TBI Considerations for Adult and Pediatric Populations

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AGENDA

- Introductions and Agenda
- Prevalence and Role of SLP
- TBI Overview
- TBI Assessment and Treatment
- Pediatric TBI Assessment and Treatment
- Considerations
- Resources
- Case Studies
- Questions

Objectives

1. Define TBI and Disorders of Consciousness
2. Discuss Evidence Based Practice for Assessment and Interventions
3. State at least 3 developmental characteristics and developmental disruptions that may occur following a brain injury in specific developmental windows
4. Identify 3 risk factors for pediatric TBI
5. Implement evidence-based assessment and treatment information for adults and pediatrics with TBI into clinical practice
6. Analyze indicators for prognosis and need for education

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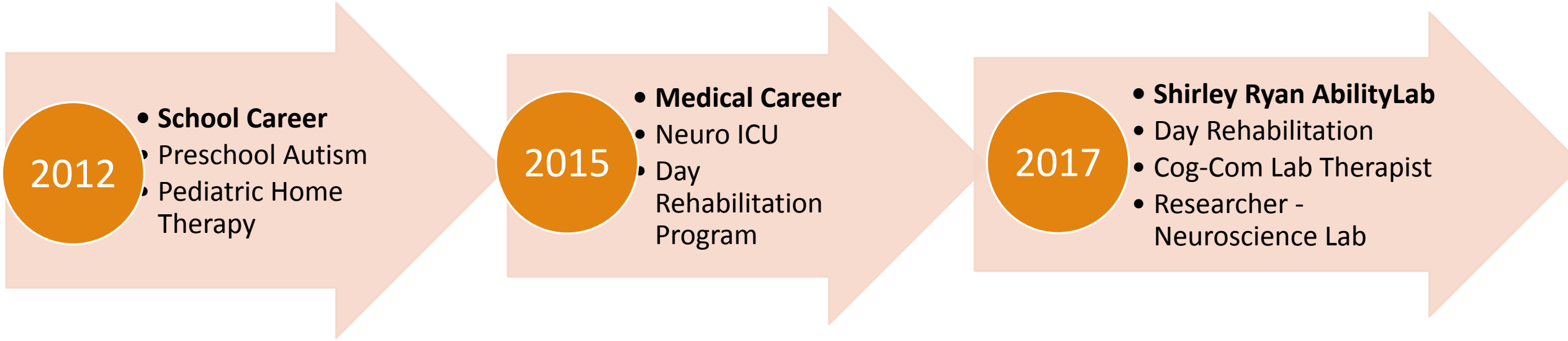
Katy's Story


2012
• **School Career**
• Preschool Autism
• Pediatric Home Therapy
2015
• **Medical Career**
• Neuro ICU
• Day Rehabilitation Program
2017
• **Shirley Ryan AbilityLab**
• Day Rehabilitation
• Cog-Com Lab Therapist
• Researcher - Neuroscience Lab

Traumatic Brain Injury (TBI)

Defined as an injury to the head, by either blunt force or penetrative means, which causes sufficient damage that the patient suffers a change in brain function; or more recently, as an alteration in brain function, or other evidence of brain pathology, caused by an external force. (Brazinova, et al., 2021)

TBI Prevalence/Statistics

- 223,135 TBI-related hospitalizations in 2019
- 69,473 TBI-related deaths in 2021.[1]

People ages +75 years

- 32% of TBI-related
- hospitalizations
- 28% of TBI-related deaths.

- Males 2x more likely hospitalized
- Males 3x more likely to die from a TBI than females (28.3 versus 8.4).

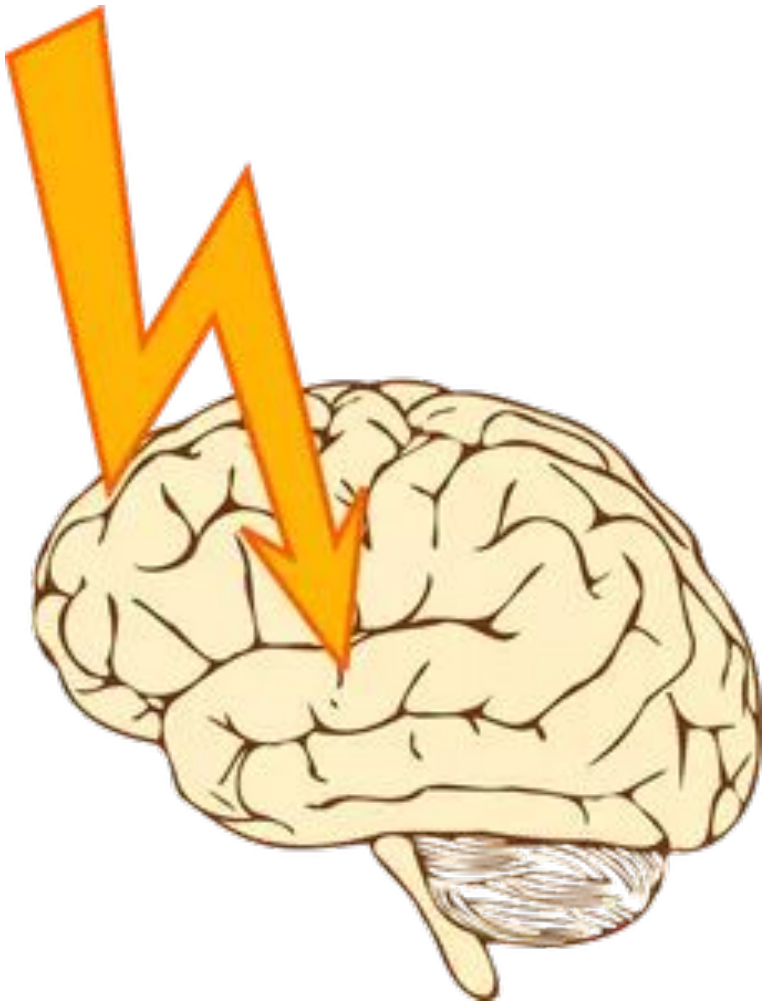
- Falls lead to nearly half of the TBI-related hospitalizations[11]
- Firearm-related suicide is the most common cause of TBI-related deaths in the United States[5,12]
- Motor vehicle crashes and assaults are other common ways a person may get a TBI[11]

CDC, 2023

Pediatric Prevalence

2010–2016: **2 million**
TBI related emergency room visits

(Sarmiento et al., 2019)



Most reported residual symptoms

- Fatigue
- Disorientation
- Anosogonsia (Dec self awareness)
- Memory loss
- Decreased attention
- Impulsivity
- Confabulations
- Emotionally labial
- Impaired executive functions
- Language of confusion*
- Vision impairments*

Role of SLP-TBI

- Arousal
- Swallowing
- Speech/Voice
- Language
- Cognition
- Social Communication
- Attention
- Orientation
- Memory
- Executive Functions

- ✔ School
- ✔ Work
- ✔ Community Reintegration

(Meulenbroek, P., 2021)

(Kelly, J., & Hardin, K. (2019)

Categories of TBI

DOC

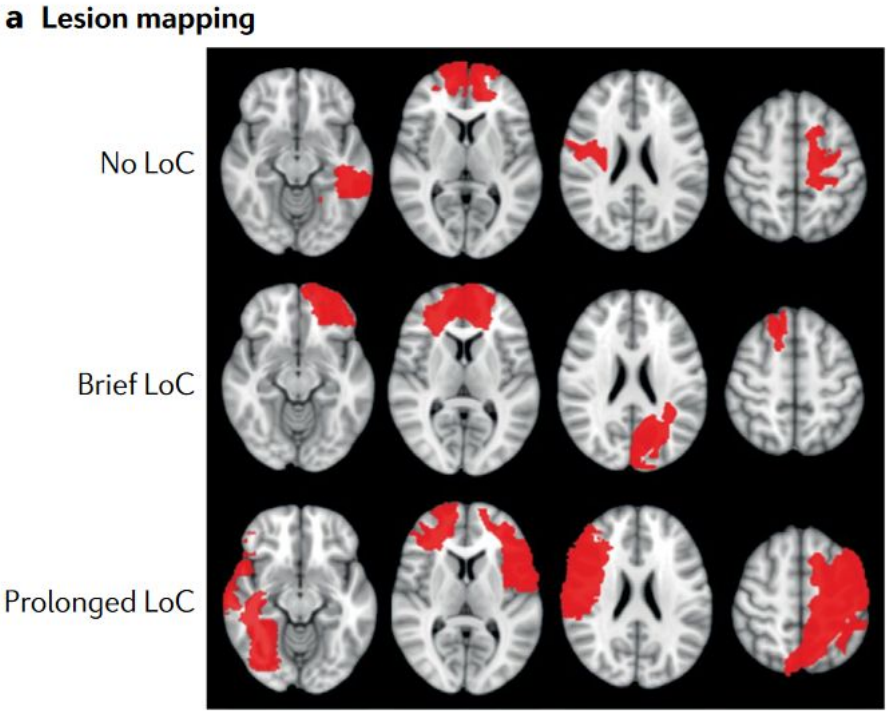
TBI

mTBI

Disorders of Consciousness

Disorders of Consciousness

Disorders of consciousness (DoC) are characterized by alterations in arousal and/or awareness



Common causes of DoC

Cardiac arrest
Traumatic brain injury (TBI)
Intracerebral hemorrhage and ischemic stroke.

(Edlow et al., 2021)

Coma

Vegetative State

Minimally Conscious State (+/-)

Disorders of Consciousness

Coma

(Edlow et al., 2021)

- In this framework, coma is defined as the complete absence of arousal and awareness
- Significant diffuse hemisphere damage
- Brainstem/Thalamus damage- resulting in decreased automatic reflexes/responses

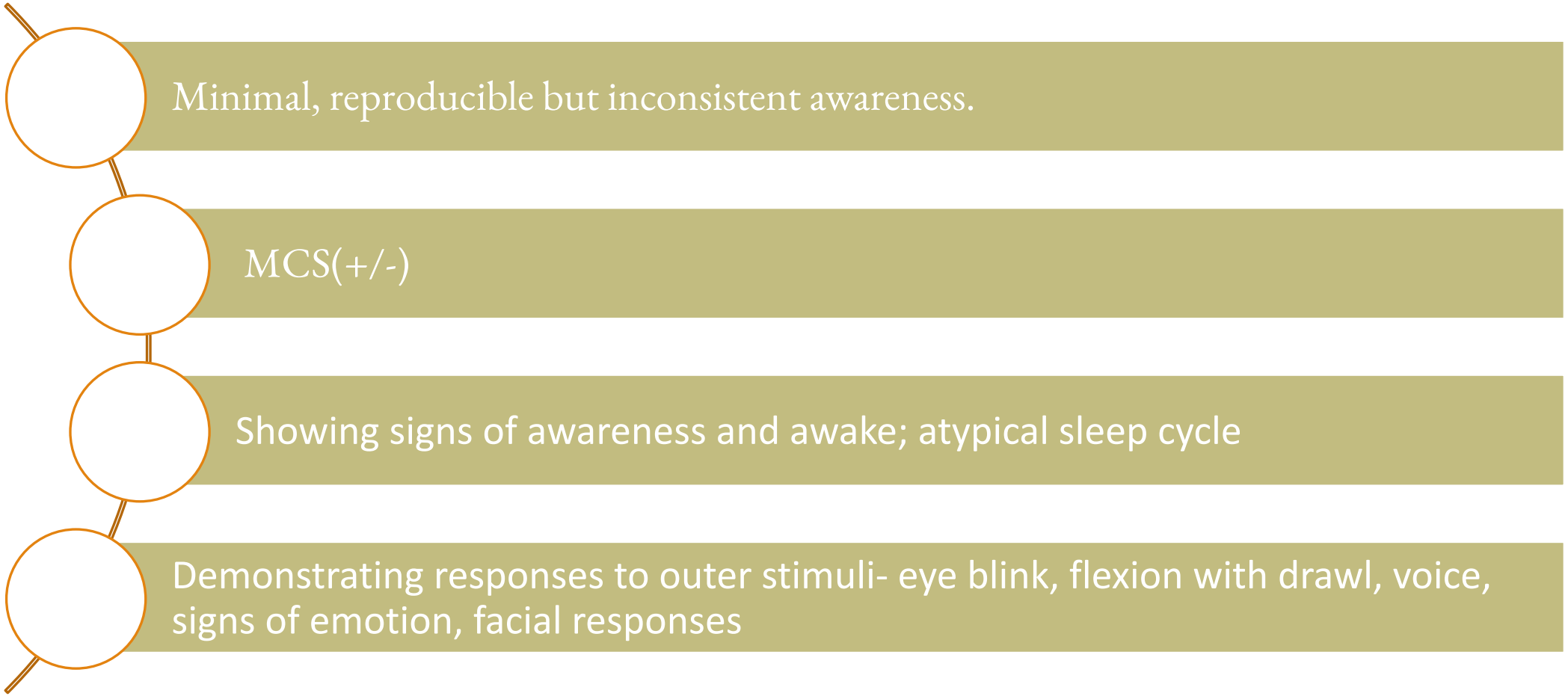
Vegetative State

(Edlow et al., 2021)

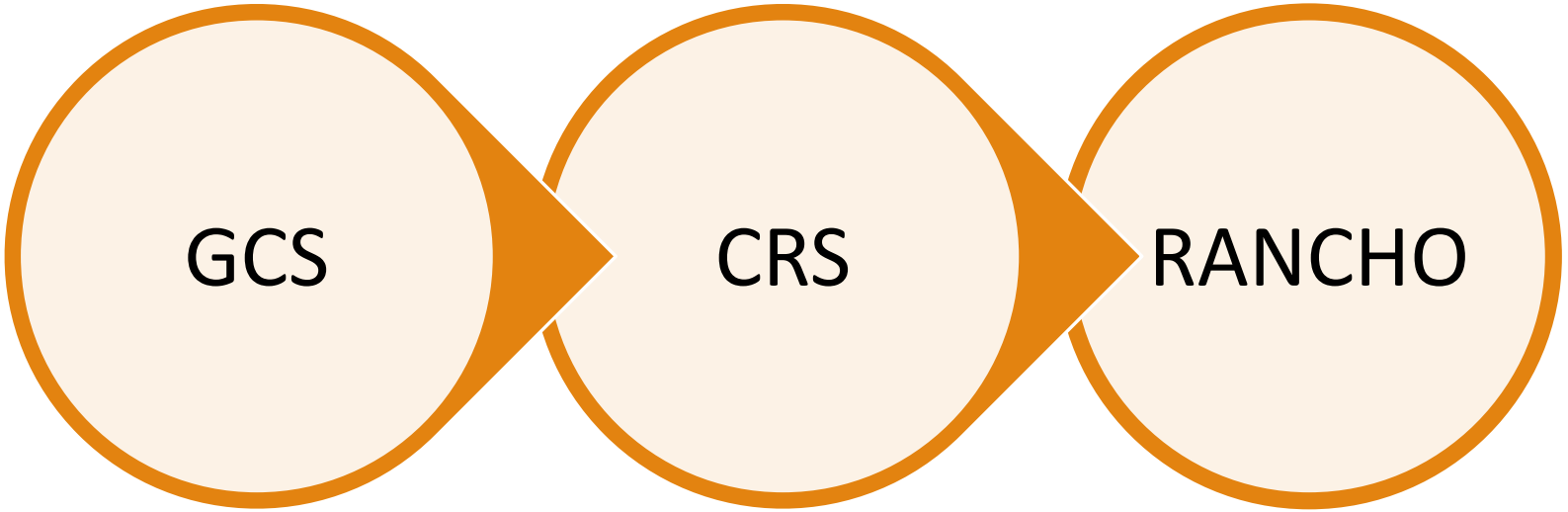
- vegetative state (later renamed ‘unresponsive wakefulness syndrome’ (VS/UWS))4 is defined as arousal without awareness
- Have regained awoken from coma, without a cycle; however not gained awareness
- Not responding to commands or showing response to outside stimuli

Minimally Conscious State

(Edlow et al., 2021)



TBI Measures



Glascow Coma Scale

- Eye
- Motor
- Verbal

Shukla, 2010

GLASGOW COMA SCALE

Patient Name: _____
Rater Name: _____
Date: _____

Activity		Score
EYE OPENING		
None	1 = Even to supra-orbital pressure	
To pain	2 = Pain from sternum/limb/supra-orbital pressure	
To speech	3 = Non-specific response, not necessarily to command	
Spontaneous	4 = Eyes open, not necessarily aware	_____
MOTOR RESPONSE		
None	1 = To any pain; limbs remain flaccid	
Extension	2 = Shoulder adducted and shoulder and forearm internally rotated	
Flexor response	3 = Withdrawal response or assumption of hemiplegic posture	
Withdrawal	4 = Arm withdraws to pain, shoulder abducts	
Localizes pain	5 = Arm attempts to remove supra-orbital/chest pressure	
Obeys commands	6 = Follows simple commands	_____
VERBAL RESPONSE		
None	1 = No verbalization of any type	
Incomprehensible	2 = Moans/groans, no speech	
Inappropriate	3 = Intelligible, no sustained sentences	
Confused	4 = Converses but confused, disoriented	
Oriented	5 = Converses and oriented	_____
	TOTAL (3–15):	_____

References

Teasdale G, Jennett B. "Assessment of coma and impaired consciousness. A practical scale." *The Lancet* 13;2(7872):81-4, 1974.

Pediatric Glascow Coma Scale

Changes in verbal responses

1. None / 1 None
2. Moans in response to pain / 2 Incomprehensible sounds
3. Cries in response to pain / 3 Incomprehensible words
4. Irritable/cries / 4 Confused
5. Coos and babbles / 5 Orientated - appropriate

Coma Recovery Scale

Kalmar and Giacino, 2005

CRS-R Record Form

JFK COMA RECOVERY SCALE - REVISED ©2004
Record Form

Patient: **Date:**								
AUDITORY FUNCTION SCALE								
4 - Consistent Movement to Command *								
3 - Reproducible Movement to Command *								
2 - Localization to Sound								
1 - Auditory Startle								
0 - None								
VISUAL FUNCTION SCALE								
5 - Object Recognition *								
4 - Object Localization: Reaching *								
3 - Visual Pursuit *								
2 - Fixation *								
1 - Visual Startle								
0 - None								
MOTOR FUNCTION SCALE								
6 - Functional Object Use †								
5 - Automatic Motor Response *								
4 - Object Manipulation *								
3 - Localization to Noxious Stimulation *								
2 - Flexion Withdrawal								
1 - Abnormal Posturing								
0 - None/Flaccid								
OROMOTOR/VERBAL FUNCTION SCALE								
3 - Intelligible Verbalization *								
2 - Vocalization/Oral Movement								
1 - Oral Reflexive Movement								
0 - None								
COMMUNICATION SCALE								
2 - Functional: Accurate †								
1 - Non-Functional: Intentional *								
0 - None								
AROUSAL SCALE								
3 - Attention								
2 - Eye Opening w/o Stimulation								
1 - Eye Opening with Stimulation								
0 - Unarousable								
TOTAL SCORE								

Denotes emergence from MCS †
Denotes MCS *

Disorders of Consciousness Interventions

General Interventions

- Neuroprotective reperfusion therapy
  - Targeted Temperature Therapy
  - Pharmaceutical Interventions

SLP Interventions

- Caregiver training
- Establishing a functional communication system
- Continue assessing through the CRS

Categories of TBI

DOC

TBI

mTBI

Traumatic Brain Injury

TBI

Defined as an injury to the head, by either blunt force or penetrative means, which causes sufficient damage that the patient suffers a change in brain function; or more recently, as an alteration in brain function, or other evidence of brain pathology, caused by an external force. (Brazinova, et al., 2021)

Level	Description
Rancho 1	No response
Rancho 2	Generalized Response; painful stimuli
Rancho 3	Localized Response; starting to respond/follow commands
Rancho 4	Confused and Agitated; limbic system online; emotional/reactive responses; slow processing,: internal state of agitation; eyes are scared; motor restless does not always mean Rancho 4

RANCHO LEVELS

Level	Description
Rancho 5	Confused; inappropriate; not agitated; increased attention, improved frontal lobe activity: not as scared
Rancho 6	Confused; appropriate; some external cues; memory still challenging
Rancho 7	Automatic; appropriate; out of PTA; robot like responses
Rancho 8	Purposeful; appropriate; improved executive functions

RANCHO LEVELS

TBI assessment

- Ross Information Processing Assessment
- Ross Information Processing Assessment (Geriatric/Pediatric)
- Scales of Cognitive Ability for Traumatic Brain Injury
- Cognitive Linguistic Quick Test
- Functional Assessment of Verbal Reasoning and Executive Functions
- Test of Everyday Attention
- Woodcock Johnson

- Orientation Log
- Cog-Log
- Neuro QOL
- Coma Recovery Scale

Post Traumatic Amnesia

Individual's disorientation in time, place and person, and/or anterograde amnesia, the inability to form new memories

Structural Connectivity

Strong Predictor

Declining 14% per week

(Bayley et al., 2023)

Confabulations

Memories/information is missing

Fill it with information regardless of truth

Provide external aids

Give correct information

Categories of TBI

DOC

TBI

mTBI

mTBI

mTBI

According to these criteria, mTBI is defined by a GCS score between 13 and 15, 30 minutes after the injury and one or more of the following symptoms:

- loss of consciousness <30 minutes
- PTA <24 hours
- impaired mental state at time of accident (confusion, disorientation, etc.)
- transient neurological deficit (including focal signs, epilepsy, surgical intracranial injury).

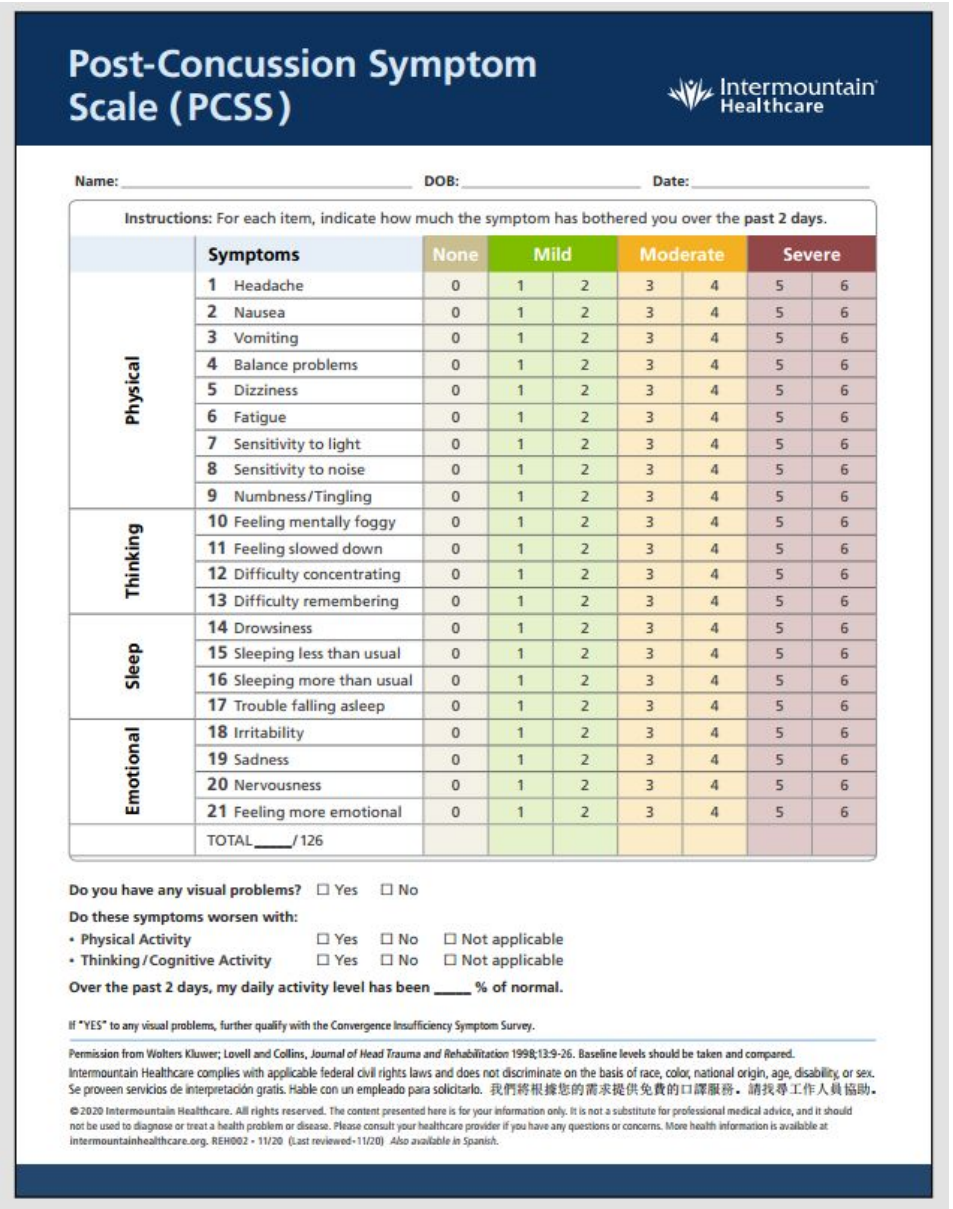
**imaging can also be used, however research argues that mTBI, should be characterized by clinical profile instead of imaging*

Concussion

- 7- to 10-day period
- Influenced by factors
- 3 months 33%
- Children > time

Leddy, et al., 2016

Post Concussion Symptom Scale



Post-Concussion Symptom Scale (PCSS)

Intermountain Healthcare

Name: _____ DOB: _____ Date: _____

Instructions: For each item, indicate how much the symptom has bothered you over the **past 2 days.**

	Symptoms	None	Mild		Moderate		Severe	
Physical	1 Headache	0	1	2	3	4	5	6
	2 Nausea	0	1	2	3	4	5	6
	3 Vomiting	0	1	2	3	4	5	6
	4 Balance problems	0	1	2	3	4	5	6
	5 Dizziness	0	1	2	3	4	5	6
	6 Fatigue	0	1	2	3	4	5	6
	7 Sensitivity to light	0	1	2	3	4	5	6
	8 Sensitivity to noise	0	1	2	3	4	5	6
	9 Numbness/Tingling	0	1	2	3	4	5	6
Thinking	10 Feeling mentally foggy	0	1	2	3	4	5	6
	11 Feeling slowed down	0	1	2	3	4	5	6
	12 Difficulty concentrating	0	1	2	3	4	5	6
	13 Difficulty remembering	0	1	2	3	4	5	6
Sleep	14 Drowsiness	0	1	2	3	4	5	6
	15 Sleeping less than usual	0	1	2	3	4	5	6
	16 Sleeping more than usual	0	1	2	3	4	5	6
	17 Trouble falling asleep	0	1	2	3	4	5	6
Emotional	18 Irritability	0	1	2	3	4	5	6
	19 Sadness	0	1	2	3	4	5	6
	20 Nervousness	0	1	2	3	4	5	6
	21 Feeling more emotional	0	1	2	3	4	5	6
	TOTAL ____ / 126							

Do you have any visual problems? ☐ Yes ☐ No

Do these symptoms worsen with:

- **Physical Activity** ☐ Yes ☐ No ☐ Not applicable
- **Thinking / Cognitive Activity** ☐ Yes ☐ No ☐ Not applicable

Over the past 2 days, my daily activity level has been ____ % of normal.

If "YES" to any visual problems, further qualify with the Convergence Insufficiency Symptom Survey.

Permission from Wolters Kluwer; Lovell and Collins, *Journal of Head Trauma and Rehabilitation* 1998;13:9-26. Baseline levels should be taken and compared.

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Post Concussive Symptoms

Physical

Headache

Fatigue

Vertigo

Endurance

Emotional

Irritability

Depression

Apathy

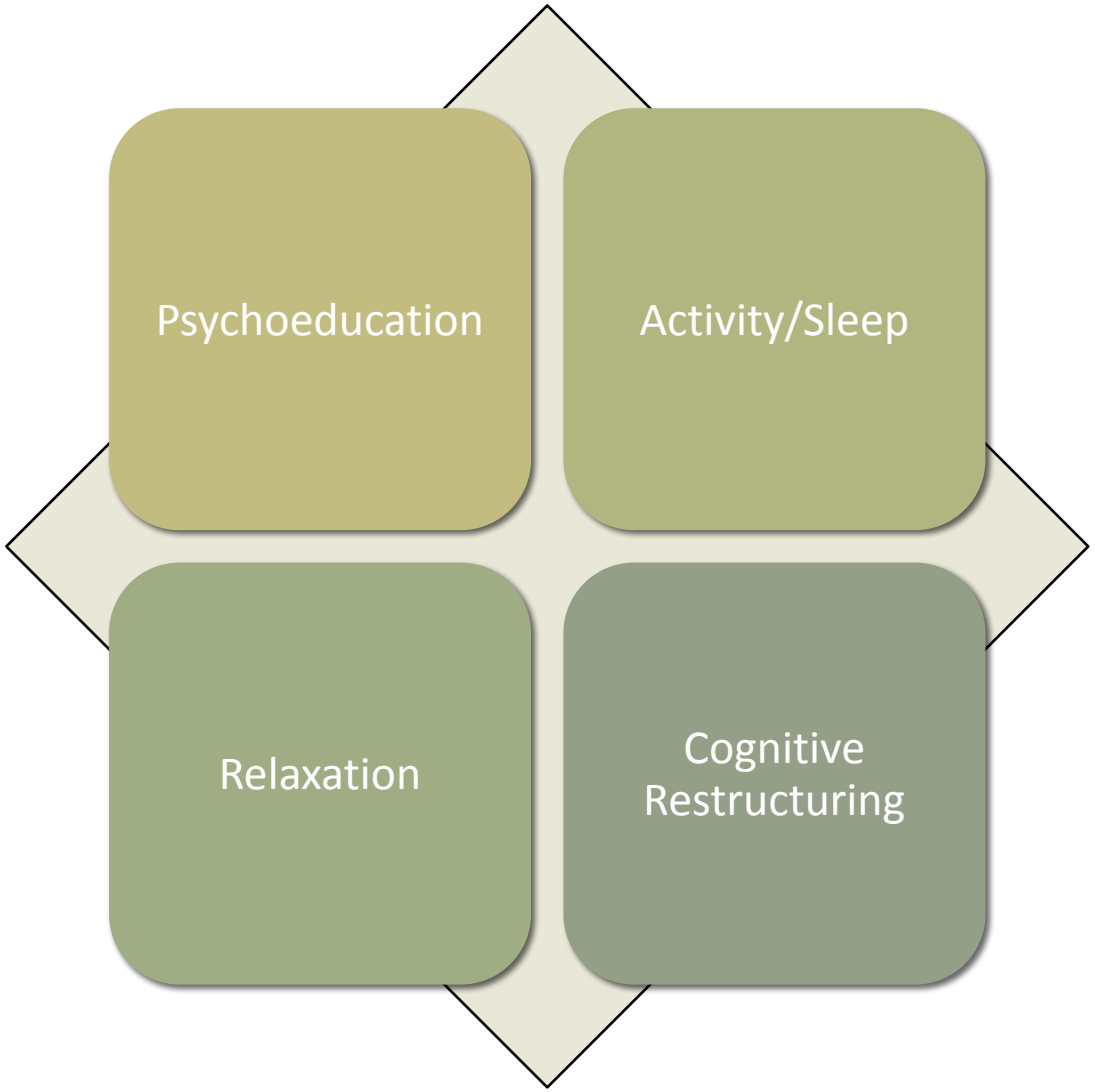
Cognitive

Attention

Memory

Executive Function

PCS Interventions

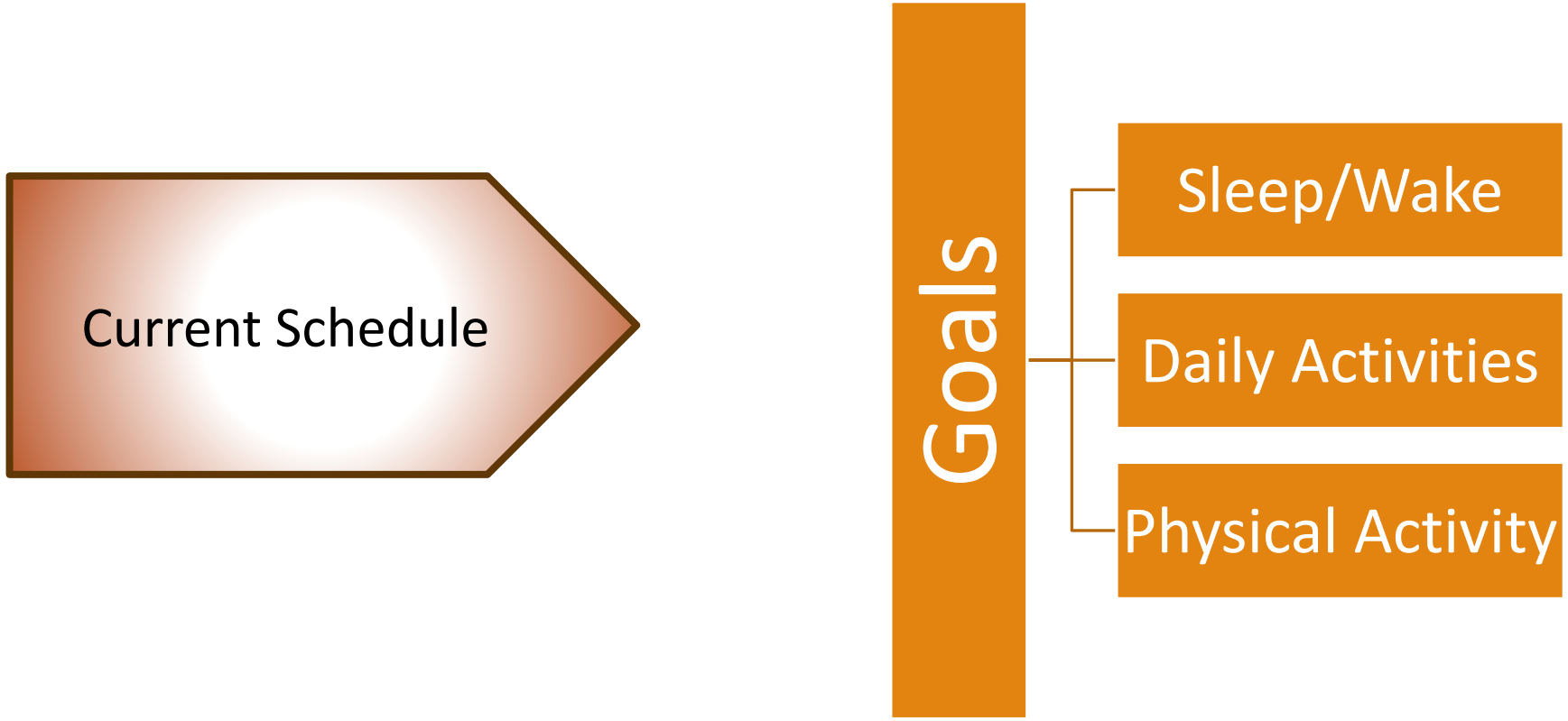


(McNally et al., 2018)

Psychoeducation

- Nature of concussion
- Symptoms
- Time of Recovery
- Role of non-injury factors impact

Activity/Sleep



Relaxation

Diaphragmatic Breathing

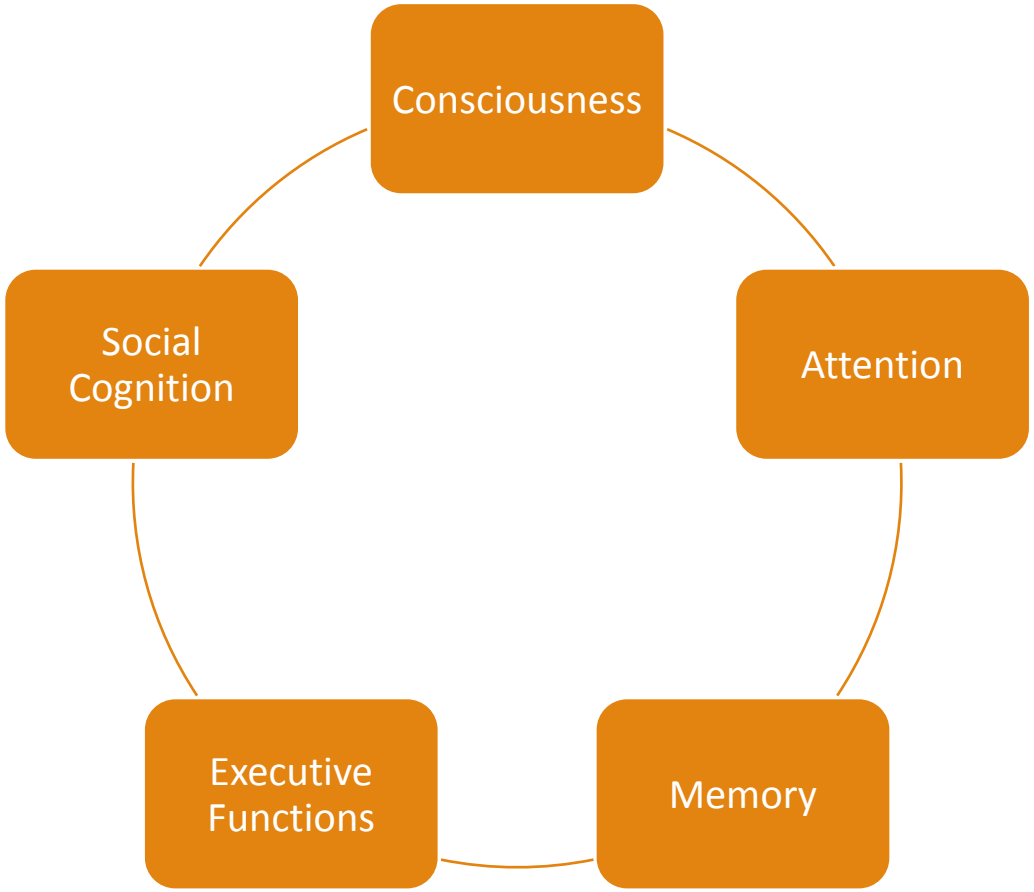
Progressive Muscle Relaxation

Relaxing Imagery

Cognitive Restructuring

Identify and replace negative automatic thought patterns regarding the injury

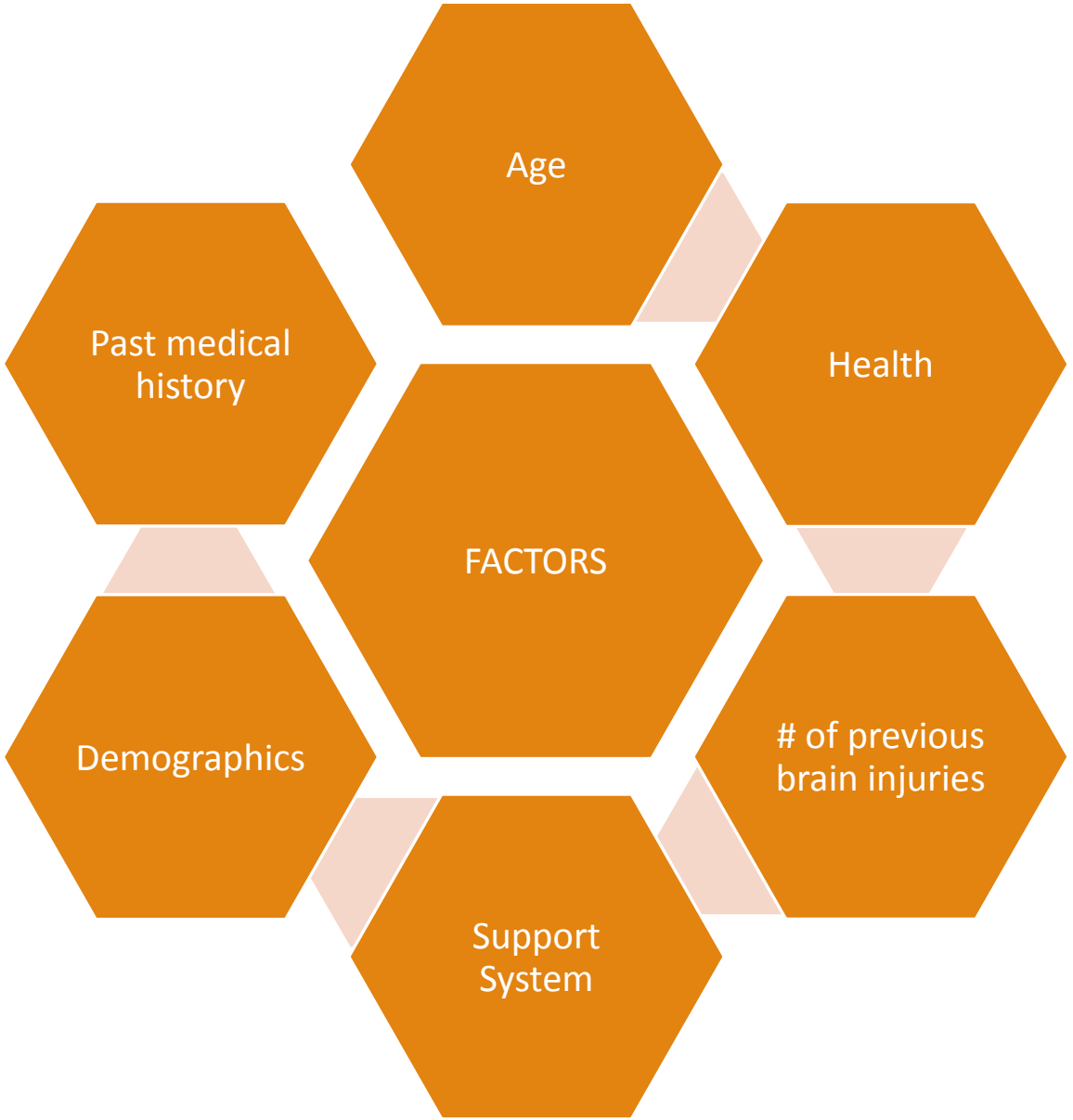
TBI Areas


Consciousness
Attention
Memory
Executive Functions
Social Cognition

Interventions

Consciousness	Attention	Memory	Executive Functions	Pragmatics
• Caregiver Training • Arousal Techniques • Tell, Don't Ask • Orientation Training	• Attention Processing Training • Strategy Implementation	• Spaced Retrieval Training • External Aid • Repetition/Errorless Learning	• Metacognitive Strategies • Cognitive Reorganization	• Group practice • Direct Feedback • Self monitoring • Intentions/Theory of Mind Interventions

Prognosis Indicators



Cultural/Demographic Statistics

- Prevalence
- Reintegration
- Access
- Rehabilitation

Pediatrics

MEGAN LYNCH MA, CCC-SLP, CBIS

Megan Lynch, MA, CCC-SLP, CBIS

Senior Speech-Language Pathologist
Pediatric Speech-Language Pathologist
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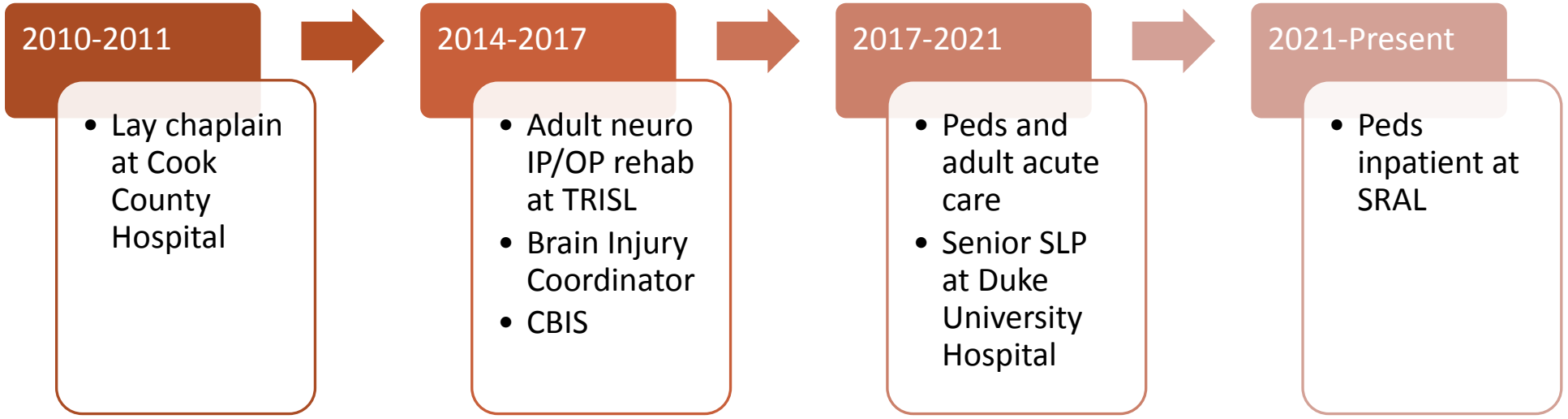
WARNING
TRUESHIELD
GRACO

Megan's Story



Course Objectives

- Implement evidence-based assessment and treatment information for children and adolescents with TBI into clinical practice
- Identify 3 risk factors for pediatric TBI
- State at least 3 developmental characteristics and developmental disruptions that may occur following a brain injury in specific developmental windows (infancy, preschool, elementary school, early adolescence, late adolescence)

Pediatric TBI Overview

Severe

- DOC Assessment & Intervention
  - CRS-P
  - PAYDOC
  - PTA

Moderate

- Formal Assessment
- Evidenced-Based Cognitive Interventions
- Pediatric considerations

Mild

- Symptom rating scales
- TBI in young children and prevention

Pediatric DOC Considerations

Age of patient

Previous developmental status

Parent interview for determining salient stimuli

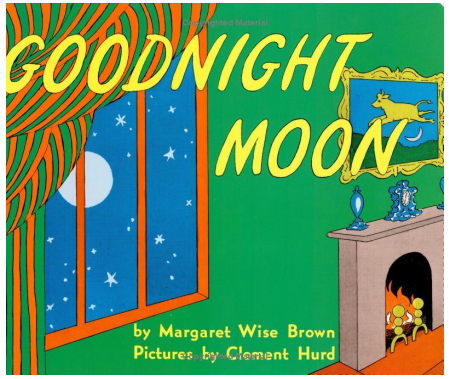
Coma Recovery Scale for Pediatrics (CRS-P) (Slomine, 2019)

Preliminary validation in typically developing infants and young children	Appropriate for use in children as young as 12 months to 4 years
	Immature language development impacted the performance of healthy children on the CRS-P. Results are consistent with existing knowledge of developmental milestones in which visual and motor skills are acquired before language skills (Sinno, 2013)
	Results indicated that all children at least 12 months of age, and no child <12 months, displayed functional object use
	All children at least 37 months of age, and none of those <29 months demonstrated functional communication
	Additional modifications may be needed for children <4 years as reliable yes-no responses were not seen consistently until 37 months

CRS-P Modifications: Communication Subscale: *Yes/No Communication*

https://tinyurl.com/yh5kn6f9

https://tinyurl.com/y2s5kzjw



https://tinyurl.com/4r3a6nhr

Situational Orientation
Picture Book Based (for each item pick a page with either a mouse or a cow)
Is this a cow? (point to mouse) Is this a mouse? (point to mouse) Is this a mouse? (point to mouse) Is this a cow? (point to mouse) Is this a mouse? (point to cow) Is this a cow? (point to cow)
Total ___/6

CRS-P Subscale Modifications: Motor Subscale: *Functional Object Use*

https://tinyurl.com/3kuym6n7

https://tinyurl.com/y662fj6x

https://tinyurl.com/5eehk26v

Preference Assessments for Youth With Disorders of Consciousness (PAYDOC) (Amari, 2017)

PAYDOC	Structured way to generate salient stimuli
	Use of preferred, salient items can be beneficial in addressing some of the unique challenges of assessment and intervention with individuals with DOC
	Well documented in adult literature differential responses to personally meaningful stimuli

Appendix

Preference Assessment for Youth with Disorders of Consciousness (PAYDOC)

Child or Adolescent's Name:
Caregiver's Name:
Date:

Clinician Instructions: The purpose of this structured interview is to get as much information as possible from the caregiver about what items may elicit a positive response, such as alerting or calming, from the child or adolescent. Such items may be useful to incorporate during brain injury recovery. This survey asks caregivers about several categories of items and activities including visual, auditory, olfactory, and tactile. When the caregiver identifies items in each category, ask additional questions to get more specific information about the child or adolescent's preferences, such as type of lotion, and the conditions under which the item has been most preferred (e.g., do they watch on the tablet or phone?)

We would like to get some information on _____'s preferences prior to his/her brain injury. In addition, we would like information on his/her current preferences based on your observations since the injury.

1. Some children/teens really enjoy looking at or watching different things. This can include things like a mirror, pictures of family or celebrities, magazines, TV (sports, sitcoms), or videos (animal videos, music videos, movies). What are the things you think _____ most likes to look at or watch?

   Response to follow up questions:

2. Some children/teens really enjoy different sounds. This may include things like listening to music, hearing jokes, family voices, car sounds, clapping, or people singing. What are the things you think _____ most likes to hear or listen to?

   Response to follow up questions:

3. Some children/teens really enjoy different smells like perfume, lotion, flowers, fruits, coffee, peppermint, or favorite foods. What are the things you think _____ most likes to smell?

   Response to follow up questions:

4. Some children/teens really enjoy physical activities, play, or movement. This may include being tickled, playing thumb war, or being rocked. What activities do you think _____ most enjoys?

   Response to follow up questions:

5. Some children/teens really enjoy touching things of different temperatures. This may include cold things like snow or an ice pack, or warm things like a warm cloth or a cup of hot tea. What items like this do you think _____ most enjoys?

   Response to follow up questions:

6. Some children/teens really enjoy feeling different sensations. This may include water, a vibrating item against their skin, a soft or textured blanket, or the feel of air from a fan on their face. What sensations like this do you think _____ most enjoys?

   Response to follow up questions:

7. Some children/teens really enjoy it when others give them attention, such as a hug, pat on the back, clapping, "high five", or praise. What forms of attention do you think _____ most enjoys?

   Response to follow up questions:

8. Some children/teens really enjoy certain toys or objects. This may include bubbles, sports items like team hats or footballs, toy cars, comic books, or dolls. What are _____'s favorite toys or objects?

   Response to follow up questions:

9. What are some other items or activities that _____ really enjoys?

   Response to follow up questions:

Disorders of Consciousness (PAYDOC) (Amari, 2017)

Case example: 10 year-old female

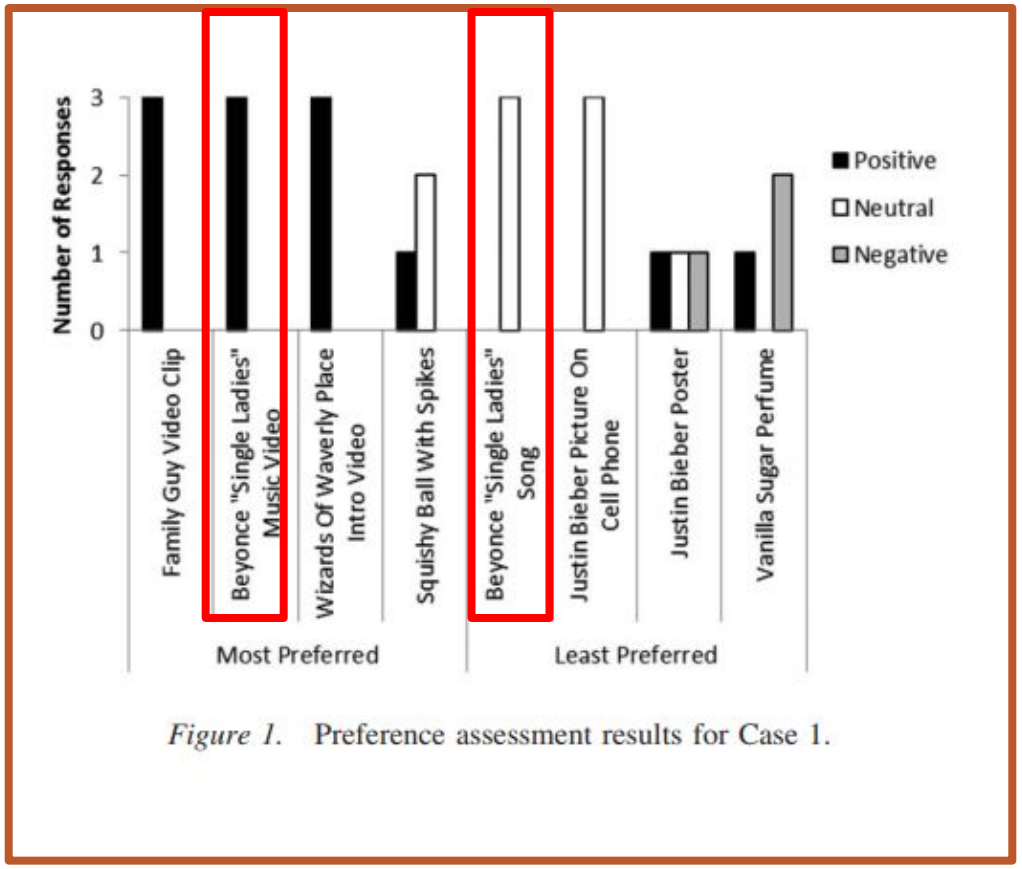


Figure 1. Preference assessment results for Case 1.

https://tinyurl.com/3cb972nf

Disorders of Consciousness (PAYDOC) (Amari, 2017)

Case example: 9 year-old male

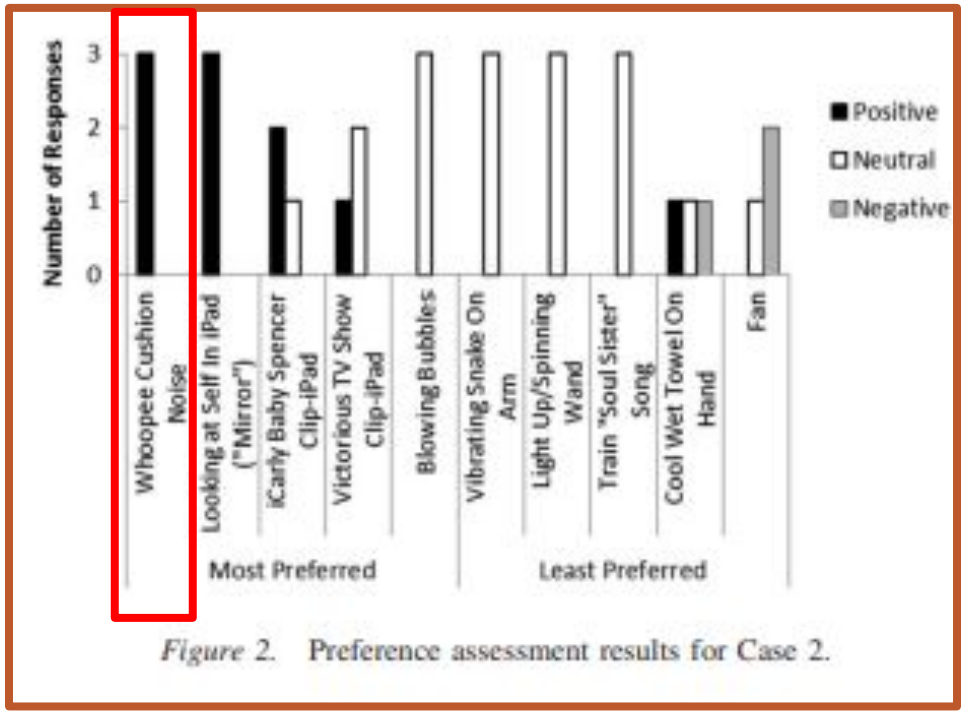


Figure 2. Preference assessment results for Case 2.

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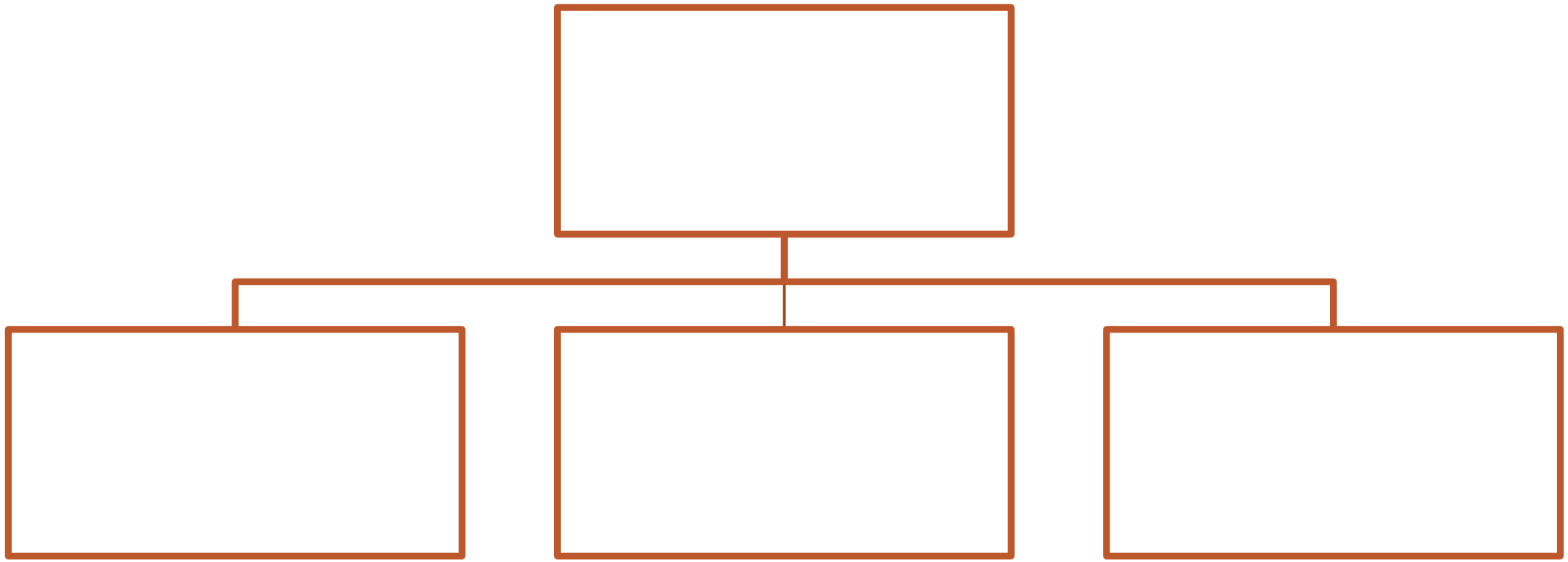
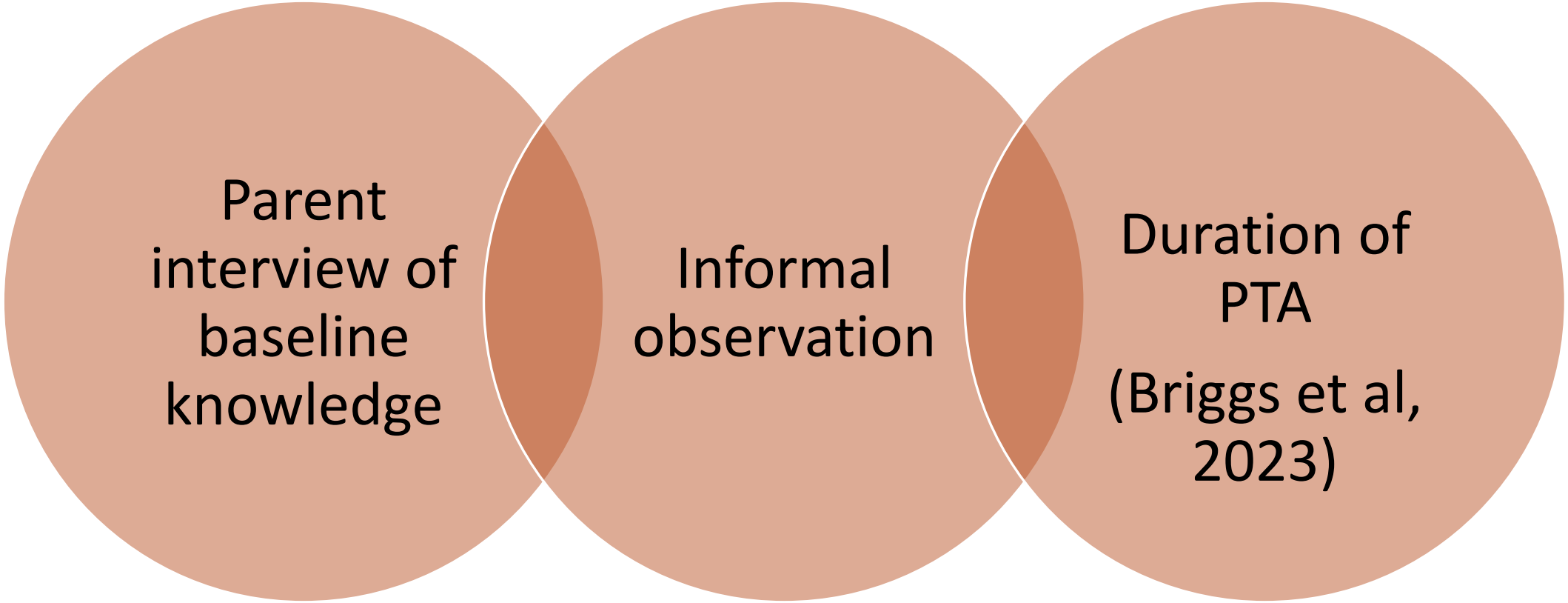
Pediatric Post-Traumatic Amnesia (PTA) (Swihart, 2017)



*Can be used for up 15 years

**No studies on use in pediatrics, but a few adult studies using O-log for as young as 16

Pediatric PTA Considerations



Standardized Pediatric Assessments	Ages
Pediatric Evaluation of Disability Inventory (PEDI) – Social functioning scales	6 mo-7:6 years
Peabody Picture Vocabulary Test, 4th ed. (PPVT-4)	2:6-90 years
Comprehensive Assessment of Spoken Language-Second Edition (CASL-2)	3-21 years
Child Health Questionnaire (CHQ)	5-18 years
Clinical Evaluation of Language Fundamentals, 5th ed. (CELF-5)	5-21 years
Behavior Rating Inventory of Executive Function (BRIEF)	5-18 years
Pediatric Test of Brain Injury (PTBI)	6-16 years
Test of Integrated Language and Literacy Skills (TILLS)	6-18 years
Comprehensive Test of Nonverbal Intelligence, 2nd ed. (C-TONI 2)	6-89 years
Test of Everyday Attention (TEA-Ch)	6-16 years
Child and Adolescent Scale of Participation (CASP)	6-12; 13-17 years
Student Functional Assessment of Verbal Reasoning and Executive Strategies (Student FAVRES)	12-19 years

Intervention: Cognition

Attention

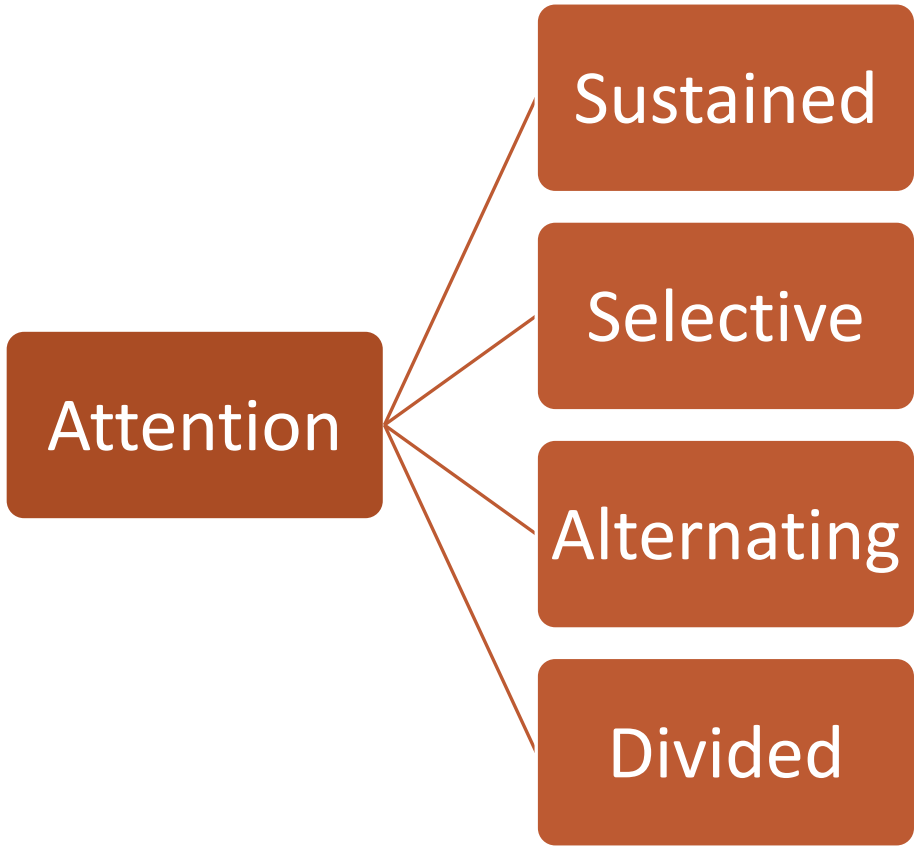
Memory

Executive Functioning

Social Communication

(Crook et al, 2023; ERABI Group 2023)

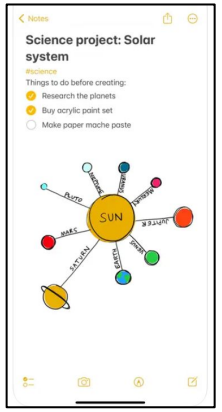
Intervention: Attention Process Training (APT) for Children 4-10 years



Intervention: Memory

Moderate –Severe Impairment

- External strategies



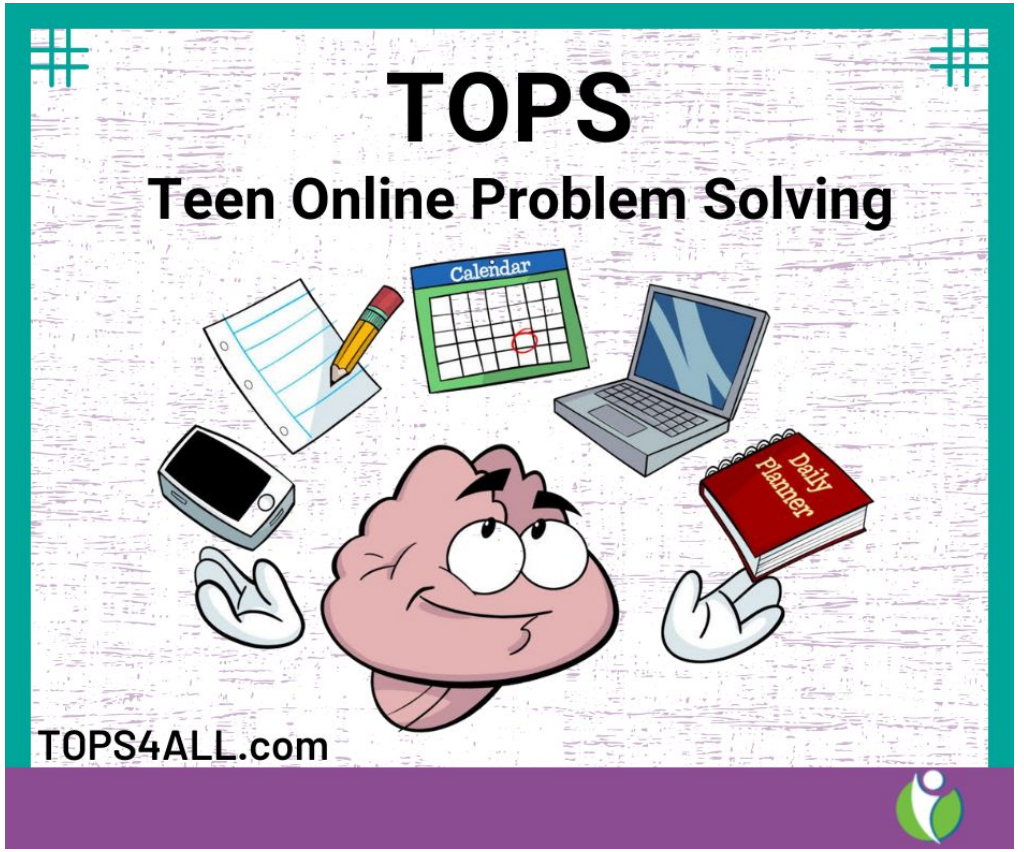
Mild Impairment

- Internal strategies

https://tinyurl.com/54unbw63
https://tinyurl.com/3ka2ntnb
https://tinyurl.com/6s43a4eb

Intervention: Teen Online Problem Solving

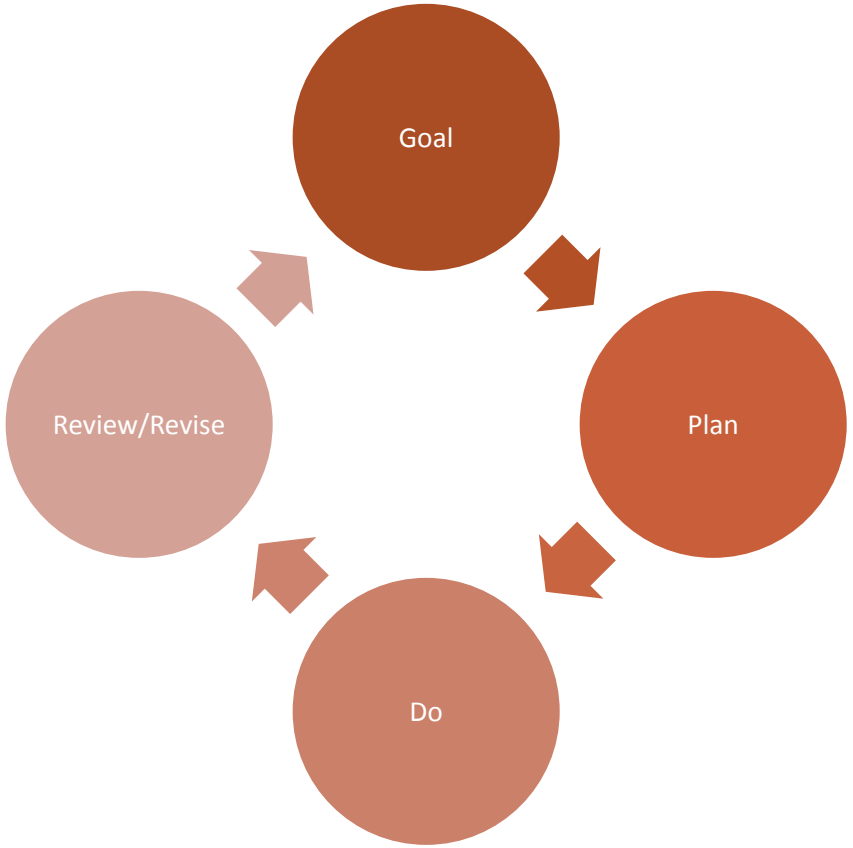
Audience	13-19 years
	English or Spanish
	Moderate to severe TBI and caregivers
Evidence-based program	9 core sessions
	11 supplemental
	Problem-solving app



Intervention: Teen Online Problem Solving (Wade et al, 2017)

Core Intervention Modules	Getting started and setting goals
	Staying positive and handling stress
	Solving problems
	Staying in control (self-regulation)
	Controlling your anger
	Verbal and non-verbal communication
	Social behavior and problem solving
	Taking care of you
	Moving forward/planning for the future

Intervention: Executive functioning



https://tinyurl.com/2fyckmmx

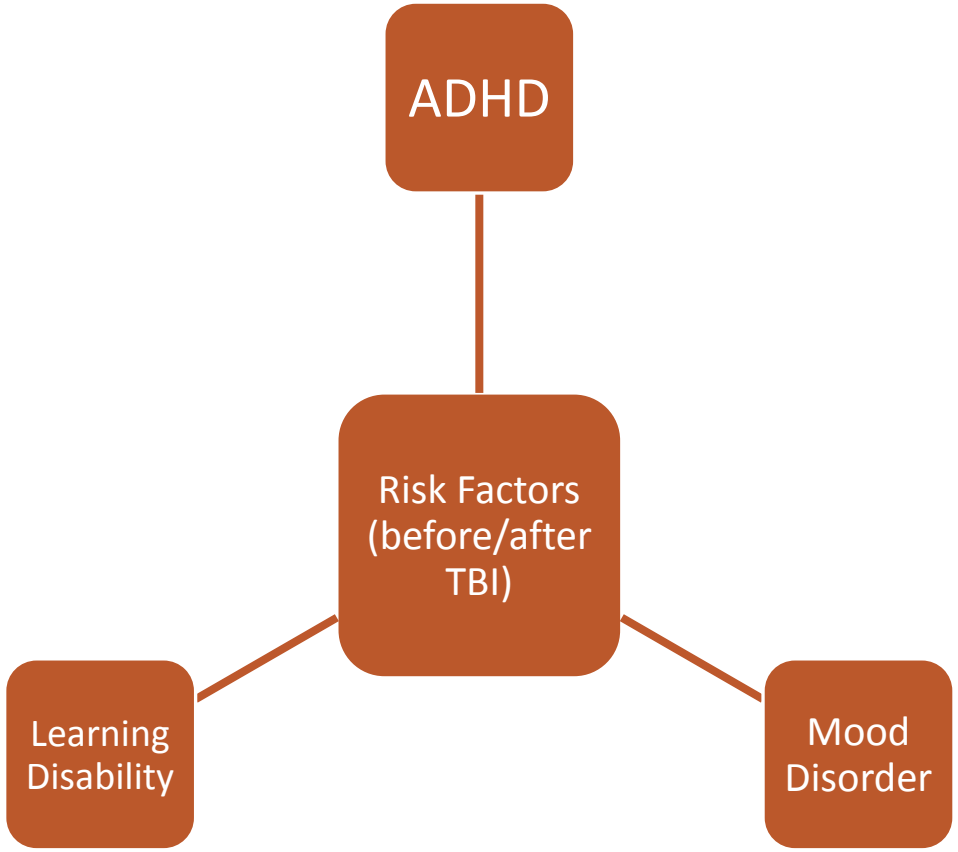
Best Suite

- Train one app at a time
- Use one app that can do many things
- Free trainings: https://bestconnections.org/online-courses/

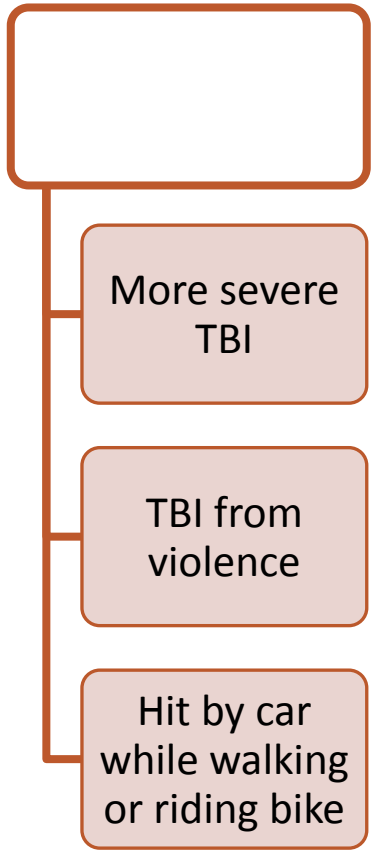
Intervention: Social Communication

https://tinyurl.com/2y2673hp

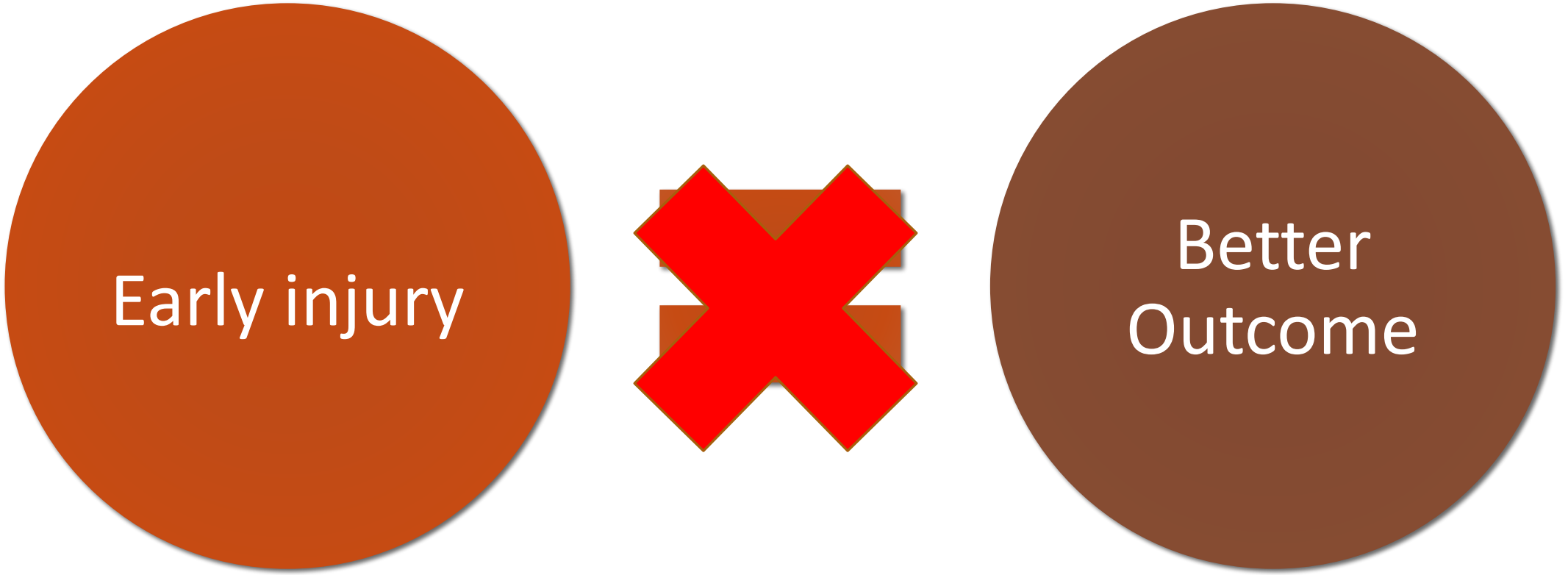
Pediatric Considerations (Ciccia, 2018)



Pediatric Considerations (Ciccia, 2018)

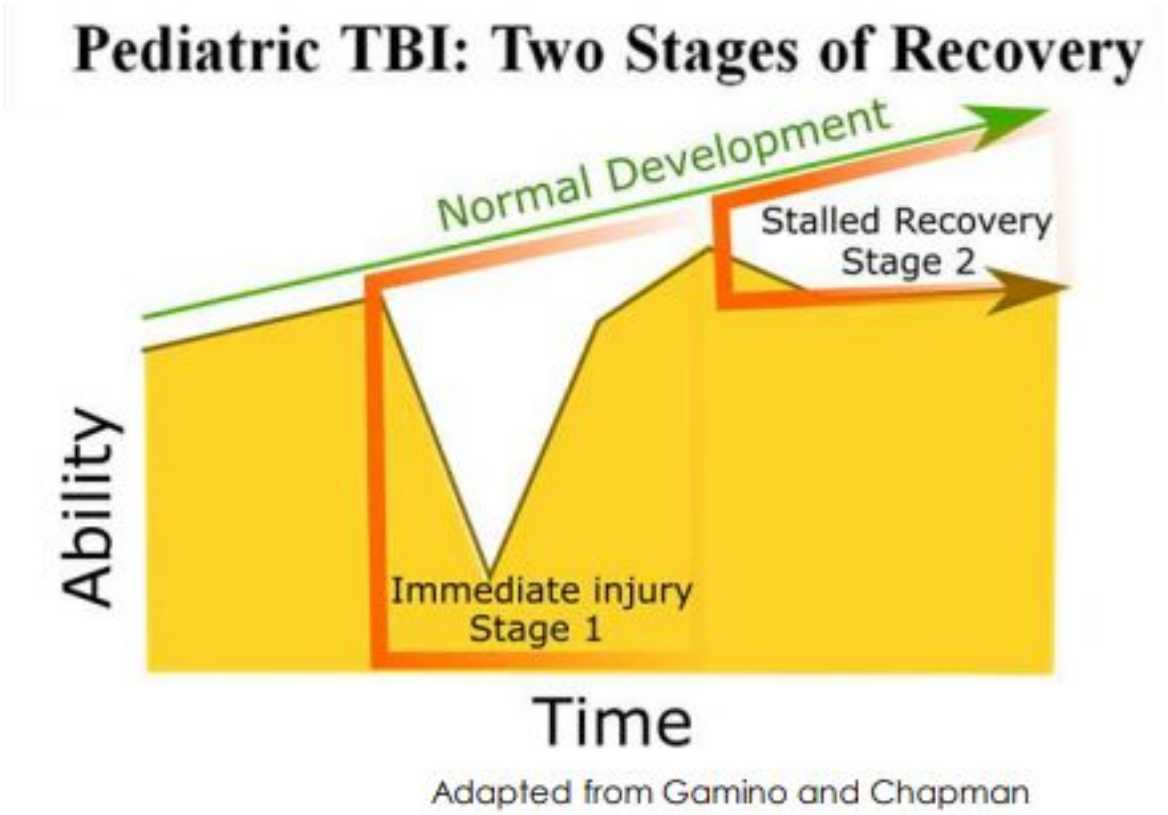


Pediatric Considerations



(Sohlberg & Turkstra, 2011; Ciccia, 2018)

Pediatric Considerations (Ciccia, 2018)



Pediatric mTBI (Lumba-Brown et al, 2018)

70-80% of children with mTBI do not show significant difficulties that last more than 1-3 months after injury

More likely to have difficulties:

- History of mTBI
- Learning difficulties/lower cognitive abilities
- Neurological or psychiatric disorder
- Family/social stressors

Symptom scales and cognitive testing (including measures of reaction time) have the strongest evidence in terms of their contribution to predicting outcomes and assessing recovery

Pediatric mTBI (Dupont et al, 2021)

TABLE 1 *REACTIONS domains, symptoms, and number of items (manifestations)*

Domain	Symptom	Example of item (manifestation)	Initial number of items	Number of poorly endorsed items[a]	
				0-2 y version	3-8 y version
Cognitive	Attention/concentration	Gets up in the middle of an activity	7	1	0
	Memory	Cannot remember what he or she did earlier in the day	5	5	2
	Thinking/moving slowly	Responds (verbally or nonverbally) more slowly to question or demands	6	4	2
Physical	Headache	Holds head	7	1	3
	Nausea	Eats or breastfeeds less than usual/has no appetite	6	4	2
	Balance	Falls more frequently	7	2	3
	Fatigue/energy	Yawns often	6	0	0
	Sleep	Takes more frequent/longer naps	6	1	3
	Vision	Bumps into things	8	5	6
	Light sensitivity	Turns head away from lights	4	4	3
	Noise sensitivity	Covers ears	5	1	1
	Tactile sensitivity	Does not tolerate foods with certain textures	2	1	1
Behavioral	Irritability	Has tantrums	9	0	1
	Mood and motivation	Cries more	7	3	4
	Anxiety	Is afraid to be left alone	8	3	2
	Regression	Wets the bed or has accidents	6	6	6
	Comfort	Only calms in arms or baby carrier	7	1	4

[a]Based on criterion of <15% endorsement by parents.

Pediatric mTBI

First several days – physical and cognitive rest

After first several days – gradually resume schedule of activities that do not exacerbate symptoms

Return to full activity if symptom free at rest and with increasing levels of physical exertion

Pediatric mTBI (Haarbauer-Krupa et al, 2019)

3 year longitudinal study of children with mild TBI prior to 6 years

Children with TBI performed WFL on most cognitive, language and reading measures

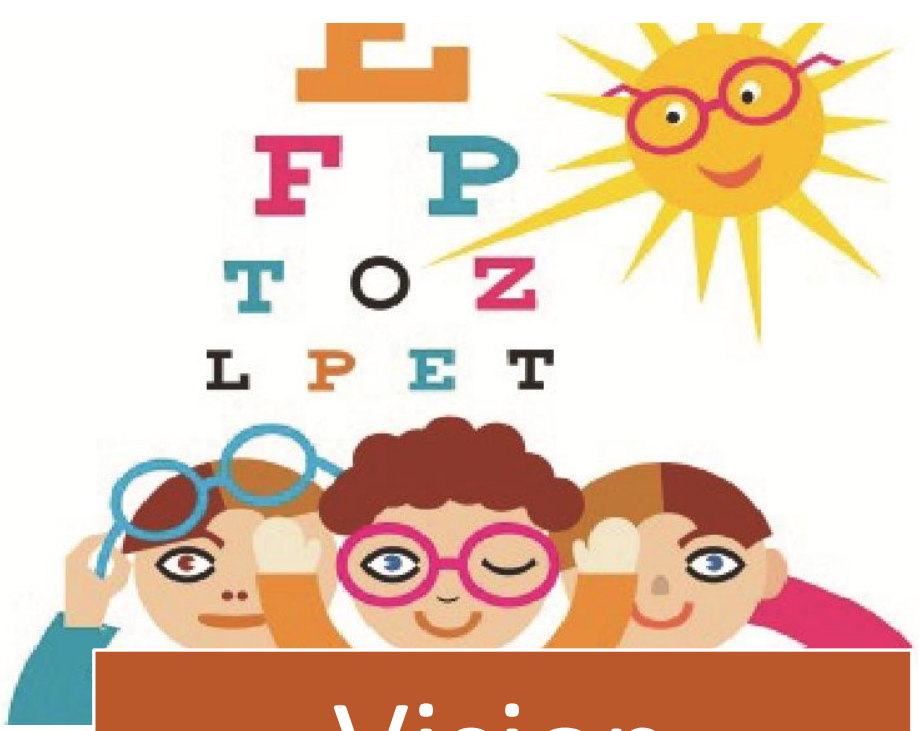
Robust performance differences from control group:

- Pragmatic language
- Story retell and word fluency
- Parent report of executive functions

Implications:

- In depth follow-up is important
- Neuropsych involvement
- General evaluation may miss more nuanced difficulties

Pediatric mTBI (Haarbauer-Krupa et al, 2019)



Vision

Hearing

Pediatric TBI Prevention (Haarbauer-Krupa et al, 2019)

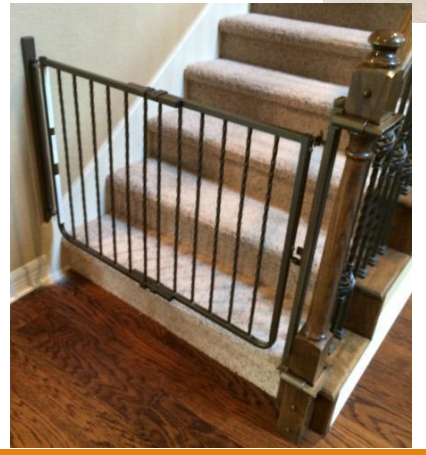
-Falls leading cause of TBI in 0-5 year olds

-Adult actions contribute to majority of falls in children <2 years

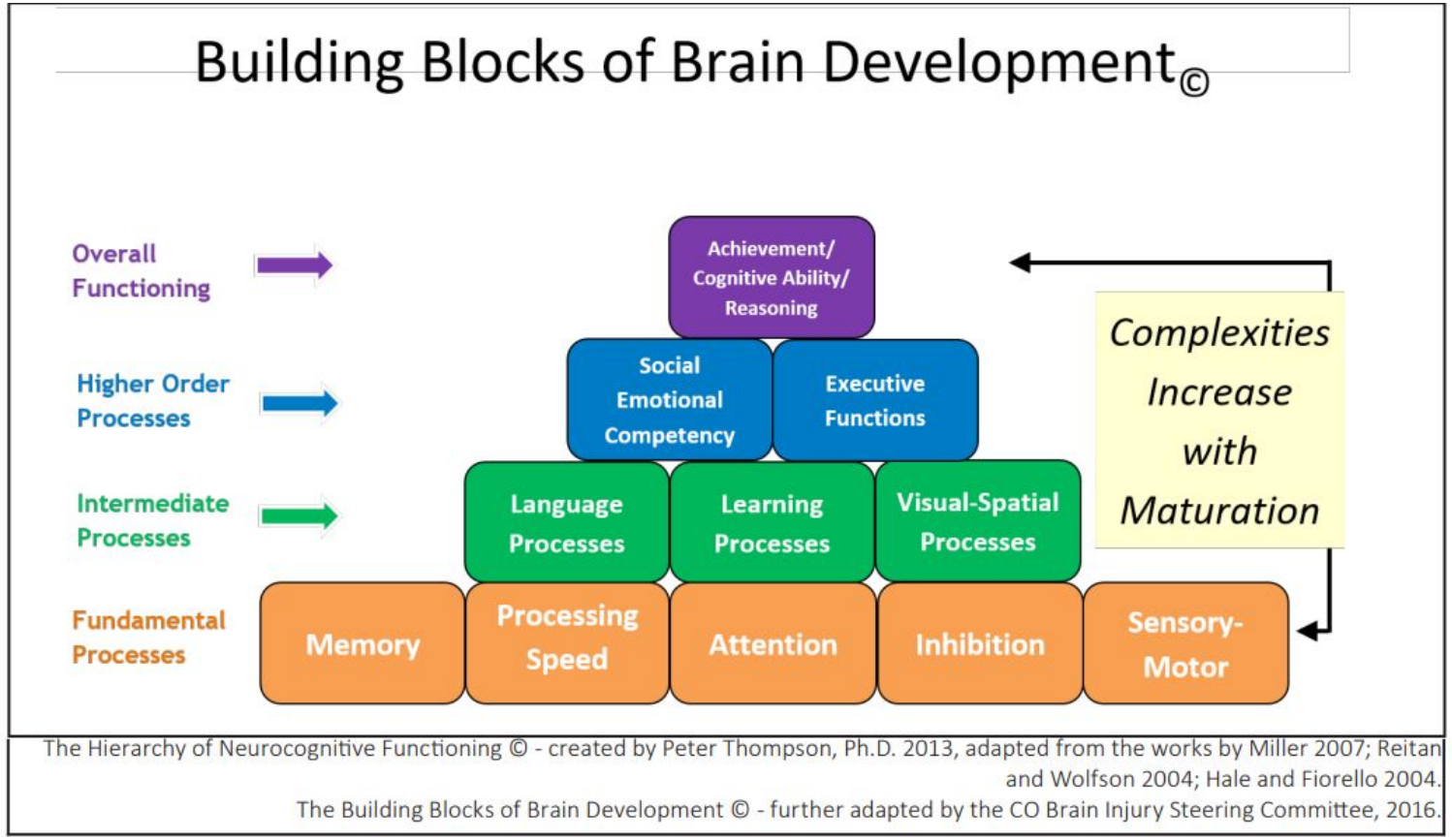
-Child actions contribute to the majority of falls >3 years

https://tinyurl.com/5n6r2p3t

https://tinyurl.com/3dz7aahx



Brain Injury and Development (Thompson & Crawford, 2016)



Brain Injury in Infancy: 0-3 years (Thompson & Crawford, 2016)

Developmental Characteristics: Birth to 3 years:

- Language acquisition
- Refinements in sensory and motor systems
- Regulation of sleep-wake patterns
- Begin to understand cause-effect relationships
- Emotionally egocentric
- Symbiotic relationships with caregivers

Behavioral Characteristics After Brain Injury: Birth to 3 Years

- Quick shifts from one emotion or state to another
- Impulsivity
- Use of primitive behaviors (biting, hitting, etc.)
- Lack of self-awareness
- Inability to self-regulate behaviors
- Lack of responsiveness to others

Brain Injury in Preschool: 3-6 years (Thompson & Crawford, 2016)

Developmental Characteristics: 3 to 6 Years

- Very basic understanding of cause and effect relationships
- Developing ability to think before acting
- Focuses on one aspect of the situation at a time
- Emotional focus is on control and mastery
- Concrete and rigid thinking

Developmental Disruptions Following Brain Injury: 3 to 6 Years

- Disruption in the connections among thinking-emotion-behavior systems
- Emotional and behavioral extremism
- "Executive function" difficulties
- Poor organization of behavior
- Immediate expression of feelings
- Temper tantrums and rigid behavior
- Poor acquisition of preschool concepts: same/different; quantity (some/all); size (big/little); shapes; time concepts (yesterday/next week)
- Dependence on structure and organization provided by adults

Brain Injury in Elementary School: 6-12 years (Thompson & Crawford, 2016)

Developmental Characteristics: 6 to 12 years

- Robust understanding of cause-and-effect relationships
- Ready to learn academic skills
- Focus on effort as important
- Recognize intention of acts as important

Developmental Disruptions Following Brain Injury: 6 to 12 Years

- Disruption in reading, spelling, math skills
- Poor performance despite hard work
- School failure/avoidance
- Behavior problems during unstructured times
- Depression, social isolation or withdrawal from peers
- Sleep disturbance
- Fatigue

Brain Injury in Early Adolescence: 12-16 years (Thompson & Crawford, 2016)

Developmental Characteristics: 12 to 16 Years

- Considers three or more dimensions simultaneously
- Abstract reasoning
- Extremism
- Increasing autonomy
- Beginning identity development
- Social stereotyping
- Responsibility: able to care for self, babysit, perform jobs for pay

Developmental Disruptions following Brain Injury: 12 to 16 Years

- Unevenness in cognitive profile
- New learning deficits
- Slower rate of mental processing
- Difficulty organizing complex tasks over time
- Judgment and reasoning difficulties
- Increased "frustration" response
- Depression
- Fatigue

Brain Injury in Late Adolescence: 16-19 years (Thompson & Crawford, 2016)

Developmental Characteristics: 16 to 19 Years

- Complex reasoning and judgment
- Ability to plan and execute complex projects over time
- Solid sense of own identity based on positive identifications
- Social sophistication
- Capacity for altruism

Developmental Disruptions Following Brain Injury: 16 to 19 Years

- New learning deficits (e.g., memory for numbers)
- Mental processing speed deficits
- Inability to organize complex tasks
- Conflict between specific challenges and career goals
- Interference in developmental drive toward independence/separation
- Social awkwardness
- Fatigue
- Defensiveness regarding emotional/cognitive problems
- Depression
- Body image/social image

Pediatric Resources:

Handouts/Education:

Family Guide to the Rancho Levels of Cognitive Functioning:

https://file.lacounty.gov/SDSInter/dhs/218115_RLOCFOriginalFamilyGuide-English.pdf

Brain Injury in Children and Youth: Manual for Educators (CO Department of Education):

https://www.cde.state.co.us/cdesped/tbi_manual_braininjury

Continuing Education:

International Brain Injury Association Pre-recorded Webinars:

https://www.internationalbrain.org/meetings-and-events/ibia-webinar-series

Clinical Resources:

International Pediatric Brain Injury Society Toolbox:

https://www.ipbis.org/tools-for-the-rehabilitation-of-children-with-abi/

NIH Toolbox:

https://www.nihtoolbox.org/get-the-toolbox/

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Case Studies

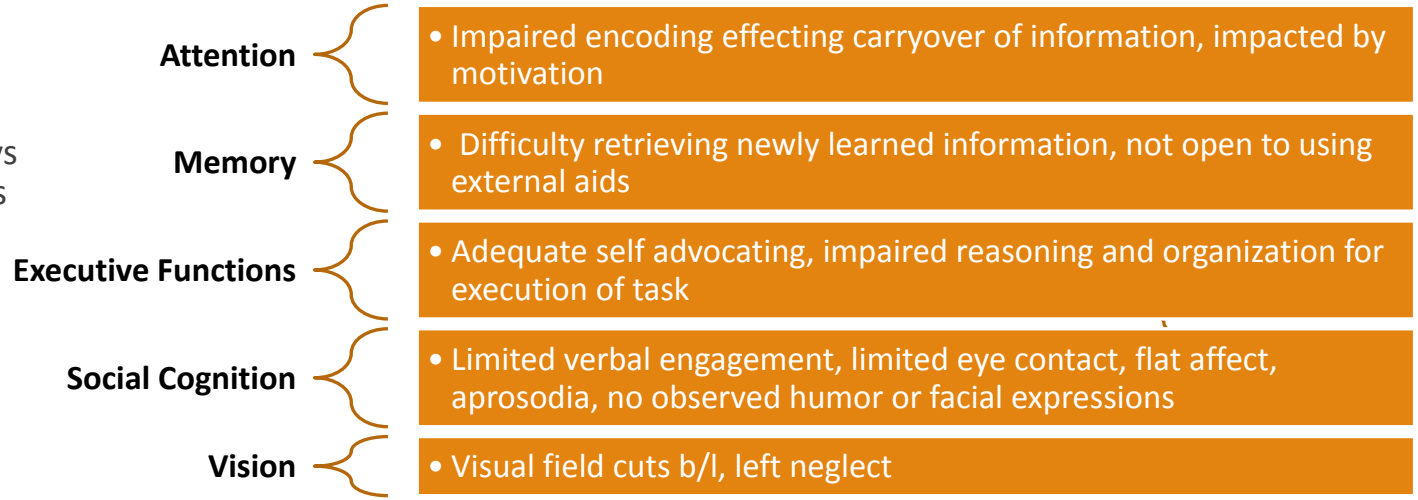
Case Study #1

Dwayne is a 17-year-old male who presents with moderate cognitive-communication deficits following a TBI

Medical history: TBI resulting from GSW. R side entry, bullet lodge in L temporal lobe, impacted R frontoparietal lobe, SAH, 5mm MLS, and bullet fragments. Bilateral Hemicraniectomy

Developmental history: Diagnosis of ADHD with 504 plan

Social history: Lives with parents and 3 siblings. Enjoys basketball, action or comedy movies, and videogames



Symptoms

SKILLS OBSERVED

- Flat affect
- Minimal reciprocity
- Decreased motivation
- Minimal engagement
- Avoidance Behaviors
- Disorganization in though and execution
- L inattention/neglect
- Grossly intact awareness… NO online monitoring or self correction
- Reasoning impairment

AFFECT

- Social engagement
- Interpersonal Relationships
- Motivation for school
- Further absences at school
- Problem solving
- Decision Making
- Efficiency and accuracy of executive function tasks

ADHD Diagnosis
504 Plan

Section 504 Student Service Plan

Seat student near the teacher Reduce classroom distractions Seat student out of main traffic areas - In space where Donovan has opportunity to take movement break Allow student additional breaks or rest time (water breaks, movement breaks)

Instructional Materials
Highlight main ideas Other - Visual cues and guides

Instructional Methods
Organizers Study guides Simplify directions Break long assignments into multiple short assignments Student to repeat and explain directions to ensure understanding Cues/reminders to slow down when rushing on assignments

Assignments/Homework
Extended time to complete homework Extended time to complete assignments

District Testing
Extended time on tests - 50% Small group testing in an alternate location

Classroom Testing
Extended time on tests - 50% Small group testing in an alternate location

Behavior
Reinforce desired behavior Clear and simple classroom rules Cue student to stay on task Behavior Contracting Allow student to meet with the social worker/counselor

SAT
SAT - Extended Time - 50% SAT - Modified Setting - Small group

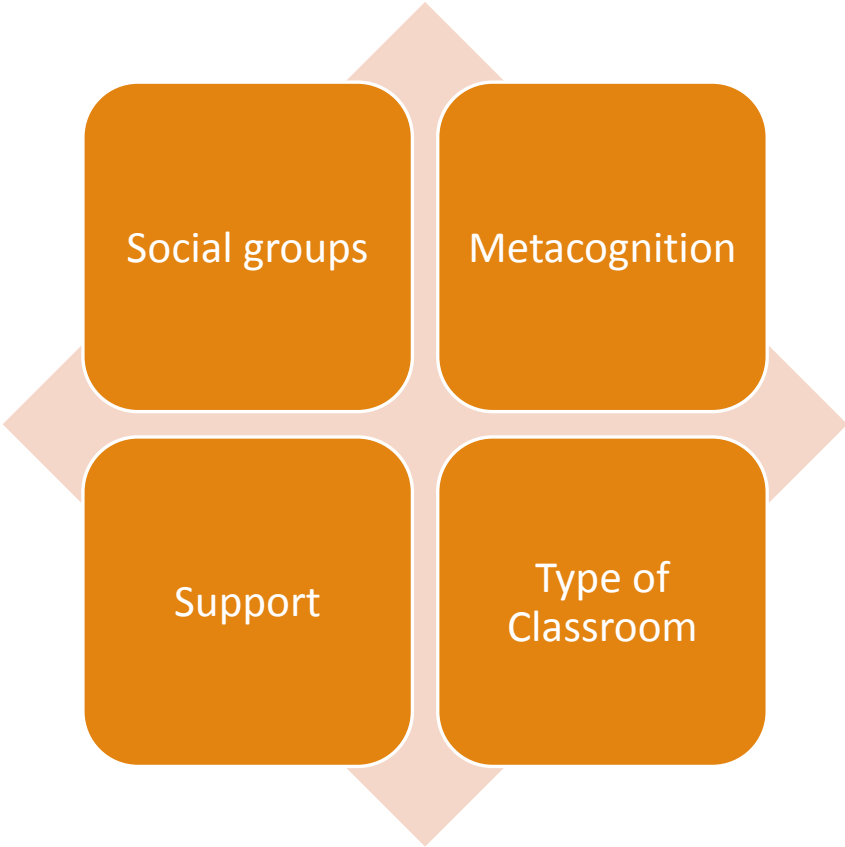
State Testing
Extended time on tests - 50% Small group testing in an alternate location

Classroom Accommodations	ELA	Math	Science	Social Sciences	World Lang	Vocational	Arts	Music	Phys Ed.	Health Ed.	Library	Computer	Other 1
Explain directions and give concrete examples.	☑	☑	☑	☑	☐	☐	☑	☐	☑	☐	☐	☑	☐	☐
Extend time on task for completion of homework assignments by _____ percent.	25	25	25	25			25		25			25		
Give verbal directions in clearly stated steps.	☑	☑	☑	☑	☐	☐	☑	☐	☑	☐	☐	☑	☐	☐
Peer Buddy	☑	☑	☑	☑	☐	☐	☑	☐	☑	☐	☐	☑	☐	☐
Provide extra examples when teaching new vocabulary/concepts.	☑	☑	☑	☑	☐	☐	☑	☐	☑	☐	☐	☑	☐	☐
Provide motivation and verbal rewards on a daily basis.	☑	☑	☑	☑	☐	☐	☑	☐	☑	☐	☐	☑	☐	☐
Provide preferential seating near: Description: the teacher	☑	☑	☑	☑	☐	☐	☑	☐	☑	☐	☐	☑	☐	☐
Provide visual cues and guides.	☑	☑	☑	☑	☐	☐	☑	☐	☑	☐	☐	☑	☐	☐
Walk by student's desk to check for accuracy every _____ minutes.	10	10	10	10			10		10			10		
Walk by student's desk to check for behavior every _____ minutes.	10	10	10	10			10		10			10		
Other: Description: assist student with long term assignments by breaking longer assignments down into smaller chunks	☑	☑	☑	☑	☐	☐	☑	☐	☑	☐	☐	☑	☐	☐
Other: Description: assist student with organizing his items	☑	☑	☐	☑	☐	☐	☑	☐	☐	☐	☐	☑	☐	☐
Other: Description: assist student with managing his homework assignments through a check in and using a preferred organizaiton method	☑	☑	☑	☑	☐	☐	☑	☐	☑	☐	☐	☑	☐	☐
Other: Description: Check in check out system for Donovan on a daily basis	☑	☑	☑	☑	☐	☐	☑	☐	☑	☐	☐	☑	☐	☐

Reintegration and Interventions

Considerations	504 vs IEP?
	What measures might you complete as his school SLP?
	What supports may you consider adding to/changing in his plan?
	Given impairments across all cognitive domains, what areas are most important to target?

Talking points



Case Study #2

Video

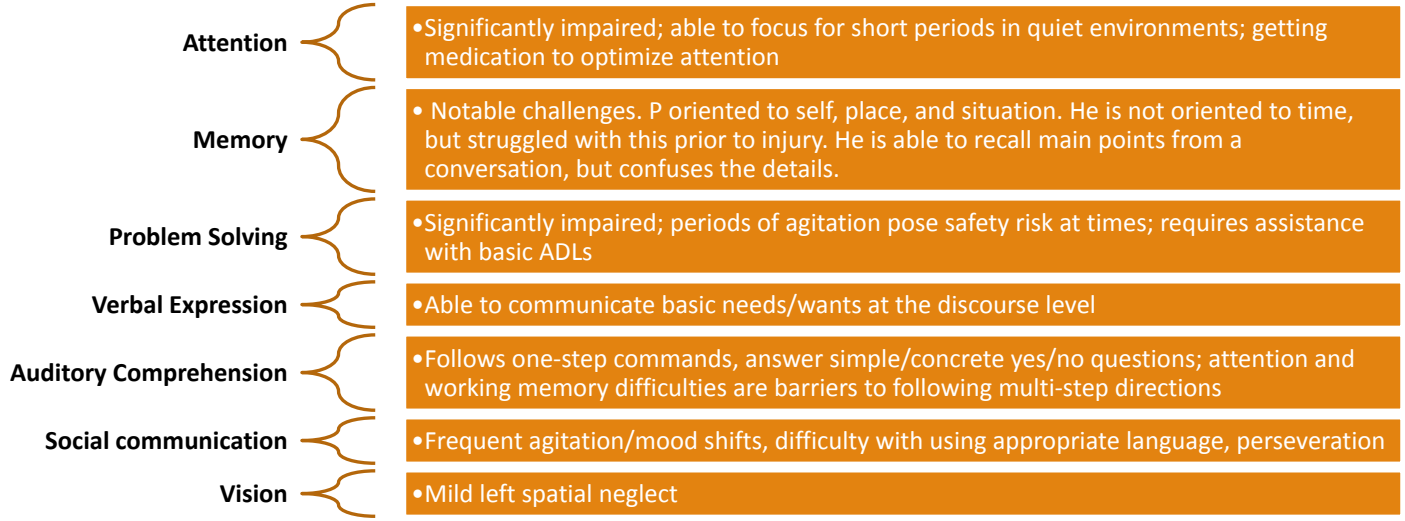
Case Study #2

"Jack" is a 9-year-old male who presents with moderately-severe cognitive-communication deficits in the setting of TBI.

Medical history: previous subdural hematoma (jumping from golf cart). No residual deficits after post concussive symptoms resolved. One year later, P sustained TBI secondary to biking accident (pedestrian vs car). He was propelled off his bike and his helmet broke. GCS of 6. In order to relieve intracranial pressure from R subdural hematoma and intracranial hemorrhage, P required a craniectomy. He is now status post VP shunt placement and R cranioplasty.

Developmental history: history of speech delay, though no previous IEP

Social history: Lives in a house with his mom, step-dad, and 5-year-old sister. He is in 3rd grade. Likes riding his bike and video games particularly Minecraft and Fortnite.



Case Study #2

KTEA-3

Subtest	Standard Score	Descriptive Category	Percentile Rank	Grade Equivalent
Letter & Word Recognition	61	Low	0.5	K.5
Math Concepts & Application	61	Low	0.5	K.1

Letter & Word

- Inadequate cite word bank
- Difficulty decoding CVC words
- Inconsistency

Math Concepts

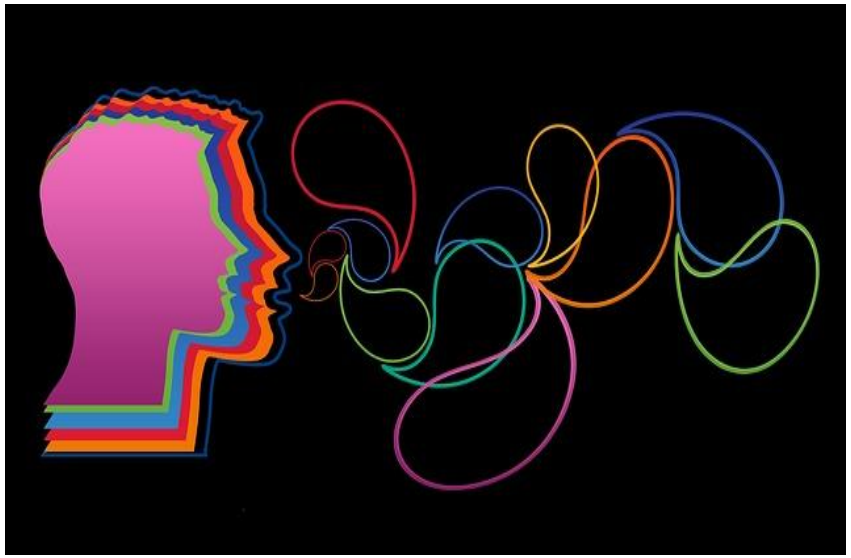
- Difficulty identifying the correct operation
- Weakness areas: number concepts, counting, addition, and subtraction
- Some understanding of graphs/tables, simple geometric shapes, and simple measurement

Case Study #2

Considerations	What formal and informal measures might you complete as his school SLP?
	Given impairments across all cognitive domains, what areas are most important to target?
	How might you incorporate some of the evidenced-based intervention practices from today's presentation?
	How might you collaborate with other members of the team?

Case Study #2 – Discussion

Video



Take Aways

1. Ensure supports and resources are in place for family and school
2. Consistent checks on performance at home and school
3. Making sure to consider all aspects of development and environment to identify problem areas

Additional Resources

TBI model systems: https://msktc.org/about-model-systems/TBI

Brain Injury Association of Illinois: https://www.biail.com/

Brain Injury Association of America: https://www.biausa.org/find-bia/illinois

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