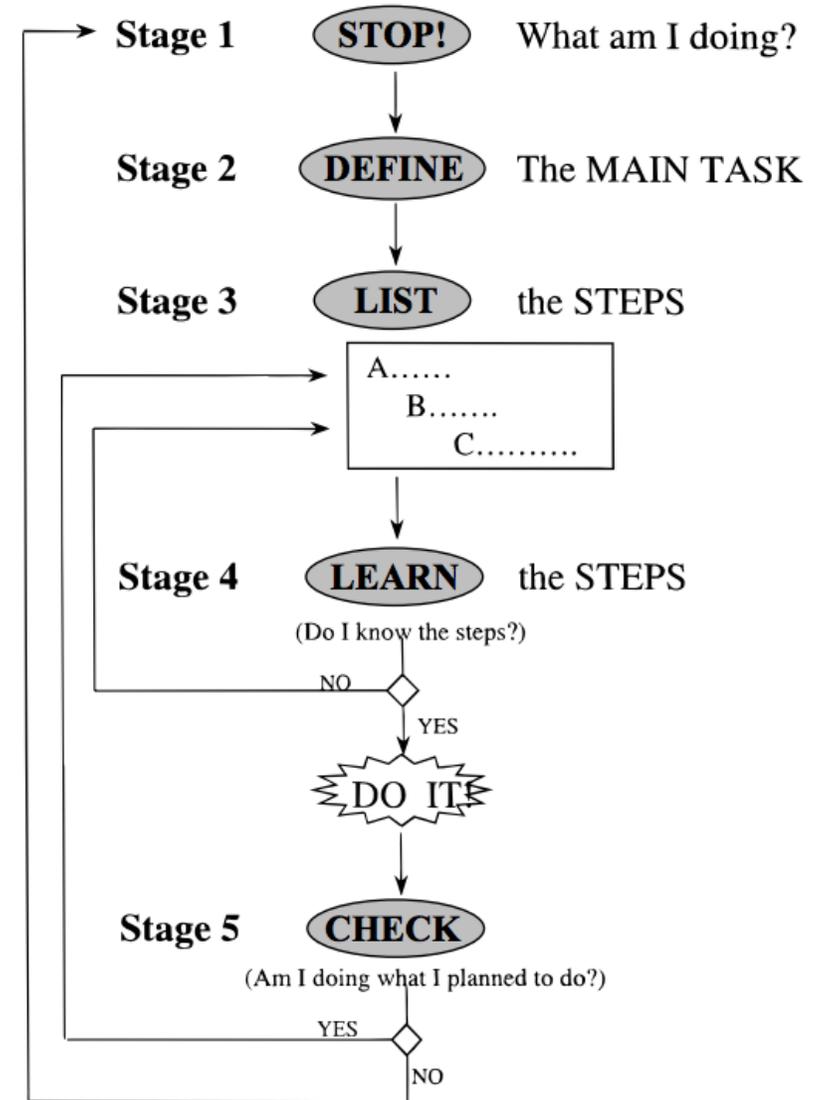


Fig. 1. Flowchart used to illustrate the five steps in goal management training.

Problem solving training

1. problem definition and formulation

- What's the goal?
- What are the constraints?

2. generation of alternatives

- Identify possible solutions

3. decision making

- Prioritize strategies based on preference/success likelihood
- Create back up plan

4. solution implementation and verification

- Create steps of action
- Gather materials
- Start the steps
- Self-monitor each step
- Modify as necessary
- Use back up strategy as needed
- Always check back to goal
- Review what worked and what did not

Strategic Memory and Reasoning Training (SMART)

Gist reasoning includes:

“(a) strategic attention (inhibiting less relevant information),

(b) integrated reasoning (abstracting concepts by combining pre-existing knowledge with relevant facts), and

(c) innovation (flexibly and fluently deriving multiple interpretations by interpreting the information from different perspectives)”

Intervention includes focus on the following strategies:

- Filter
- Integration
 - Focus/chunk
 - Link
- Innovation
 - Zoom
 - Generalize

Results in improved performance on executive function tasks, and also improved functional performance

Case study

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