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

McKay Moore Sohlberg PhD CCC-SLP
Communications Disorders & Sciences
University of Oregon

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

- Typical symptom resolution is 7-10 days
- Youth at highest risk for persistent problems and represent highest incidence group
- Approx 15% experience physical, academic & social challenges after 3 weeks
- 2% remain symptomatic after a year
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

- **Iatrogenic factors**: Incorrect diagnosis (cervicogenic), overinvestigation/overtesting, Creates expectation of lasting symptoms
- **Comorbid conditions**: Depression, anxiety, PTSD, chronic pain, fatigue, sleep disturbance, headache; All can contribute to maintenance of PCS
- **Psychological factors**: Expectation as etiology, recall bias good old days, perception of little/no control, symptom-focused hypervigilance, personal gain
- **Pre-injury factors**: Diminished resilience (self-efficacy, optimism & positive emotions, positive reframing of negative thoughts, social support, sense of purpose in life), Personality characteristics (neuroticism, low self-esteem, poor coping)

**Our interventions must address the key issues beneath the surface**
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
Step 1. Total rest.
- No mental exertion (computer, texting, video games, or homework), stay at home, no driving.

Step 2. Light mental activity.
- Up to 30 minutes of mental exertion, but no prolonged concentration, stay at home, no driving.
- Progress to next level when able to handle up to 30 minutes of mental exertion without worsening of symptoms.

Step 3. Part-time School.
- 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).
- Progress to next level when able to handle 30–40 minutes of mental exertion without worsening of symptoms.

- Moderate accommodations (no standardized testing, modified classroom testing, moderate decrease of extra time, help, and modification of assignments).
- Progress to next level when able to handle 60 minutes of mental exertion without worsening of symptoms.

Step 5. Full-time School.
- 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).
- 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.

Step 6. Full-time School.
- Full academics with no accommodations (attends all classes, full homework).

---

**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 re integrate into school.

<table>
<thead>
<tr>
<th>General</th>
<th>Cognitive/Thinking</th>
<th>Fatigue/Physical</th>
<th>Emotional</th>
</tr>
</thead>
<tbody>
<tr>
<td>Adjust class schedule (alternate days, shortened day, abbreviated class, late start to day).</td>
<td>Reduce class assignments and homework to critical tasks only. Exempt non-essential written classwork or homework. Base grades on adjusted work.</td>
<td>Allow time to visit school nurse/counselor for headaches or other symptoms.</td>
<td>Develop plan so student can discreetly leave class as needed for rest.</td>
</tr>
<tr>
<td>No PE classes until cleared by a healthcare professional. No physical play at recess.</td>
<td>Provide extended time to complete assignments/tests. Adjust due dates.</td>
<td>Allow for extended rest breaks (e.g., 5-10 minutes every 30-45 minutes) during the day.</td>
<td>Keep student engaged in extra-curricular activities. Allow student to attend but not fully participate in sports practice.</td>
</tr>
<tr>
<td>Avoid noisy and over-stimulating environments (i.e., band) if symptoms increase.</td>
<td>Once key learning objective has been presented, reduce repetition to maximize cognitive stamina (e.g., assign 5 of 90 math problems).</td>
<td>Allow half passing time before or after crowds have cleared.</td>
<td>Encourage student to explore alternative activities of non-physical nature.</td>
</tr>
<tr>
<td>Allow student to drop high level or elective classes</td>
<td>Allow student to demonstrate</td>
<td>Allow student to wear sunglasses indoors.</td>
<td>Develop an emotional support plan for the</td>
</tr>
</tbody>
</table>
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.

---

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/](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/](https://cbirt.org/)
- GetSchooledOnConcussions.com
- info@hawaiiconcussion.com
- Brainline.org
Sometimes cognitive and learning symptoms persist

Special Ed/Protection Under IDEA 504/IEP and/or Supplemental Clinical Supports

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

- Favorite Class
- Instance(s) When Studying Goes Well
- Successful Test or Assignment
- Successes Outside of School

Assessment: Key ingredients

- Hypothesis Testing
- Type of measure/available resources
- Client’s goals and functional challenges
Types of measures—How will we answer assessment questions and/or establish baseline?

**Neuropsychological tests**
- Indirect measures of cognitive processes
  - Examples: RBANS, Test of Everyday Attention

**Performance-based**
- Direct and/or Indirect measures of functional capacity or capability using simulated tasks
  - Examples: Attendance logs, web-based assignments, FAVRES, etc.

**Clinician-reported**
- Direct measures of functional capability in decontextualized environments
  - Examples: FIM, FAM, GCSE, Key Behaviors change Index

**Client-reported**
- Direct measures of functional capability from a client’s perspective
  - Examples: LASSI, MSLQ, PCSS, HIT, GAS

**Instrumental**
- Functional imaging, direct measures of cognitive processes
  - Examples: fMRI, DTI

Choosing a Measure: What is Your Assessment Question?

**Somatic**
- HIT, PCSS
- Neurobehavioral Symptom Inventory

**Psychosocial**
- Collaboration with other professionals to determine anxiety, depression
  - MPAI-4, SCL-90, PCRS

**Cognitive**
- Attention: TEA-CH, PASAT
- Executive functions: D-KEFS, FAVRES, BADS
  - Cognitive Batteries: RBANS

**School Behavior**
- Attendance logs, web-based tracking
  - Study skills inventories: LASSI; MSLQ

**Knowledge gaps**
- Academic tests: Math; Writing; Reading Comprehension

Outcome measure: GAS
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**

---


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

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

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?

Promoting Positive Expectations for Recovery

Impairments, Deficits  vs. Challenges

Therapy  vs. Strategies

Mild TBI  vs. Concussion

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
- 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


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
- 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
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.

Before
- Plan
- Identify purpose
- Preview

During
- Highlight
- Take notes
- Periodically Review

After
- Review
- Summarize
- Test

CampusReader Training Program

Videoclip: Concussion Recovery Video

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