

## Managing Executive Functions Post TBI

Executive function (EF) impairments are a common form of cognitive disability following traumatic brain injury (TBI). These impairments can be challenging to evaluate and manage. The frontal lobes, with many inter-connections to other parts of the brain, regulate executive functions and are highly prone to damage during a TBI. Often “behavior problems” post-injury are, in fact, problems with executive functions (see TBI Research Briefs No. 2 & 3, Behavior Assessment and Management). In this research brief, we will provide an overview of EF impairments, including definitions and evidence-based techniques for managing these impairments.

### What are executive functions and executive function impairments?

Executive functions allow us to self-regulate our behavior and are “. . . those mental capacities necessary for formulating goals, planning how to achieve them, and carrying out the plans effectively” (Lezak, 1982).

Specifically, these include:

Executive Functions	Examples of Executive Functions Impairments
Starting behavior (initiation)	Chris regularly has difficulty getting started with his morning routine.
Stopping behavior (controlling impulsivity)	Anna can't stop herself from interrupting conversations, even when she is not directly involved.
Maintaining behavior (task persistence)	Raul has a hard time keeping on task with his homework once he gets started.
Sequencing & timing of behavior (organization)	Chris isn't able to organize ingredients or follow the correct order of steps for simple cooking tasks.
Creativity, fluency, & problem solving (generative thinking)	Anna often can't generate alternative solutions to problems at home and work.
Self evaluation & insight (awareness)	Raul is not able to self-monitor when out in the community; he frequently gets lost.

Individuals diagnosed with EF impairments don't necessarily demonstrate all the above symptoms. Typically a combination of symptoms occurs (dysexecutive syndrome), depending on the severity and location of injury, time post-injury, pre-injury characteristics, etc. Standard neuropsychological assessments conducted in controlled, clinical settings won't always detect EF impairments because the highly structured testing situations can mask these challenges. These difficulties are more readily apparent in everyday life events and environments. Children injured at younger ages are particularly susceptible to increased behavior challenges/problems associated with executive functions as they enter adolescence due to significant developmental (e.g., physical/hormonal) and environmental changes (e.g., increased expectations of self-management following transition from elementary school to middle school).

## What are current evidence-based guidelines for managing executive functions?

Two approaches for managing EF impairments are supported by research. These include teaching strategies to compensate for executive deficits (meta-cognitive strategies) and changing the environment to reduce the impact of these deficits (environmental adaptations).

### I. *Meta-cognitive Strategy Instruction (MSI)*

MSI is used to address challenges in problem solving, planning, organization, and self-monitoring. Several MSI techniques share the following features.

The survivor is systematically taught to:

1. identify the target problem or goal
2. identify potential solutions/steps to solve the problem or achieve the goal
3. self-monitor/evaluate performance both during and after the target problem-solving or goal activity has taken place

#### ***Meta-cognitive strategies can take one of two forms: General Executive Function Strategies or Task-Specific Executive Function Strategies***

##### ***General Executive Function Strategies:***

The survivor learns self-management strategies that guide performance during *all activities* requiring executive control. These procedures frequently involve *self-talk* and are particularly useful for checking progress (“How am I doing?”) or orientation (“What do I need to be doing now?”).

Examples: goal management therapy such as, *Goal-Plan-Do-Review* or *Stop-Look-Go*

##### ***Task-Specific Executive Function Strategies:***

The survivor learns strategies that guide performance and self-evaluation for *specific tasks*. Task-specific strategies frequently include the use of *external aids* tailored to the target behavior (e.g., using a PDA alarm to prompt paying attention during homework; checklist of steps for cooking routine).

Examples: task-specific checklists, calendars, and planners; prompts/alerts provided by timers, personal digital assistants, and smart phones

### II. *Environmental Adaptations*

MSI techniques are often combined with environmental modifications (e.g., change seating arrangement, reduce distractions, have a central location for phone-calendar-planner-keys) and/or natural supports (e.g., train other people to cue the survivor to initiate and/or complete the task). Survivors with severe EF impairments and minimal to no awareness of their deficits are generally less successful learning verbal self-talk strategies and therefore are more likely to benefit from environmental modifications, natural supports, and possibly external aids.

#### **Where can I find out more information?**

- \* Kennedy, M.R.T. et al. (2008). Intervention for executive functions after traumatic brain injury: A systematic review, meta-analysis and clinical recommendations. *Neuropsychological Rehabilitation*, 18(3), 257-299. [www.ancds.org/pdf/articles/Kennedy\\_Executive\\_Functions.pdf](http://www.ancds.org/pdf/articles/Kennedy_Executive_Functions.pdf)
- \* Lezak, MD (1982). The problem of assessing executive functions. *International Journal of Psychology*, 17, 281–297.
- \* Sohlberg, M.M. et al. (2007). Evidence based practice for the use of external aids as a memory rehabilitation technique. *Journal of Medical Speech Pathology*, 15 (1), xv-li. [www.ancds.org/pdf/articles/Kennedy\\_Executive\\_Functions.pdf](http://www.ancds.org/pdf/articles/Kennedy_Executive_Functions.pdf)
- \* Sohlberg & Mateer (2001). *Cognitive Rehabilitation: An Integrative Neuropsychological Approach*. Guilford Press, New York
- \* LearnNet <http://www.bianys.org/learnnet/>
- \* TBIEducator <http://www.tbied.org/evidence/behavior-ebp/>
- \* Brainline <http://www.brainline.org>