

# Use of Cognitive Rehabilitation to Support School Success for Persistent Effects Post Concussion

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## Disclosures

- No Financial Conflicts to Report
- Salaried Professor at University of Oregon in the Communication Disorders & Sciences Program

*I study for twice as long as I used to, but I'm doing much worse.*

***I'm disorganized and can't manage my assignments***

**My headaches are so bad, I can't read.**      **I'm too dizzy and the lights bother me so I just quit going to school.**

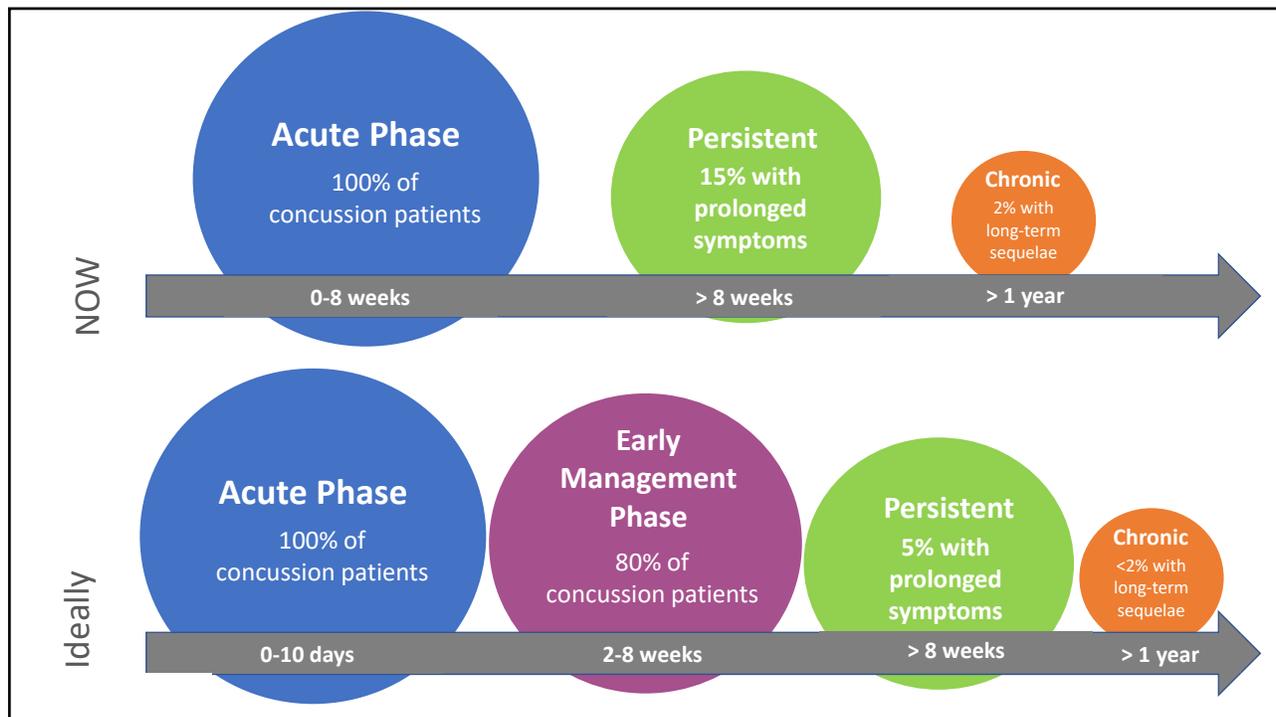
**I'm so distracted. I can pay attention for five minutes and then my mind wanders.**

**I go to class but nothing sinks in.**

***I study hard and feel like I know the material. Then I go into the test and can't come up with the answers.***

**mTBI/Concussion:  
A National Health Concern**

<ul style="list-style-type: none"><li>-Typical symptom resolution is 7-10 days</li><li>-Youth at highest risk for persistent problems and represent highest incidence group</li></ul>	<ul style="list-style-type: none"><li>-Approx 15% experience physical, academic &amp; social challenges after 3 weeks</li><li>-2% remain symptomatic after a year</li></ul>
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## Today's Talk

### **Purpose is to discuss ways we can reduce:**

- *overall cognitive symptom burden in our students*
- *duration of symptoms in our students*
- *the overall number of students who end up in persistent or chronic concussion states, which impact education, and at times, result in long-term disability.*

Our lens will be on persistent symptoms and the use of cognitive rehabilitation

### **Primary Topics:**

- *Brief review of mechanism and symptoms of concussion*
- *Early supports*
- *Model and approaches for intervening on cognitive symptoms in a clinical setting*

**Future Ideal:**

Symptoms persisting beyond 10 days managed by a multidisciplinary team with academic, medical, cognitive, emotional and vestibular supports

(International Consensus Panels 2012; 2017; David et al., 2017)

**Current Landscape:**

- Progressive-step guidelines for return to play and learn
- Poorly specified recommendations across providers
- No standardized protocols for treating complicated, interacting somatic, cognitive and affective symptoms

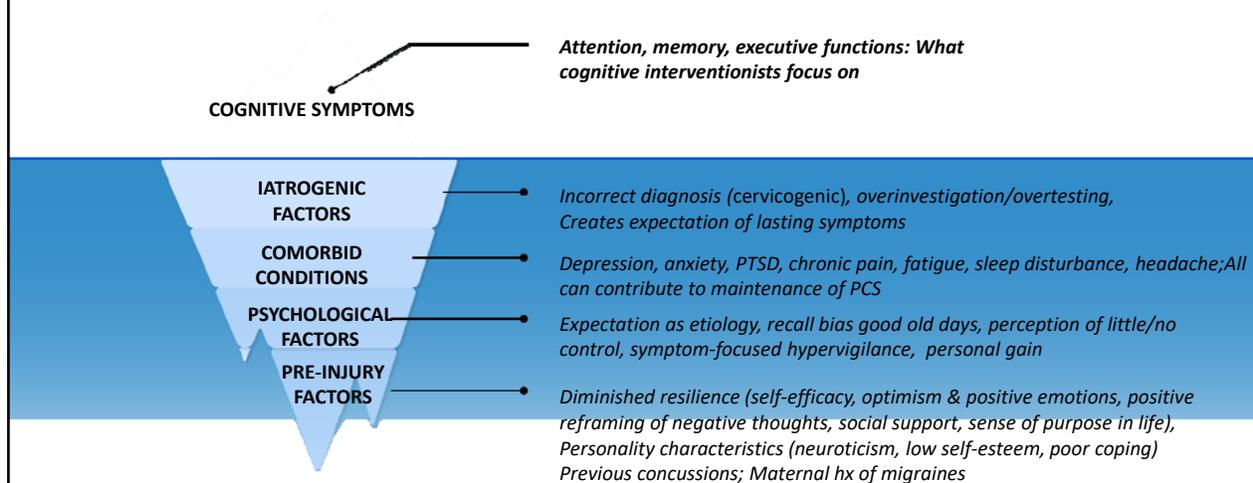
## Prerequisites What We Need to be Effective

- Understand mediators of persistent concussion symptoms
- Have established methods for cross-sector communication
  - Identification and response to symptoms occurs in multiple contexts, with varied providers
- Have options for managing cognitive impairments that are based on the best current evidence

## Concussion knowledge snapshot

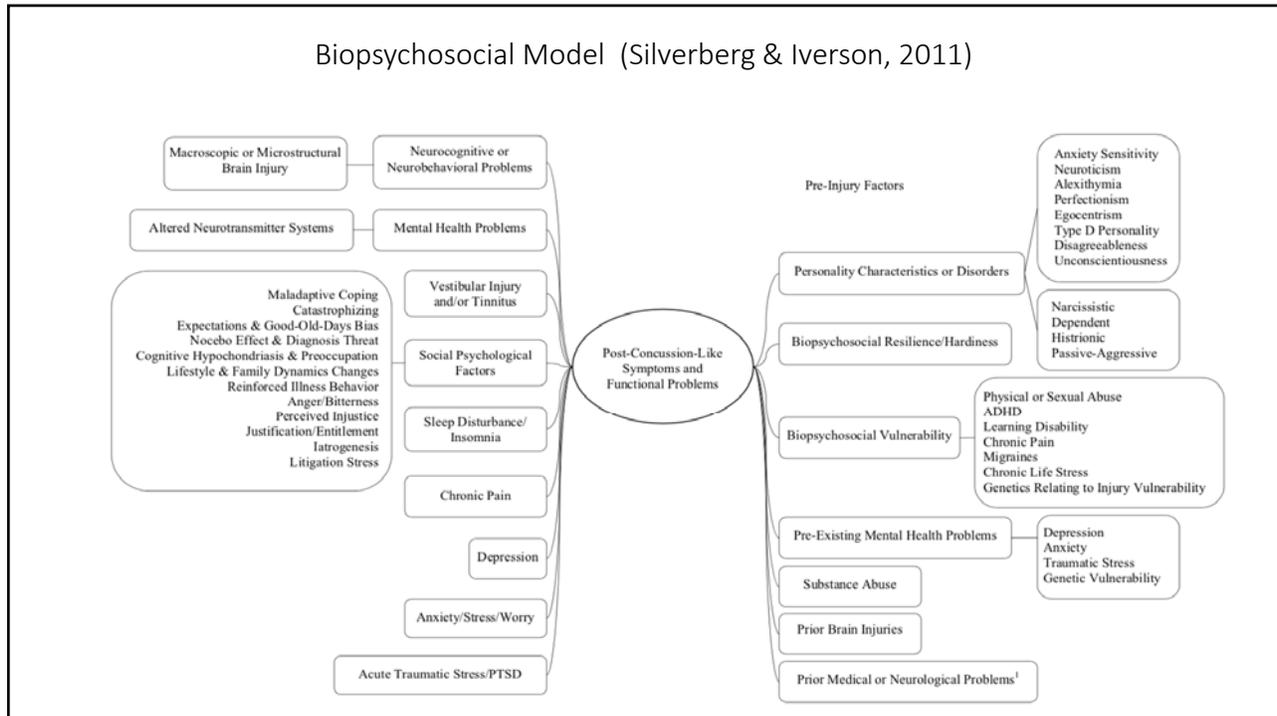
- **Cascade of events:** (1) biomechanical force, (2) ionic flux, (3) excitatory glutamate release, (4) mitochondrial dysfunctions and ensuing alterations in cellular energy and metabolism, (5) axonal injury and dysfunction & (6) alterations in CBF
- Typical resolution of symptoms caused by this cascade is **0-10 days**
- **Gradual resolution of symptom clusters** (physical/somatic; cognitive; emotional/behavioral).
- Assessment is moving from LOC, PTA to **grading by type, number, intensity and duration of symptoms**.
- Recommendations for management of acute symptoms has shifted from complete rest **toward reactivation**

There are many mediators of cognitive symptoms responsible for persistent effects



**Our interventions must address the key issues beneath the surface**

### Biopsychosocial Model (Silverberg & Iverson, 2011)



#### POSSIBLE MEDIATORS ACCOUNTING FOR PERSISTENT COGNITIVE EFFECTS

Check any that should be considered and provide supplementary recommendatio request for further assessment

##### I. COMORBID CONDITIONS

- 1) PTSD \_\_\_\_\_
- 2) Depression \_\_\_\_\_
- 3) Anxiety \_\_\_\_\_
- 4) Chronic Pain \_\_\_\_\_
- 5) Sleep disturbance/Fatigue \_\_\_\_\_

\_\_\_\_\_

##### II. IATROGENIC FACTORS

- 6) Overtreatment/overtesting during recovery \_\_\_\_\_
- 7) Diagnosis may be incorrect \_\_\_\_\_
- 8) Overemphasis on rest from school related activities \_\_\_\_\_

\_\_\_\_\_

##### III. PSYCHOLOGICAL FACTORS

- 9) Recall bias-good old days \_\_\_\_\_
- 10) Symptom focused hypervigilance \_\_\_\_\_
- 11) Nocebo effect/Expectation bias \_\_\_\_\_
- 12) Perception of little/no control \_\_\_\_\_
- 13) Personal gain \_\_\_\_\_

\_\_\_\_\_

##### IV. PRE-INJURY FACTORS

- 14) Family hx migraine \_\_\_\_\_
- 15) Vulnerable personality \_\_\_\_\_
- 16) Previous concussion(s) \_\_\_\_\_
- 17) Previous Learning Disability \_\_\_\_\_

\_\_\_\_\_

We use this information to help guide us when clients may need more risk reduction to prevent development of persistent or chronic effects.

## Multiple causes of academic challenges

- Cognitive Deficits
- Somatic Symptoms
- Psychosocial Challenges

## Early Supports-Prevention of PCS is the Goal

- Who is on the team?
  - medical provider, teacher, slp, pt, psych—will depend upon symptoms
  - Guidelines emphasize importance of communication
- Progressive return to learn protocol
- Psychoeducation
- Academic Accommodations
  - Built in rests or breaks
  - Alternative test setting
  - Extended time for assignments or tests
  - Peer notetaker
  - Adapted schedule

<b>Step 1. Total rest.</b>	<ul style="list-style-type: none"> <li>No mental exertion (computer, texting, video games, or homework), stay at home, no driving.</li> </ul>
<b>Step 2. Light mental activity.</b>	<ul style="list-style-type: none"> <li>Up to 30 minutes of mental exertion, but no prolonged concentration, stay at home, no driving.</li> <li>Progress to next level when able to handle up to 30 minutes of mental exertion without worsening of symptoms.</li> </ul>
<b>Step 3. Part-time School.</b>	<ul style="list-style-type: none"> <li>Maximum accommodations (shortened day/schedule, built-in breaks, provide quiet place for mental rest, no significant classroom or standardized testing, modify rather than postpone academics, provide extra time, extra help, and modified assignments).</li> <li>Progress to next level when able to handle 30–40 minutes of mental exertion without worsening of symptoms.</li> </ul>
<b>Step 4. Part-time School.</b>	<ul style="list-style-type: none"> <li>Moderate accommodations (no standardized testing, modified classroom testing, moderate decrease of extra time, help, and modification of assignments).</li> <li>Progress to next level when able to handle 60 minutes of mental exertion without worsening of symptoms.</li> </ul>
<b>Step 5. Full-time School.</b>	<ul style="list-style-type: none"> <li>Minimal accommodations (no standardized testing, but routine testing ok; continued decrease of extra time, help, and modification of assignments; may require more supports in academically challenging subjects).</li> <li>Progress to next level when able to handle all class periods in succession without worsening of symptoms AND medical clearance for full return to academics.</li> </ul>
<b>Step 6. Full-time School.</b>	<ul style="list-style-type: none"> <li>Full academics with no accommodations (attends all classes, full homework).</li> </ul>

[https://cbirt.org/sites/cbirt.org/files/resources/return\\_to\\_academics.pdf](https://cbirt.org/sites/cbirt.org/files/resources/return_to_academics.pdf)

### Academic Accommodations Matrix

**Student Name:** \_\_\_\_\_ **Date of Evaluation:** \_\_\_\_\_ **Staff Contact:** \_\_\_\_\_

Following concussion, students who receive academic accommodations with penalty for missed work are more successful and better able to reintegrate into school.

General	Cognitive/Thinking	Fatigue/Physical	Emotional
Adjust class schedule (alternate days, shortened day, abbreviated class, late start to day).	Reduce class assignments and homework to critical tasks only. Exempt non-essential written classwork or homework. Base grades on adjusted work.	Allow time to visit school nurse/counselor for headaches or other symptoms.	Develop plan so student can discreetly leave class as needed for rest.
No PE classes until cleared by a healthcare professional. No physical play at recess.	Provide extended time to complete assignments/tests. Adjust due dates.	Allow strategic rest breaks (e.g., 5-10 minutes every 30-45 minutes) during the day.	Keep student engaged in extra-curricular activities. Allow student to attend but not fully participate in sports practice.
Avoid noisy and over-stimulating environments (i.e., band) if symptoms increase.	Once key learning objective has been presented, reduce repetition to maximize cognitive stamina (e.g., assign 5 of 30 math problems).	Allow hall passing time before or after crowds have cleared.	Encourage student to explore alternative activities of non-physical nature.
Allow student to drop high level or elective classes	Allow student to demonstrate	Allow student to wear sunglasses indoors.	Develop an emotional support plan for the

## Early Psychoeducation is key (It is very useful late in the game too)

### Messaging Matters

- Concussion caused by a temporary, minor disruption of some signals in the brain which can cause very disruptive symptoms.
- Symptoms are predominantly related to physical trauma, stress from injury and concern over recovery
- Reassurance
  - Rapid and full recovery very likely
  - We will support you
- Reactivation
  - Importance of returning to physical and cognitive activity.
    - Newest literature suggests you can push yourself a bit above where you start to be symptomatic and there will not be a worsening.

1

#### Primary Role

- Has extensive knowledge of concussion and its consequences
- Leads advocacy efforts, promotes community awareness, develops the protocol with other professionals, gains district approval, trains and oversees program implementation, works directly with students, collaborates with medical providers, and updates protocol as needed

2

#### Secondary Role

- Has working knowledge of concussion and its consequences
- Advocates for team development, promotes community awareness, works directly with students, and provides feedback to team leaders

3

#### Tertiary Role

- Has limited knowledge of concussion and its consequences
- May advocate for development of a team and provide relevant information to decision-makers

Dachtly, Sarah A., and Pedro Morales. "A collaborative model for return to academics after concussion: athletic training and speech-language pathology." *American journal of speech-language pathology* 26.3 (2017): 716-728.

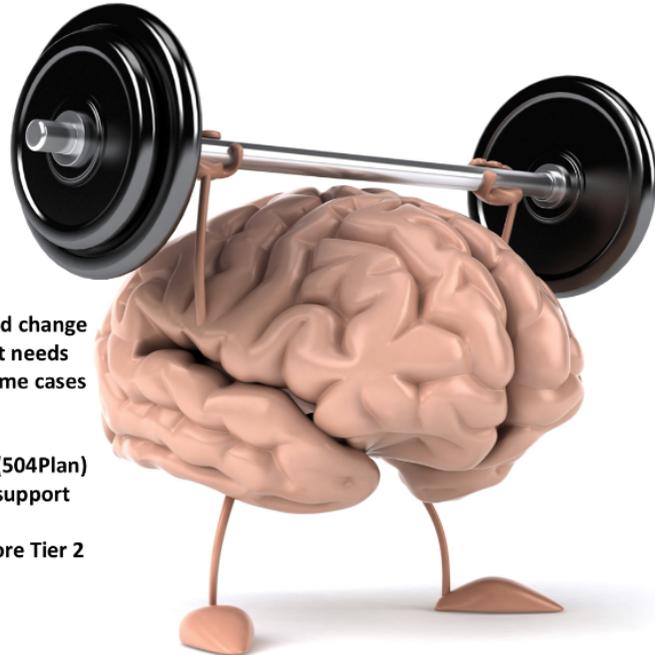
Table 1  
Ascending levels of academic support applied to concussion

Level or Tier	Focus of Level or Tier
Universal Level, Tier 1	<p>At the Universal Level, Tier 1:</p> <ul style="list-style-type: none"> <li>• Students receive informal assistance within the general education setting</li> <li>• Students receive quick and early screening</li> <li>• Students receive <i>academic adjustments</i> promptly and liberally</li> <li>• Students receive academic supports that can be adjusted frequently (hourly, daily, weekly) by the general education teacher</li> <li>• An IHP is a tailor-made plan for students whose healthcare needs affect or have the potential to affect the student's safe and optimal school attendance and academic performance</li> </ul> <p>Universal Level Applied to Concussion:</p> <ul style="list-style-type: none"> <li>• Seventy % of students with a concussion recover within 4 weeks, therefore, the RTL plan needs to be immediate and applied in general education</li> <li>• General education teachers need to be widely trained and empowered to front-load academic supports within the first 4 weeks and fade academic supports as the concussion symptoms subside</li> </ul> <p>An IHP may prove to be an ideal mechanism for use in the RTL (either at a Tier 1 or 2) process for students who have sustained a concussion</p>
Targeted Level, Tier 2	<p>If support at the universal is not adequate, an intermediary level of more intensive support may be implemented at the Targeted Level/Tier 2</p> <ul style="list-style-type: none"> <li>• Students may receive academic supports in a more customized fashion</li> <li>• Students may receive academic supports for a longer period of time</li> <li>• The most common Tier 2 support is the Section 504 Plan. Section 504 of the Rehabilitation Act is a federal civil rights law. A 504 Plan may be considered if a medical condition, substantially limits at least one of the major life activities such as thinking, concentrating, reading, or learning</li> </ul> <p>Academic supports provided in a 504 Plan would be referred to as <i>academic accommodations</i></p> <p>Targeted Level Applied to Concussion:</p> <p>Especially in the case of protracted recovery from concussion (beyond 1 month), a 504 Plan may prove to be an ideal mechanism for use in the RTL process for symptoms that are severe and/or long-lasting resulting in more customized or longer educational need</p>
Intensive Level, Tier 3	<p>If a student is unable to receive reasonable benefit from general education alone and/or requires specialized instruction, placement, programming, Intensive level, Tier 3 supports may be provided on an IEP.</p> <ul style="list-style-type: none"> <li>• Academic supports provided on an IEP may include <i>academic modification</i> of the curriculum</li> </ul> <p>Intensive Level Applied to Concussion:</p> <ul style="list-style-type: none"> <li>• Since concussions are commonly short-term, transient injuries that rarely result in a significant disability,</li> </ul>

McAvoy et al., 2018

## Putting A Return-To Learn (RTL) Plan in Place with the Established Tools of the Education System

- Invest in Tier 1 support and training of all general education and special education staff to support students returning from a concussion
- Tier 1 supports are driven by the classroom teacher and change depending upon what the teacher believes the student needs
- Tier 2 and Tier 3 supports should only be used in extreme cases due to:
  - Cost
  - Necessity of medical diagnosis for Tier 2 support (504Plan)
  - Time required to complete assessment for Tier 3 support (IEP)
  - Likelihood of concussion symptoms resolving before Tier 2 or Tier 3 supports can officially be implemented



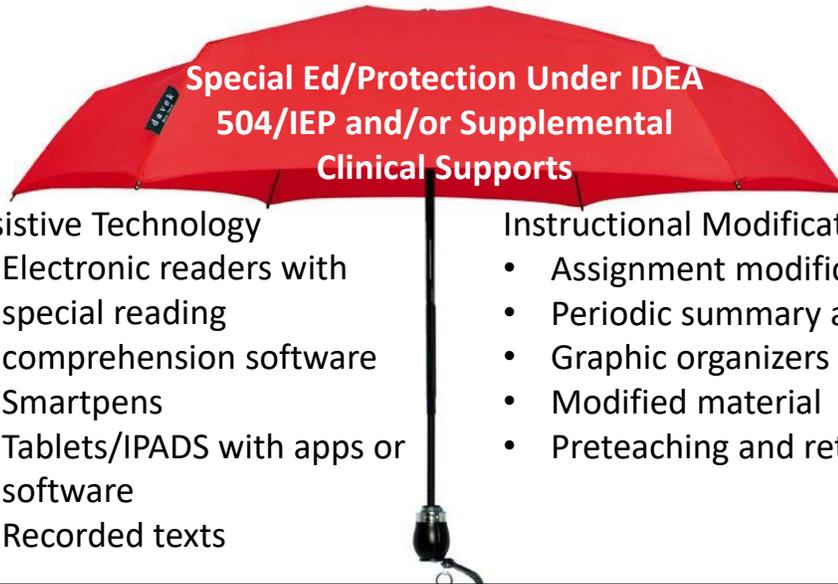
## Considerations

- Not every General Educator can implement the accommodations and early supports due to constraints on time, resources and/or training
  - What are models in your context where SPED, SLP, might be able to provide indirect or coaching supports?
- In Oregon we have the Regional Brain Injury Resource Team
  - Trained team members may serve on evaluation and IEP teams;
  - Provide trainings for district staff on effective strategies
  - Collaborate with student's medical team
  - <https://cbirt.org/>
- If students remain symptomatic, will want to bring in extra supports both in school and outside of school.

## Resources

- <https://cbirt.org/>
- [GetSchooledOnConcussions.com](http://GetSchooledOnConcussions.com)
- [info@hawaiiconcussion.com](mailto:info@hawaiiconcussion.com)
- [Brainline.org](http://Brainline.org)

## Sometimes cognitive and learning symptoms persist



### Assistive Technology

- Electronic readers with special reading comprehension software
- Smartpens
- Tablets/IPADS with apps or software
- Recorded texts

### Instructional Modification

- Assignment modification
- Periodic summary and review
- Graphic organizers
- Modified material
- Preteaching and reteaching

## Provision of Cognitive Rehabilitation

- **Assessment Process**
- **Treatment Options**
- **Treatment Process**

**Remember: Cause of cognitive or learning symptoms may be multifactorial**

## Assessment and Intervention following mTBI

**FOCUSED**

+

**COLLABORATIVE**  
**(aka student centered)**

### BEGIN WITH THREE KEY QUESTIONS

- **WHAT DO YOU WANT TO CHANGE?**
  - What matters to the student?
- **WHAT IS PREVENTING YOU FROM REACHING YOUR GOALS?**
  - What are the primary challenges responsible for school concerns?
- **WHAT IS GOING WELL?**
  - Identify strengths and skills so you can build on them

## Question #1: Range of Functional Goals

Improve Grades (overall GPA, course quiz, assignment performance)

Increase Assignment Management (assignment completion, study skills)

Improve Academic Skills (reading, writing, lecture comprehension, oral presentation)

Boost Course Specific Knowledge (e.g., math, biology)

Feel Socially Connected

## Question #2: Range of Possible Obstacles

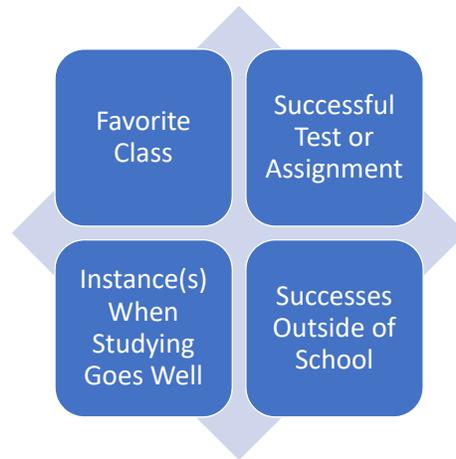
Cognitive Challenges (e.g. wm, EF, attn)

Psychosocial Variables (anxiety, motivation, confidence)

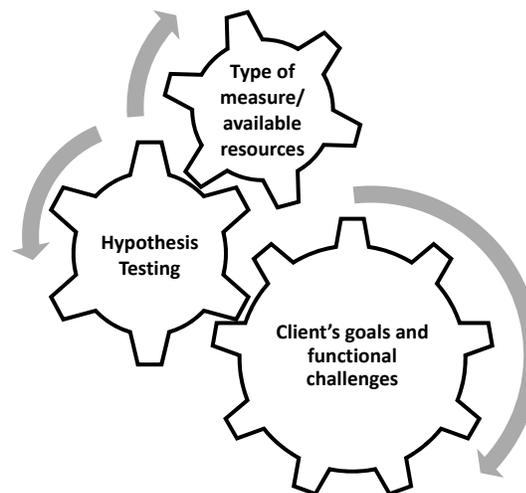
Knowledge Gaps (pre-existing school challenges)

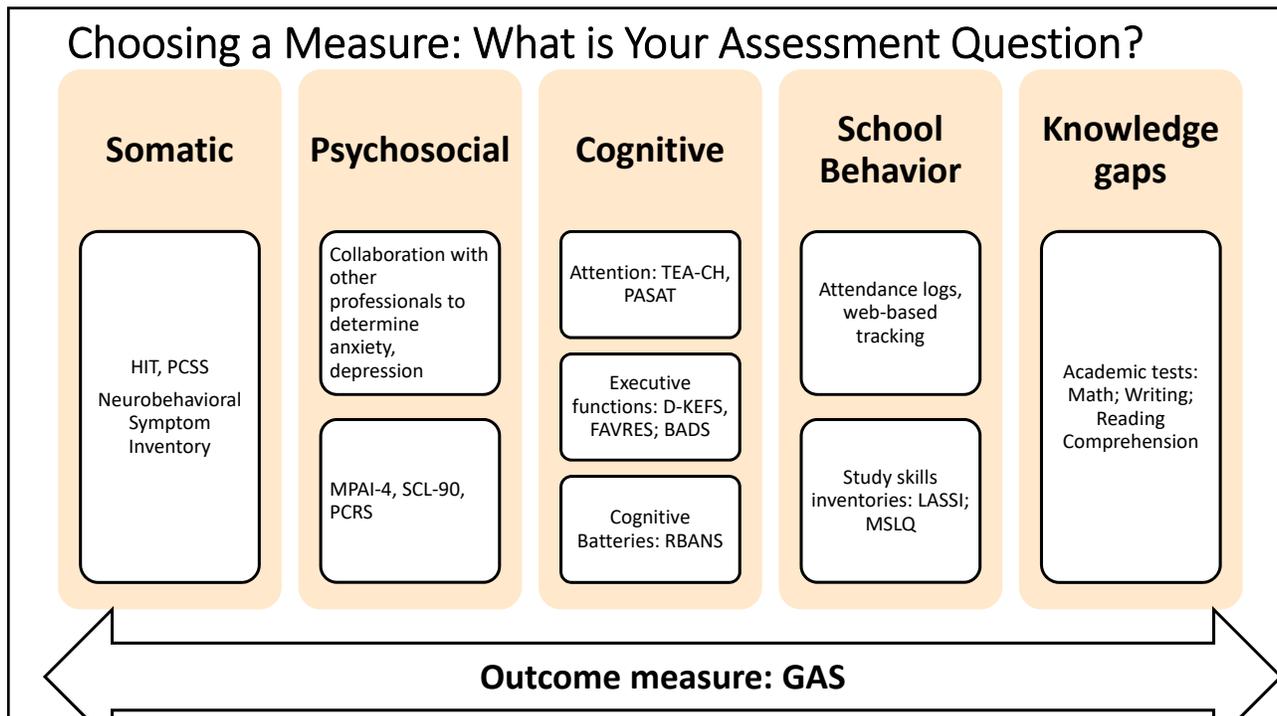
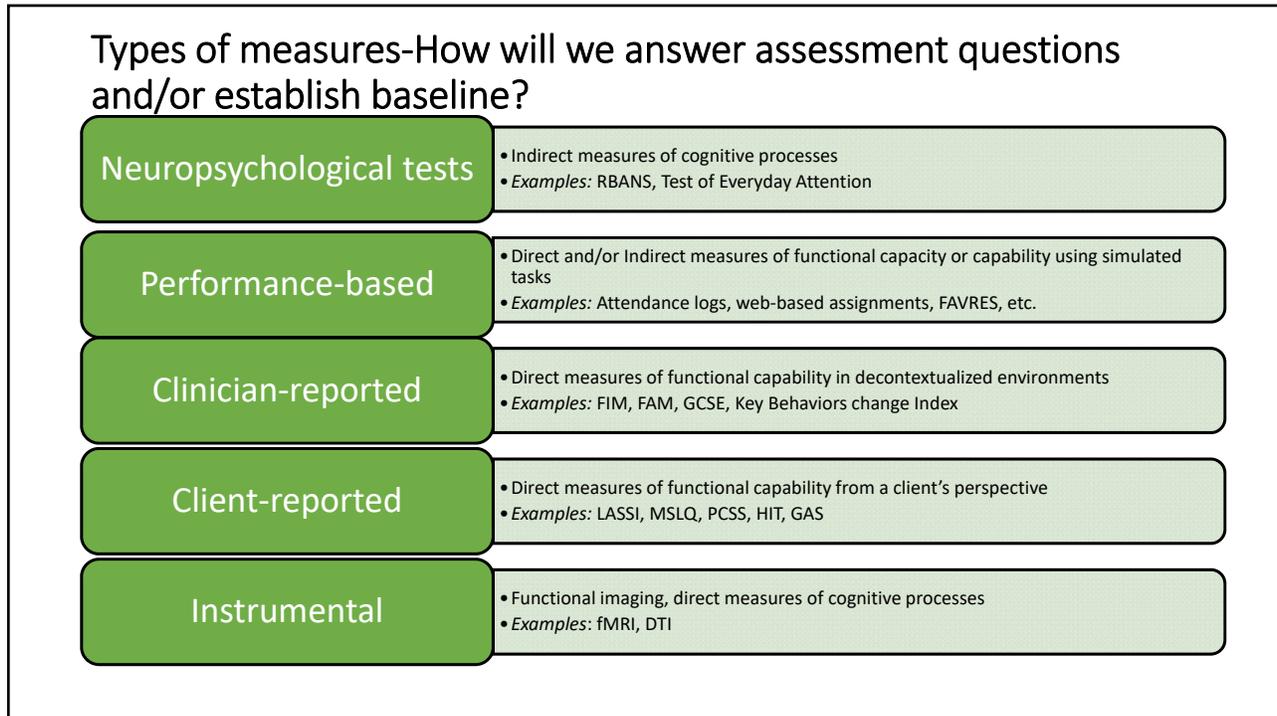
Somatic Variables (headache, fatigue,

### Question #3: Range of Contexts to Identify Skills / Strengths



### Assessment: Key ingredients





## Selecting a Measure: Additional Considerations

- #1: Does it capture what the client subjectively experiences?
  - Ecologically valid?
- #2: Is it evidence-based?
  - Validated psychometric properties
  - assesses areas specific to target population?
- #3: Can it serve as an outcome measure?
  - Indicator of treatment efficacy
  - Measures progress toward goal
- #4: What resources are available to you?
  - Time
  - Financial cost
  - Access to a computer

## FIVE EVIDENCE-BASED INTERVENTION APPROACHES

Training Use of  
ATC

Strategy Training

Environmental  
Management

Direct Attention  
Training

Psychoeducation  
Self Advocacy

## Intervention Principles: Selection

- Focus on Function
  - “Sounds like what is most important is passing biology”
- Collaboratively Select Approach
  - “Do any of these approaches I have described seem like they might be a good match for you?”
- Establish Current Level
  - “Let’s try to nail down where you are now and that’ll give us our starting point.”
- Establish Anticipated Level (goal setting)
  - “If the intervention is helpful, where do you think you might be in six weeks?”
- Devise Measurement Plan
  - Let’s figure out who, what and when, we’ll measure this progress”

## Key Intervention Principles: Implementation

- **Build in Expectation for Recovery**
  - Recruit resilience
  - Build in therapeutic alliance
- **Coordinate with Relevant Others**
  - Multifactorial complexities make a team approach essential
- **Move Toward Self Management**

Working Group to Develop a Clinician’s Guide to Cognitive Rehabilitation in mTBI(2016). *Clinician’s guide to cognitive rehabilitation in mild traumatic brain injury: Application for military service members and veterans*. Rockville, MD: American Speech-Language-Hearing Association.

Available from [http://www.asha.org/uploadedFiles/ASHA/Practice\\_Portal/Clinical\\_Topics/Traumatic\\_Brain\\_Injury\\_in\\_Adults/Clinician\\_s-Guide-to-Cognitive-Rehabilitation-in-Mild-Traumatic-Brain-Injury.pdf](http://www.asha.org/uploadedFiles/ASHA/Practice_Portal/Clinical_Topics/Traumatic_Brain_Injury_in_Adults/Clinician_s-Guide-to-Cognitive-Rehabilitation-in-Mild-Traumatic-Brain-Injury.pdf)

**Goals should be:**  
Achievable – in a reasonable amount of time and be important to you!

**Build a Measurement Plan**

How often?  
per week, day, hour, 15 min block?

How well?  
Accuracy  
Performance

How much time does it take?  
Efficiency

Self-rating, 1-5  
Rate your effort (during the task)  
Rate your confidence (to do the task)

WHO will measure?  
HOW will they measure?

**Priorities**  
We've talked about several things you might be interested in working on with us. Which seem most important?

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

## Promoting Positive Expectations for Recovery

Impairments, Deficits	vs.	<b><i>Challenges</i></b>
Therapy	vs.	<b><i>Strategies</i></b>
Mild TBI	vs.	<b><i>Concussion</i></b>

**Much of the language we use in rehabilitation everyday carries negative connotation that can impact a client's perception of their condition**

## Assistive Technology: The three most used tools

- Electronic readers with special reading comprehension software
- Smartpens
- Tablets/IPADS with apps or software
- Recorded texts

## Study Skills Strategies

- Reading Comprehension/Retention Strategies
- Writing Strategies
- Test Taking Strategies
- Note Taking Strategies
- Lecture Comprehension/Retention Strategies

## Assignment Management (Assistive Technology)

- Task Management Apps
- Homework Management Apps
- Metacognitive Strategies

## Managing Somatic Symptoms

- Sleep hygiene
  - Partnering with psychologists; trouble staying vs trouble falling asleep are two different profiles
- Screen behavior
- Headache Management
  - <http://www.headachereliefguide.com/index.php>
- Symptom Monitoring
  - Monitoring triggers, response, effect
  - Monitoring low symptom periods

## Accommodations/Self Advocacy

- Copy of course slides and notes
- Alternative test setting
- Extended time for assignments or tests
- Peer notetaker

[https://cbirt.org/sites/cbirt.org/files/resources/classroomaccommodations\\_ocamp.pdf](https://cbirt.org/sites/cbirt.org/files/resources/classroomaccommodations_ocamp.pdf)

## DYNAMIC COACHING MODEL

(KENNEDY, 2015; USED WITH PERMISSION)

- 1. IDENTIFY POTENTIAL GOALS**
- 2. SELECT A DOABLE GOAL**
- 3. IDENTIFY POTENTIAL STRATEGIES OR SOLUTIONS**
- 4. CREATE STEPS AND MATERIALS**
- 5. INITIATE STRATEGY STEPS**
- 6. CHECK: STRATEGY USE**
- 7. TRACK PERFORMANCE**
- 8. COMPARE OUTCOME TO GOAL & ADJUST**

## In a Nutshell...

- Pick an approach with associated goal attainment levels
- Train and practice (this is often the step that is not sufficiently supported)
- Monitor and Adjust

16 y/o female; 7 months post mTBI from MVA

Improve my  
biology grade to a  
B by end of term

Reading  
Strategy  
Training

Change  
lighting

Focus  
Booster  
app

The image shows the Focus Booster app interface on three devices: an iPhone, an iPad, and an Apple Watch. Each device displays a circular timer with the time 14:38 and a pause icon. To the right is a settings menu for the app, titled "focus booster". The settings include:

- 25:00 Set session length
- 05:00 Set break length
- OFF Play ticking sound?
- ON End of session / break alarms
- YES Window in front

At the bottom of the settings menu are buttons for "SAVE", "RESET", and a close icon "X".

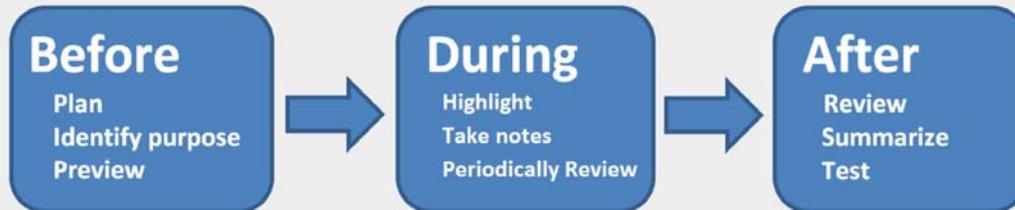
- App allows user to segment time into basic allotments for working and taking breaks;
- Default is 25 min work/5 min break (stretching; resting eyes; water; mindfulness)
- Compatible with Iphone, Ipad, Apple watch

The image consists of three vertical panels illustrating the Forest app's mechanics:

- Panel 1:** "When you want to focus, plant trees!" Shows a smartphone screen with a "Plant" button and a timer set to 1:05:00. A tree icon is shown in a circular frame.
- Panel 2:** "The harder you work, the lushier your forest becomes" Shows a smartphone screen displaying a 3D forest scene. Below the forest is a bar chart showing focus time over a week (Sun to Sat). The total time is 1 day 11 hour 30 mins for the period 2017 Aug 6 - Aug 12.
- Panel 3:** "Your tree will die if you leave the app" Shows a smartphone screen with a dead tree icon and the message "Oops! You can do better next time".

## Before Reading

The key to understanding and remembering what you read is to divide your reading into three phases. This program will teach you what to do during each of these three reading phases.



CampusReader Training Program

## Videoclip: Concussion Recovery Video

- Emphasis on recovery, management of remaining symptoms, advocacy and support for others.

