

BrainSTEPS
Strategies Teaching Educators, Parents, & Students
A BRAIN INJURY SCHOOL RE-ENTRY CONSULTING PROGRAM

**Assessment in School-Age
TBI: Focus on
Executive Functions**
Sponsored by BrainSTEPS
May 1, 2014



BrainSTEPS
Strategies Teaching Educators, Parents, & Students
A BRAIN INJURY SCHOOL RE-ENTRY CONSULTING PROGRAM

**Child & Adolescent
Brain Injury
School Re-Entry Consulting
Program**
www.brainsteps.net



BrainSTEPS
Strategies Teaching Educators, Parents, & Students
A BRAIN INJURY SCHOOL RE-ENTRY CONSULTING PROGRAM




- 1. What are BrainSTEPS Teams?**
- 2. What are Return to Learn
Concussion Management Teams
(CMTs)?**

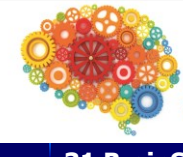
The BrainSTEPS Program

Created by:
PA Department of Health in 2007

Unique partnership for funding:
PA Department of Health
PA Department of Education, Bureau of
Special Education via the PaTTAN network

Implemented by:
Brain Injury Association of Pennsylvania

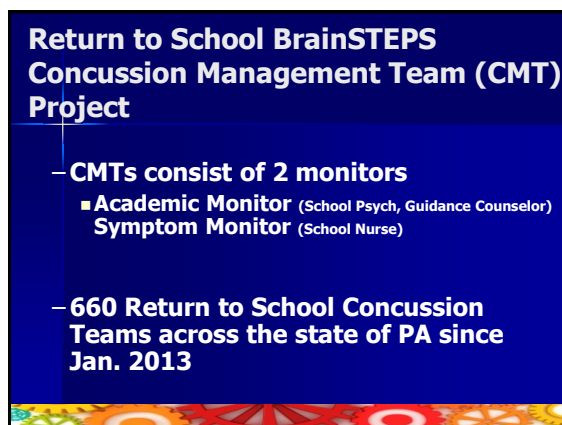
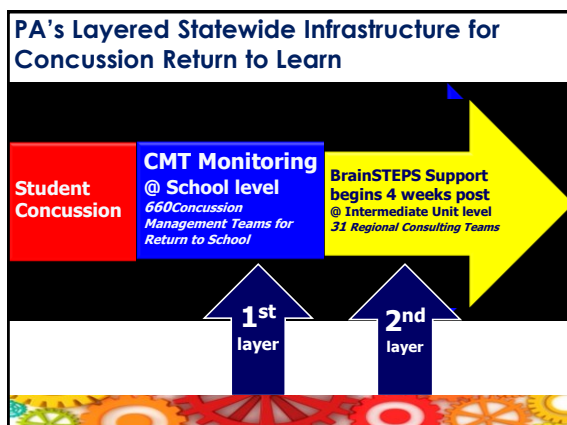
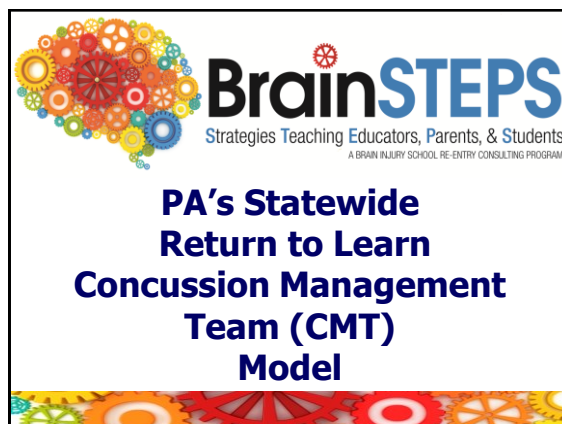


BrainSTEPS
Strategies Teaching Educators, Parents, & Students
A BRAIN INJURY SCHOOL RE-ENTRY CONSULTING PROGRAM

- **31 BrainSTEPS Teams cover the
state of Pennsylvania**
- **290 Brain Injury school consultants**
 - Educational professionals
 - Medical & Rehab professionals
 - Family members

**BrainSTEPS team
member
Consultation
Activities**

- Communication with family
- Communication with school
- Consultation with student
- Records review
- Consultation: strategies
- Consultation with medical professionals
- Consultation educational plan
- Training of educators and support staff
- Classroom and peer education
- Information sharing among team
- Demonstration of interventions
- Observations/evaluations of student
- Participation in IEP and 504 meetings



Assessment in School-Age TBI: A Focus on Executive Functions

Stephen R. Hooper, Ph.D.
Department of Allied Health Sciences
University of North Carolina School of Medicine

May 1, 2014

Learning Objectives

- Describe the various definitions of Executive Functions (EF).
- State the indicators of EF deficits.
 - Neurological underpinnings
 - Associated models

Learning Objectives

- Construct an assessment battery for measuring EF.
 - How do we measure this construct?
- Identify the manifestations of EF deficits in Traumatic Brain Injury
- Provide an overview of specific behavioral and learning strategies for managing executive dysfunction.

Structure of the Day

- 9:00-10:15 Definition and models
- 10:15-10:30 Break
- 10:30-11:45 Assessment strategies
- 11:45-12:00 Questions
- 12:00-1:00 Lunch
- 1:00-2:15 Management Strategies
- 2:15-2:30 Break
- 2:30-3:00 Questions

Case Example

Case Example

- Marcus was referred for a neuropsychological evaluation due to a reported decline in intellectual functioning, and to assist in identifying neurocognitive contributions to his ongoing learning and social-emotional difficulties.

Case Example

Marcus is an 8 year, 8 month old male whose history is significant for aggression and exposure to family conflict and abuse.

At the age of 3 months, Marcus was removed from his biological parents' care because his parents were physically abusive toward each other and toward him via abusive head trauma.

Marcus was adopted at 3 months of age by his maternal grandparents.

Case Example

Educationally, Marcus is placed in a self-contained classroom for children with emotional/behavioral challenges where he has received instruction since Kindergarten due to destructive and aggressive behaviors in preschool.

With respect to specific skills, Marcus is behind his peers in all core areas and he is not yet able to read or count fluently.

Concerns have arisen regarding Marcus' language abilities as he can be difficult to understand and he struggles with sound-symbol associations.

Case Example

- Emotional/behavioral difficulties are long standing. His adoptive parents noted that he can be aggressive, which includes hitting, biting, and spitting at others, and that he is impulsive, inattentive, and lacks self-control with few self-soothing strategies.
- He has sensitivity to food textures and experiences difficulty sleeping through the night.

Case Example

- Socially, Marcus is teased by peers, does not play well in groups, prefers to organize his own play, is unwilling to share, and prefers to play with younger children.
- His adoptive parents noted that it is not uncommon for peers to encourage him to become angry and act out.

Case Example

- In addition to Traumatic Brain Injury, Marcus carries the diagnoses of Bipolar Disorder, Post-traumatic Stress Disorder, Asperger's Disorder, and Attention Deficit/Hyperactivity Disorder (ADHD).

Case Example

- Marcus' medical history is significant for abusive head trauma, and possible in utero alcohol and cocaine exposure for the duration of his prenatal life.
 - Alcohol amounts reached a bottle of whiskey a day as per the DSS report, with the drinking continuing post birth.
- Subsequent premature birth, asthma, and significantly delayed milestones.

Case Example

- IQ = 77
- Achievement:
 - Reading = 64
 - Math = 65
 - Spelling = 63
- Motor: Right sided dominance, slow fine-motor speed bilaterally, fine-motor coordination was poor
- Sensory: No major problems with tactile perception, discrimination, or sensory suppressions
- Language – Borderline to low average range
- Visual Processing – Visual discrimination intact, but borderline higher-order visual-spatial and visuoconstructive functions.

Case Example

- Problem Solving:
 - Disproportionately low, with associated poor planning and significant cognitive rigidity;
 - Characterized by concrete thinking
- Set-Maintenance/Shifting:
 - Highly rigid and prone to frequent perseverations

Case Example

- Inhibitory Control
 - Highly impulsive and poorly regulated
- Working Memory
 - Disproportionately low verbal and visual working memory
- Processing Speed and Efficiency
 - Overly quick in his responding, consistent with his high degree of impulsivity.
- Attention Regulation
 - Selective and sustained attention were poor and highly variable

Definitions

Definitions

- Of all of the neurocognitive constructs, this one is probably the most complex.
 - Is it taught as part of an assessment class sequence?
- The complexity comes not only in its overall regulatory functions, but also in how executive functions interact with nearly every other neurocognitive function.
- Executive processes are critical to the integrity of many learning and social-behavioral functions.
 - Not typically assessed in a psychoeducational evaluation.
- There are a number of definitions of executive functions, some extending back nearly 50 years.

Executive Functions (Luria, 1966)

- Executive function is defined as the ability to maintain an appropriate problem-solving set for attainment of a future goal. This involves:
 - an intention to inhibit a response or to defer it to a later, more appropriate time;
 - a strategic plan of action sequences and/or;
 - a mental representation of the task, including the relevant stimulus information encoded in memory and the desired future goal-state.

Executive Functions (Welsh & Pennington, 1988)

- Executive function is primarily the set maintenance required to achieve a future goal.
 - This set maintenance includes the requisite skills of planning, organization, inhibition of maladaptive responses, self-monitoring, and flexibility of strategies contingent on feedback.
 - Goldman-Rakic (1990) would add to this definition the concept of working memory.

Executive Functions (Zelazo & Mueller, 2002)

- Executive function (EF) describes the control processes that affect overall output. This collection of abilities involves:
 - Regulatory control over thoughts and behaviors during goal-directed or intentional actions
 - Problem solving
 - Flexible shifting between actions to meet task demands.

Executive Functions (Stuss & Alexander, 2000)

- Noted that one important contribution of EF is the regulation of affect and social behavior.
- This notion is supported by the finding that abstract reasoning has been linked to vulnerability to social anxiety during adolescence in typically developing children.

Models

Models of Executive Functioning

- Executive functions are generally viewed within a multidimensional framework of cognitive abilities that provide critical support for goal-directed, future-oriented behaviors.
- These behaviors typically include attention regulation, inhibitory control, working memory, set shifting/cognitive flexibility, planning, and cognitive efficiency.
- The multiple dimensions of executive functions have been embedded within conceptual and empirical models that comprise two, three, four, and six factors.

Executive Functioning (Welsh et al., 1991)

- Speeded responding
 - Visual search - achieved at age 6
 - Verbal fluency - > age 12
 - Motor sequencing - > age 12
- Set maintenance
 - Wisconsin Card Sort - achieved at age 10
 - MFFT - achieved at age 10
- Planning
 - Tower of Hanoi (3 disk) - achieved at age 6
 - Tower of Hanoi (4 disk) - > age 12

Executive Functions (Pennington, 1997)

- Implicated 4 empirical subcomponents of EF using Typical and children with Reading Disabilities. Then applied to different disorders:
 - Inhibition (ADHD < FXS, ASD; ADHD improves on medication)
 - Set Shifting (ADHD > FXS > ASD)
 - Working Memory (ADHD > ASD > FXS)
 - Planning (ADHD > FXS > ASD)
- Both the level and pattern of EF abilities has potential to discriminate across disorders.

Executive Functioning (Denckla, 1993)

- Delay between stimulus and response
- Internal representation of schema
- Internal representation of action plan
- Response inhibition
- Efficiency and consistency of response
- Active strategies and deployment
- Flexible strategies and deployment

Executive Functioning (Denckla, 1993)

- Denckla utilized this conceptual framework to propose a 4-factor model of executive functions:
 - Initiating
 - Sustaining
 - Set-Shifting
 - Inhibiting
- Has been applied to 4th and 5th grade students with Written Language Disorder (Hooper et al., 2002).
 - Poor Writers were less proficient at initiation, set-shifting, and sustaining than Good Writers.

Executive Function Summary

- There are notable differences between these models, but there does appear to be a number of specific executive functions that appear across the models.
 - Planning and problem solving, inhibitory control, set shifting, and set maintenance usually are included in some fashion.
 - Speeded responding and working memory also have been discussed as subcomponents of executive function.
 - Don't forget affective regulation.

Executive Function Summary

- Most of these functions are linked to the dorsolateral prefrontal cortex and associated brain regions
 - It is important to remember that the emotional control functions associated with the ventromedial prefrontal cortex also should be included in a larger executive function model.
- This will be especially important for increasing our understanding of the childhood neurobehavioral difficulties seen in many children post TBI.
 - Applications for both behavioral and affective regulatory difficulties in children.

Neurodevelopmental Underpinnings

Neurodevelopmental Underpinnings

- Lesion, neuroimaging, and brain function (e.g., EEG) studies suggest that the prefrontal cortex (PFC) is primarily involved in executive processing.
- Based upon anatomical connectivity, there are two major regions of the PFC:
 - Dorsolateral PFC (DIPFC)
 - Ventromedial PFC (VmPFC).

Neurodevelopmental Underpinnings

- The so called “cool” functions of dorsolateral prefrontal cortex represent the executive functions of motor planning and regulation, integration of sensory and mnemonic information, working memory, and attention regulation
- The ventromedial regions of the orbitofrontal cortex are involved in planning and decision-making, but they also mediate affective regulatory functions, or the so called “hot” functions.

Neurodevelopmental Underpinnings

Dorsolateral Prefrontal Cortex (DIPFC)

- Regions within DIPFC influence:
 - The selection of behaviors
 - Recognition of context-dependent changes between stimuli and behavior
 - Potentiation of sets of stimulus-response contingencies related to behaviors in context
 - Flexible, goal-driven control of behavior

Neurodevelopmental Underpinnings

- Varying levels of damage to the DIPFC are associated with:
 - Lack of motivation, creativity, or goal-following.
 - Difficulty in initiating or flexibly modifying actions, resulting in stereotyped responses.
 - Loss of affect.
 - Inability to assess others' mental states – Theory of Mind.
 - Perseveration and more random-choice errors than age-matched controls.
 - Increased distractibility and problems with sustained attention.
 - Impaired working memory.
 - Understanding of complex task rules.

Neurodevelopmental Underpinnings

Ventromedial Prefrontal Cortex (VmPFC)

- The VmPFC is critical for elucidating the relation between stimuli and reinforcers, and for explaining the inability of individuals with vmPFC damage to learn reward contingencies.
- Important for affective regulation.

Neurodevelopmental Underpinnings

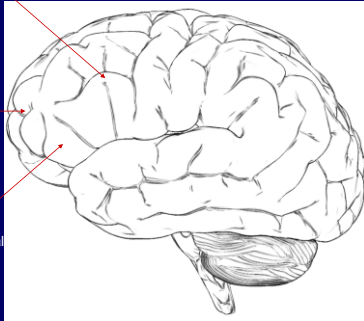
- Varying levels of damage to the vmPFC are associated with:
 - Impulsivity
 - Sensitivity to immediate rewards
 - Lack of self-control
 - Disruption of both affective and nonaffective stimuli
 - Tendency to select behaviors with the highest perceived reward, not the highest perceived utility

Neurodevelopmental Underpinnings

Dorsolateral Prefrontal Cortex

Frontal Pole

Ventromedial Prefrontal Cortex



Neurodevelopmental Underpinnings

- All of the various executive functions have a developmental basis that will have differential effects on learning and behavior over time.
- There is a sequential unfolding of various executive functions over the course of development.
- Contemporary findings from typical developmental studies, lesion studies, and primate studies suggest that the PFC is operational, at a basic level, by the end of infancy (i.e., ~24 months), with some evidence of even earlier emergence.

Neurodevelopmental Underpinnings

- While executive functions appear to develop from infancy into early adulthood, it appears that the period of most rapid development occurs:
 - Between the ages of 6 and 8 years of age
 - More modest gains between the ages of 9 and 12
- Differential development continues through adolescence into early adulthood depending on the specific task or behavior.
- A brain injury during any of these periods of development will have an effect on specific functions along with the developmental trajectories of these functions.

Neurodevelopmental Underpinnings

- Disruption to the neurological underpinnings of any of these brain regions of the prefrontal cortex could trigger specific executive dysfunctions in cognitive and/or behavioral-emotional functioning.
- Given the developmental trajectories of many of these functions, it also is possible for an earlier injury to "lie silent" until they are developmentally required, and a specific executive dysfunction could emerge at a later developmental epoch (e.g., during middle school).
- This can create the apparent emergence of a "new" learning or behavior problem, and requires that evaluators routinely inquire about brain injuries in their developmental history for any given case.

Manifestations of Executive Dysfunction in Pediatric TBI

Disorders with Executive Dysfunction

- The presence of EF deficits can appear in a variety of disorders and conditions.
 - Chronic illness (e.g., diabetes, CKD)
 - Pediatric neurological conditions (e.g., traumatic brain injury, stroke)
 - Pediatric Genetic Disorders (e.g., Prader-Willi Syndrome, Fragile X Syndrome)
 - Psychiatric disorders (e.g., bipolar disorder, schizophrenia, substance abuse, childhood maltreatment)
 - Developmental disabilities (e.g., Autism Spectrum Disorder, Learning Disabilities, ADHD)

Traumatic Brain Injury

- Along with attention impairments, one of the most common findings in pediatric traumatic brain injury is the presence of various types of executive dysfunction.
- This is not unexpected given that many cases of TBI will evidence some degree of frontal lobe involvement.

Traumatic Brain Injury

- Empirical studies have documented the presence of impairments in:
 - Planning and problem solving
 - Abstract thinking and analogical reasoning
 - Set-shifting and cognitive flexibility
 - Inhibitory control
 - Metacognitive capabilities
 - Processing speed
 - Working memory
 - Self-monitoring
 - Social cognition

Traumatic Brain Injury

- Given the regulatory role of the ventromedial prefrontal cortex in social and affective functions, a number of studies have documented the difficulties of self-regulation and social cognition in children following a traumatic brain injury.
 - These impairments have been documented in moderate to severe brain injuries up to five years post injury.
- Self-regulatory abilities also can serve as mediators of the effects of traumatic brain injury and the emergence of social-behavioral difficulties in this population.

Traumatic Brain Injury

- Children sustaining a TBI also have evidenced problems in:
 - Identifying emotions
 - Labeling emotions
 - Extracting meaning from non-literal social communication
 - Evaluating problem solving outcomes
- Higher-order language impairments have been reported such that both expressive and receptive language pragmatic skills (e.g., understanding proverbs, figurative sayings).

Traumatic Brain Injury

- In general, following a TBI, nearly all of these executive functioning components will evidence some degree of impairment that is dictated, in part, by the severity of the brain injury.
 - These findings have been reported for children with a mild TBI, although results have not been as striking.
- These deficits also have been reported to be persistent in some fashion 7 to 10 years post injury.

Traumatic Brain Injury

- Executive function ratings have been associated with:
 - Psychiatric status
 - Family burden
 - General family functioning
- Adolescents with severe TBI tended to report fewer problems in executive functioning, when compared to their parents, particularly in their metacognitive abilities.
 - Assessment and treatment issues?

Executive Function Assessment Strategies

Assessment

- Most psychoeducational measures do not assess executive functions.
- Intellectual measures have rarely assessed EF, although recent efforts have tried to extend into this area. For example:
 - WISC-IV and WISC-IV-I
 - K-ABC-2
 - Stanford-Binet V
 - WJ-III Cognitive Abilities Test

Assessment

- Executive deficits can appear in a myriad of medical conditions and disorders.
 - Can impact both learning and social-behavioral functioning in these situations.
- In this regard, the inclusion of executive functions measures should be considered in any assessment of neurocognitive abilities.
- In the past, there were few instruments available to clinicians—even neuropsychologists—for the assessment of executive functions.
 - This was accentuated by the lack of training in these types of assessments.

Assessment

- Over the past 20 years or so the assessment of EF has seen the development of a number of tools, many of which are normatively based, standardized, and span a wide age range—including the preschool years.
- Assessment tools even have been developed to assess EF using qualitative approaches and rating scales in an effort to increase ecological validity.
- The “value added” may be critical to treatment planning and developmental surveillance.

Assessment

- There are a number of standardized measures that provide estimates of selected executive functions.
- Executive function batteries and ratings scales also have been developed.
- Regardless of the measurement, remember the “s” in executive functions; i.e., this is a highly multidimensional construct.

Assessment

- When one considers the various subcomponents of executive functions, there are measures of:
 - Planning and problem solving
 - Set maintenance and set-shifting
 - Inhibitory control
 - Working memory
 - Speeded responding
 - Attention regulation

Assessment

- Problem Solving and Planning
 - Wisconsin Card Sorting Test
 - Test of Problem Solving Skills-Revised
 - HRNB Category Test (Booklet version)
 - Tower of Hanoi
 - Tower of London
 - Porteus Mazes
 - WJ-III Planning Subtest

Assessment

- Set Maintenance and Set-Shifting
 - Wisconsin Card Sorting Test
 - Stroop Color and Word Test
 - Ruff Figural Fluency Test
 - Verbal Fluency Test
 - Trail-Making Test (Part B)

Assessment

- Inhibitory Control
 - Continuous Performance Tests
 - Matching Familiar Figures Test
 - Go No-Go tasks
 - Stop Signal Test
 - Stroop Color and Word Test

Assessment

- Working Memory
 - Span Tasks
 - Digit Span
 - Word Span (words and pseudowords)
 - Spatial Span
 - Dane-Carpenter task
 - Delayed recall types of tasks
 - WRAML-2 Design Memory
 - Manipulation tasks
 - Mental arithmetic
 - WJ-III Auditory Working Memory Subtest

Assessment

- Attention Regulation
 - Continuous Performance Tests
 - Visual search tasks
 - Auditory Sequencing tasks

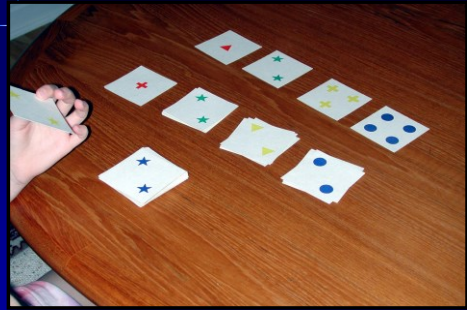
Assessment

- Speeded Processing
 - Rapid naming tasks
 - Motor sequencing tasks
 - Verbal fluency (e.g., Controlled Oral Word Association Test)
 - Nonverbal fluency (e.g., Ruff Nonverbal Fluency Test)
 - WJ-III Processing Speed Cluster
 - Reaction Time

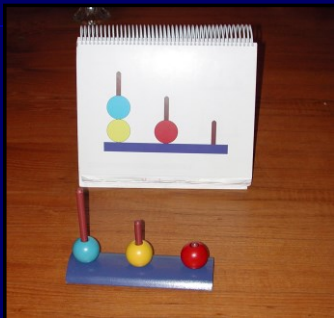
Assessment

- Working Memory Battery for Children
 - 9 subtests based around the Baddelley Working Memory model
- Delis-Kaplan Executive Function System
 - 9 subtests that adapt classic EF measures
- Behavioural Assessment of the Dysexecutive Syndrome for Children

Wisconsin Card Sorting Test



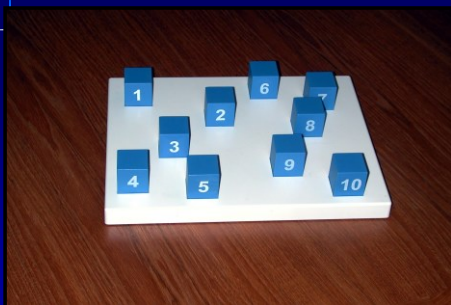
Tower Task



Tower Task



WISV-IV Integrated Spatial Span



Stroop Color and Word Test



Assessment

- Additionally, there are relatively new measures becoming available to assess selected executive functions in the preschool population, with tasks going down to two years of age.
- Several of these tasks include:
 - The Shape School, which assesses inhibitory control
 - The IS Task, which measures set-shifting
 - Working memory span tasks
 - The Tower Task, which assesses planning and problem solving
 - Continuous performance tests (e.g., Kiddie Conners CPT) are available for use for children ages 3 to 5

Assessment

- To assess affective regulation, there are emergent tasks that extend from the laboratory into the clinical arena:
 - Reading the Mind in the Eyes Test
 - Benton Facial Recognition Test
 - The Awareness of Social Inference Test
 - NEPSY-II Social Perception Domain
 - Affect Recognition
 - Theory of Mind

Assessment

- A number of the measures to assess affective regulation are now computerized.
- The Penn Neuropsychological Battery
 - Emotional Recognition Task
- The Affective Go No-Go Task from the Cambridge Neuropsychological Automated Battery
 - The individual is asked to inhibit responses to selected targets
- The Diagnostic Assessment of Nonverbal Abilities (DANVA)
 - Provides estimates of emotional regulation and control via visual and auditory pathways.
 - Scores provide an indication of both receptive and expressive affective regulation.

Assessment

- There are several ratings scales available to assess executive functioning in children and adolescents.
- These measures are not direct assessment batteries per se, but rather comprehensive rating scales that provide estimates of both cognitive and affective regulatory functions in a multi-rater, multi-setting framework and in a time efficient manner.
- Examples include:
 - The Dysexecutive Questionnaire for Children (DEX-C), which is part of the larger Behavioural Assessment of the Dysexecutive Syndrome for Children
 - The Behavior Rating Inventory of Executive Function (BRIEF)
 - The Delis Rating of Executive Functions – uses online administration, scoring, and reporting (ages 5 to 18 years)

Assessment

- The BRIEF:
 - Three overall summary indices
 - Metacognitive Index
 - Behavioral Regulation Index
 - Global Executive Composite
 - Eight different empirically derived scales:
 - Inhibit
 - Shift
 - Emotional Control
 - Initiate
 - Working Memory
 - Plan/Organize
 - Organization of Materials
 - Self-Monitor

Assessment

- Qualitative tasks that involve real-life simulations:
 - Video-taped vignettes of social situations
 - The Party Planning Task
 - The Child-Kitchen Task
 - The School Assessment of Motor and Process Skills
 - Provides an appraisal of skills that children need to function in the classroom setting.
 - The Children's Cooking Task
 - An adaptation of an adult task that was designed to determine the child's ability to follow a checklist without being distracted, evaluate the outcomes with respect to the initial goals for cooking, and make adjustments for any errors.
 - Comprised of making a chocolate cake and a fruit cocktail; performed in a kitchen.
 - Variables of interest include the number of errors and an overall qualitative analysis of the task.
 - Children with TBI made more errors in the cooking process as compared to aged matched controls.

Assessment Summary

- There are a variety of measures that currently exist that cross age boundaries from preschool through adulthood.
- Employ one of the theoretical models of EF in your assessment approach.
 - Which constructs will you employ?
 - How does it align with known brain function?
- Don't hesitate to employ both quantitative and qualitative assessment methods.

Executive Function Management Strategies

Management Strategies

Problem Solving

- Develop a guide to help the individual through the stages of problem solving
 - Identifying the problem
 - Acquire relevant information
 - Generate several possible solutions
 - List pros and cons for each solution
 - Identify best solution
 - Create a plan of action
 - Evaluate the effectiveness of the plan
 - Encourage generalization

Management Strategies

Problem Solving

- Raise questions about alternatives and consequences (Can they predict outcomes?)
- Allow the child to bring up relevant real-life problems that are appropriate for group discussions, and promote brainstorming
- Introduce roadblocks and complications to encourage flexibility
- Provide ongoing, non-judgmental feedback

Management Strategies

Problem Solving

- Computerized intervention for problem solving have received some support
 - Teen Online Problem Solving Program for pediatric traumatic brain injury
- Computerized interventions for attention regulation have been mixed.

Management Strategies

Organizational Processes

- Limit the number of steps in a task
- Provide part of a sequence and have the student finish it
- Give cues such as, "Correct, but what do you think will happen next?"
- Structure thinking processes graphically (e.g., time lines, outlines, flow charts, graphs, etc.)

Management Strategies

Organizational Processes

- Use categories to focus on one topic at a time
- Identify the main idea and supporting details, categorize them, and encourage student to do the same
- Have the student practice organizational skills in other settings

Management Strategies

Speed of Information Processing

- Recognize as the student fatigues, speed of processing declines
- Recognize speed of processing can be negatively affected by some medications
- Eliminate timed measures to assess learning
- Reduce the amount of work required

Management Strategies

Speed of Information Processing

- Provide a reader for text materials and tests
- Permit the student the use of an aide or peer tutor to take notes for them, or a computer for written language
- Lower difficulty level until speed of processing improves

Management Strategies

Speed of Information Processing

- Allow extra time for the completion of tests and assignments
- Frequent breaks allow the student to "recharge"
- When necessary, allow the student extra time to travel between classes

Management Strategies

Working Memory

- Making lists
- Graphic organizers
- Automatization of information
 - This frees up other cognitive resources (e.g., driving a car)
 - Overlearning and rehearsal training
- Environmental manipulations
 - Chunking, repetition
 - Use of technology (e.g., iPads, iPhones)
- Computerized training programs
 - Cogmed Working Memory Training Program

Management Strategies

Social Skills Curricula

- ICPS-I Can Problem Solve: Preschool, Kindergarten, and Elementary
- Skillstreaming in Early Childhood, Elementary, and Adolescence
- Second Step: Preschool through 9th grade
- Positive Action: Elementary grades
- The ACCEPTS Program: Elementary
- The PREPARE Curriculum: Middle and High School
- The ACCESS Program: Middle and High School
- Teaching Social Skills to Youth: A curriculum for child-care providers
- Innovative Programming addressing:
 - Affective Training
 - Family involvement
- Field needs more evidence-based treatment approaches to the management of EF deficits.

Management Strategies

- Feeney & Ylvisaker (1995) developed an empirically-based approach to reduce maladaptive behaviors and increase on-task efforts:
 - Analysis and restructuring of the individual's daily routine wherein the sequencing of the routine was negotiated (e.g., task analysis)
 - Liberal use of visual cues to facilitate the sequencing
 - Liberal rehearsal prior to each component, accompanied by a performance review

Management Strategies

- Feeney & Ylvisaker found that this program:
 - Promoted predictability and orderliness
 - Gave the individuals a sense of control
 - Promoted goal setting
 - Lessened oppositionality and impulsivity
 - Increased decision-making
 - Increased problem solving efforts

Management Strategies

- Self-Regulated Strategy Development (SRSD) is a model wherein individuals are taught an overarching strategy to learn specific strategies.
- SRSD comprises three major areas:
 - Six stages of explicit instruction (i.e., Develop background knowledge; Discuss it; Model it; Memorize it; Support it; Independent performance)
 - Explicit instruction in self-regulation strategies including goal setting, self-monitoring, and self-instruction
 - Develop positive self-efficacy about strategy use

Management Strategies

- SRSD is considered a problem solving process that involves planning, knowledge transfer, and various skills.
- The SRSD model for written language distinguishes itself from alphabetic principle-based intervention strategies (e.g., PAL) as the focus is on advancing higher-order executive functions versus developing phonological processes, vocabulary, or other language functions.
- Developmentally appropriate for middle school.
- Significantly positive data for students with writing disabilities and behavior disorders.
- Holds promise for teaching other self-regulatory skills (e.g., affective regulation).

Management Strategies

- Math Curriculum: Solve It!
- A research-based instructional program in which teachers explicitly teach the processes and strategies that underlie mathematical problem solving.
- Incorporates the cognitive processes critical to mathematical problem solving, with a particular focus on strategies:
 - Reading the problem and developing math vocabulary
 - Paraphrasing
 - Visualizing
 - Hypothesizing about problem solutions and their order
 - Estimating and predicting the answer
 - Computing via procedures and calculations
 - Checking the problem
- Students learn a metacognitive strategy that they apply at each step:
 - Say aloud or to themselves what the problem is asking them to do
 - Ask themselves if they understand the problem
 - Check their progress
- Data on students with MDs are encouraging.

Conclusions

Conclusions

- There are numerous definitions and models of executive function to consider, but the available evidence clearly indicates that this a complex, multidimensional construct that evolves over the course of development.
- There is a clear linkage to underlying neurological integrity and neurodevelopmental processes that is critical to understanding executive functions and dysfunctions.

Conclusions

- The assessment of executive functions has come a long way over the past two decades, with many measures moving out of the laboratory into the clinical setting
 - Affective regulatory measures
- Even with these advances, the assessment of EFs is not conducted as part of a routine psychoeducational or psychological evaluation, or as part of other types of evaluation (e.g., speech/language, OT, etc.).

Conclusions

- Given the regulatory aspects of many of the EFs, it is not uncommon to see functions such as expressive and receptive language, sensory-motor functions, or academic achievement skills appearing to be unaffected by a brain injury, yet the child is not able to access the preserved information accurately and/or efficiently secondary to executive dysfunction.
- Given the relatively high prevalence of frontal lobe involvement in children and adolescents with TBI (AND a wide variety of disorders), this oversight could leave a significant hole in the overall profile of the impact of a specific disorder or condition on cognitive functioning, adherence to care, response to treatment, and quality of life.

Conclusions

- Without the assessment of executive functions, those working with the child are left with other assumptions about the nature of the child's capabilities (e.g., lazy, unmotivated, uninterested, behavioral problems, etc.).
- Consequently, it is essential for the examiner to include executive function measures as part of any assessment of a child as part of a larger assessment.

Conclusions

- It is suspected that the administration, scoring, and interpretation of EF measures are rarely taught across the various professional training programs (e.g., clinical psychology, school psychology, speech and language, occupational therapy, etc.), and it is time for these types of assessment procedures to become part of training programs.
- This is important not only from an assessment perspective, but also with respect to how executive dysfunctions can impact upon therapeutic activities of children and the understanding of how these deficits can emerge later in development.
- Field needs more evidence-based treatments!

Questions

