Concussion and Brain Injury in College: Considering the Range of Needs for Students

Katy H. O'Brien, PhD CCC-SLP

Disclosures

• Part of this work was supported by the UGA Student Affairs Faculty Grant Program.
• Katy O'Brien is a paid employee of the University of Georgia and as part of that work, conducts the research presented here.
• Katy O'Brien is a board member of the Brain Injury Association of Georgia and the Academy of Neurologic Communication Disorders and Sciences.
• No other relevant financial or non-financial disclosures related to this presentation.
Broad Areas of Interest

- Adults with traumatic brain injuries (TBIs)
- Cognitive Rehabilitation
- Returning to College after TBI

Traumatic Brain Injury (TBI)

- “A TBI is caused by a bump, blow or jolt to the head or a penetrating head injury that disrupts the normal function of the brain.” (CDC, 2015)
- >5 million living with disabilities from TBI in US
  - **2.8 million** new injuries annually
    - most mild
    - U.S. leading cause of disability < 34 years old
- $60 billion
  - medical care and lost productivity
Neuropathology of TBI

Ylvisaker, Szekeres, & Feeney, 2001

Cognitive Processes

Self
Executive Functions
Metacognition

Prefrontal

Frontal

Memory and Learning
Perception
Attention

Posterior

Stuss, 1991; Busch et al., 2005
Coaching College Success
Returning to College after TBI

College Students with TBI

Demographics
- 56% of reporting institutions serve students with TBI
- 91% at large colleges and universities (>10,000 students)
- Most recent data is from 2008-2009 (NCES; Raue & Lewis, 2011)
- 16.4% of undergraduates at BGSU (Krause & Richards, 2014)

Challenges
- Have lower GPAs
- Take longer to graduate
- More expensive education
- Participate in fewer extracurricular activities (NLTS-2; Wagner et al., 2005)
College Survey for Students with Brain Injury
(CSS-Bi; Kennedy & Krause, 2009; Kennedy, Krause, & O’Brien, 2014)

Academic Challenges
1. I have to review material more than I used to.
2. I forget what has been said in class.
3. I don’t always understand instructions for assignments.
4. I get overwhelmed in class.
5. Others do not understand my problems.
6. I have fewer friends than before.
7. I procrastinate on things I need to do.
8. I have trouble paying attention in class or while studying.
9. I am late to class.
10. I have trouble prioritizing assignments & meeting deadlines.
11. I have trouble managing my time.
12. I get overwhelmed when studying.
13. I get nervous before tests.

Return to College Program
(O’Brien, Schellinger, & Kennedy, 2018)

Purpose
To develop self-regulation and self-regulated learning

Premise
To improve self-regulation, you have to explicitly teach the self-regulation process $^{1,2,3}$

Tools
Student-selected goals and self-regulated learning strategies

1Ylvisaker & Feeney (1998); 2Ylvisaker (2006); 3Kennedy & Krause (2013)
The Dynamic Coaching Approach

Goal is for students to become experts in how they learn, manage time, and advocate

- Emphasize self-regulation
- SR is explicitly instructed with metacognitive strategies and procedures
- On campus, in real time, with constant feedback
- Coaches, not Teachers, SLPs

1 Ylvisaker & Feeney (1998); 2 Ylvisaker (2006); 3 Kennedy & Krause (2011); O’Brien, Schellinger, & Kennedy (in press)

Self-Regulation
(revised from Kennedy & Coelho, 2005)

Goal – self-monitor

Execute strategy

Strategy decision – self-control

Metacognitive beliefs Awareness

Ongoing self-monitoring is affected by frontal lobe injury
Self-Regulation in Three Domains

Self-Learning
Self-Advocacy
Self-Management

Self-Management is Core Skill

Self-Learning
Self-Management
Nervous
Self-Advocacy
Methods: Intervention Program

• Return to College Program
  • Each student assigned one primary coach, with whom they met one-on-one over two semesters
  • Number of sessions ranged from 19-25
  • Average length of session ranged from 44 minutes to 88 minutes, depending on student needs

Goal Setting

**Self-Learning (SL)**
- Grade based: want to get a B
- Process based: Write better papers; use keywords
- Develop strategies for taking multiple choice tests

**Self-Management (SM)**
- Turn in all my papers on time
- Keep up with a long term project instead of waiting until the end
- Prioritize assignments to work efficiently

**Self-Advocacy (SA)**
- Discuss my disability with instructors
- Find more activities that I can still do with my friends
- Become a part of a class study group
Methods: Strategy Coding  
(O’Brien, Schellinger, & Kennedy, 2018)

Strategy types were coded using an adaptation of Zimmerman and Martinez-Pons’s (1986) schema:

1) Self-Evaluation  
2) Organizing and Transforming  
3) Goal Setting and Planning  
4) Seeking Information  
5) Keeping Records and Monitoring  
6) Environmental Structuring  
7) Self-Consequences  
8) Rehearsing and Memorizing  
9) Seeking Social Assistance – Peers  
10) Seeking Social Assistance – Teachers  
11) Seeking Social Assistance – Adults and DS  
12) Reviewing Records – Tests  
13) Reviewing Records – Notes (including audio)  
15) Other (Non-strategic)  
16) Too Vague or Unable to Code

Reliability across the two coders was good (Cohen’s kappa, K = .828).

Summary of Findings: Proximal

- When averaged across participants, all outcomes demonstrated an increase following intervention.

<table>
<thead>
<tr>
<th>Total #</th>
<th>Increased for 3 of 5 participants</th>
</tr>
</thead>
<tbody>
<tr>
<td>Variety</td>
<td>Increased for 4 of 5 participants</td>
</tr>
<tr>
<td>Specificity</td>
<td>Increased for 4 of 5 participants</td>
</tr>
<tr>
<td>Acad. Challenges</td>
<td>Increased for 3 of 5 participants</td>
</tr>
</tbody>
</table>
Summary of Findings: Distal

- When averaged across participants, all outcomes demonstrated an increase following intervention.

<table>
<thead>
<tr>
<th>Category</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Grades</td>
<td>Maintained or improved for 4 of 5</td>
</tr>
<tr>
<td>Credit Hours</td>
<td>All continued to earn credits</td>
</tr>
<tr>
<td>Graduation</td>
<td>Extended timeline for 4 of 5</td>
</tr>
<tr>
<td>Employment</td>
<td>All employed or seeking graduate degrees</td>
</tr>
</tbody>
</table>

Factors that contribute to College Success

- Focus on process/steps, not just the end goal
- Reasonable accommodations
- Coaching & team support
- Persistence and resiliency
- Universal design
Concussion and mTBI

What is concussion?

“trauma–induced alteration in mental status that may or may not involve loss of consciousness.”

2016 Berlin Definition Sport–Related Concussion (McCrory et al 2017)

- Sport related concussion is a traumatic brain injury induced by biomechanical forces.
- May be caused either by a direct blow to the head, face, neck or elsewhere on the body with an impulsive force transmitted to the head.
- Typically results in the rapid onset of short-lived impairment of neurological function that resolves spontaneously. However, in some cases, signs and symptoms evolve over a number of minutes to hours.
- May result in neuropathological changes, but the acute clinical signs and symptoms largely reflect a functional disturbance rather than a structural injury and, as such, no abnormality is seen on standard structural neuroimaging studies.
- Results in a range of clinical signs and symptoms that may or may not involve loss of consciousness. Resolution of the clinical and cognitive features typically follows a sequential course. However, in some cases symptoms may be prolonged.
- Cannot be accounted for by other circumstances.

What is concussion?

- Rarely loss of consciousness (~10%)
- Rarely identifiable on neuroimaging
- Impaired function rather than structural changes
Structural versus Functional

Ylvisaker, Szekeres, & Feeney, 2001

Neurometabolic Cascade

Neurometabolic Cascade Following Cerebral Concussion/mTBI

From Glaze CC, et al (1978)
Physical Effects Over Time

![Graph showing physical symptoms over time.]

FIGURE 1
Percent of patients reporting individual physical symptoms during study period. Bars represent 95% CI.

Cognitive and Emotional Effects Over Time

![Graph showing cognitive and emotional symptoms over time.]

FIGURE 2
Percent of patients reporting individual cognitive and emotional symptoms during study period. Bars represent 95% CI.

Academic Recovery


“Cocooning”
Downsides to Cocooning

• Physical deconditioning (Silverberg & Iverson, 2013)
• Mood dysregulation (Wells et al., 2015)
• Increased Depression and Anxiety/Nocebo Effect (DiFazio et al., 2015)
• Conflicts with standard of care for more severe TBIs


Figure 1: Duration of symptoms by quartile of cognitive activity-days. Shaded area represents 95% confidence intervals for the curve.
Rest Recommendations (McCrory et al., 2017)

- 24–48 hours of rest
- Return to moderate activity
- Reassess symptoms

Concussions in College