

Concussion and Brain Injury in College:

Considering the Range of Needs for Students

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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.
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Broad Areas of Interest

Adults with traumatic brain injuries (TBIs)

Cognitive Rehabilitation

Returning to College after TBI

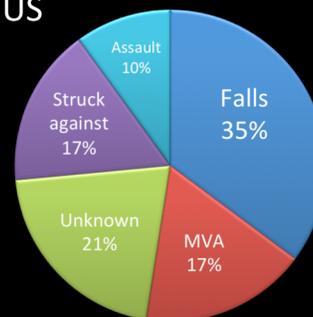
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Traumatic Brain Injury (TBI)

- *"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

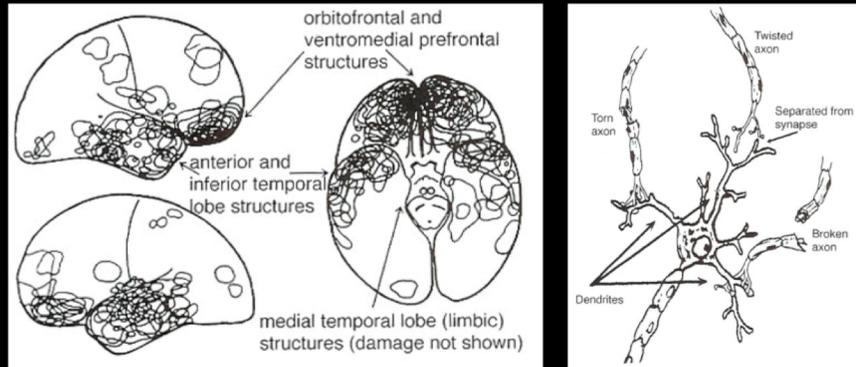


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Neuropathology of TBI



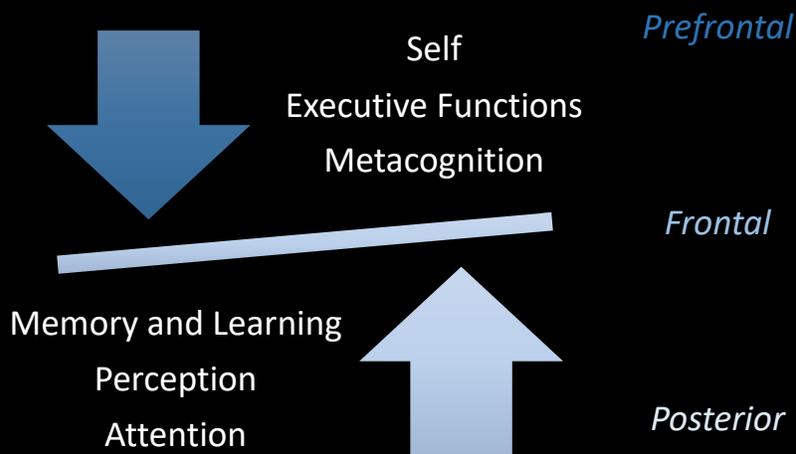
Ylvisaker, Szekeres, & Feeney, 2001

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Cognitive Processes



Stuss, 1991; Busch et al., 2005

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Coaching College Success

Returning to College after TBI

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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)

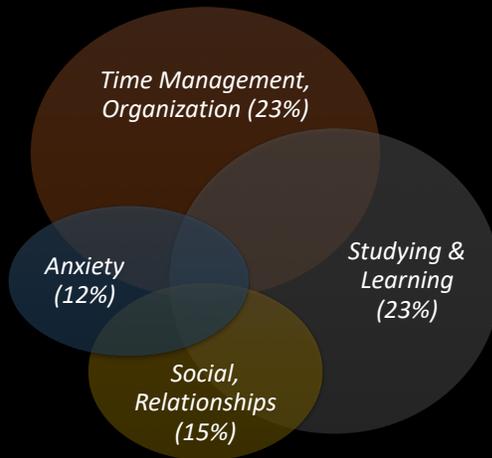
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College Survey for Students with Brain Injury

(CSS-BI; Kennedy & Krause, 2009; Kennedy, Krause, & O'Brien, 2014)



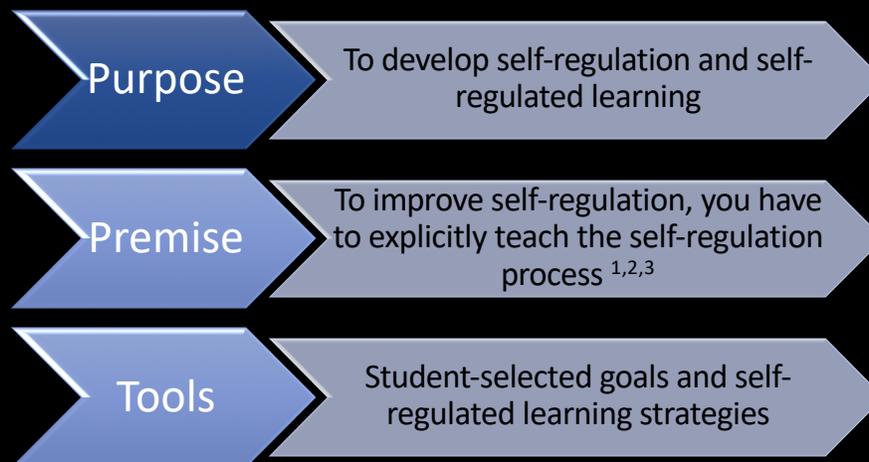
Academic Challenges

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.

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Return to College Program

(O'Brien, Schellinger, & Kennedy, 2018)



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¹Ylvisaker & Feeney (1998); ²Ylvisaker (2006); ³Kennedy & Krause (2013)

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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

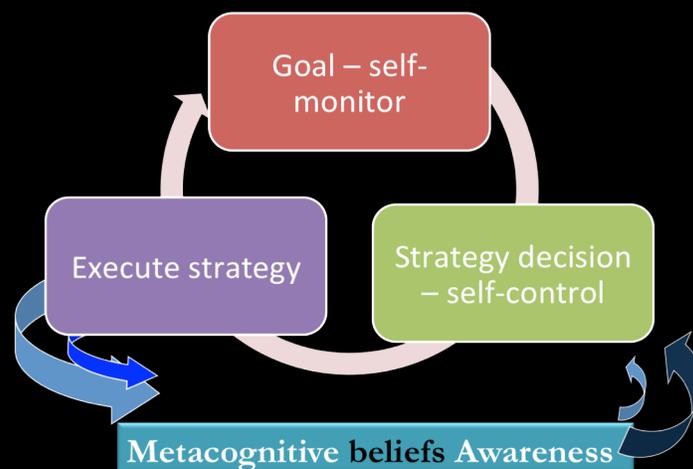
On campus, in real time, with constant feedback

Coaches, not Teachers, SLPs

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

Self-Regulation

(revised from Kennedy & Coelho, 2005)

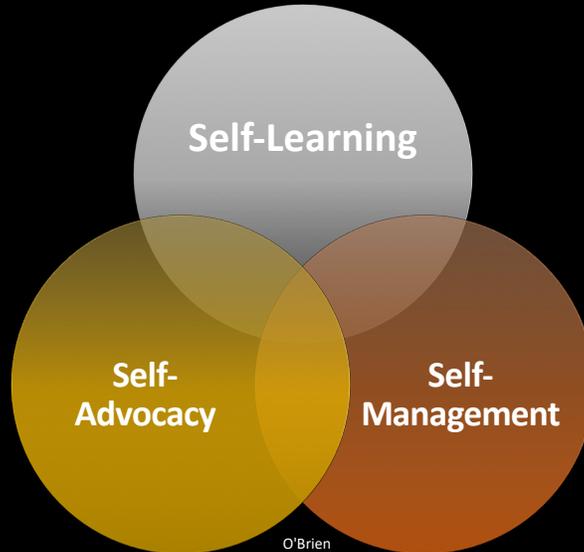


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Ongoing self-monitoring is affected by frontal lobe injury

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Self-Regulation in Three Domains

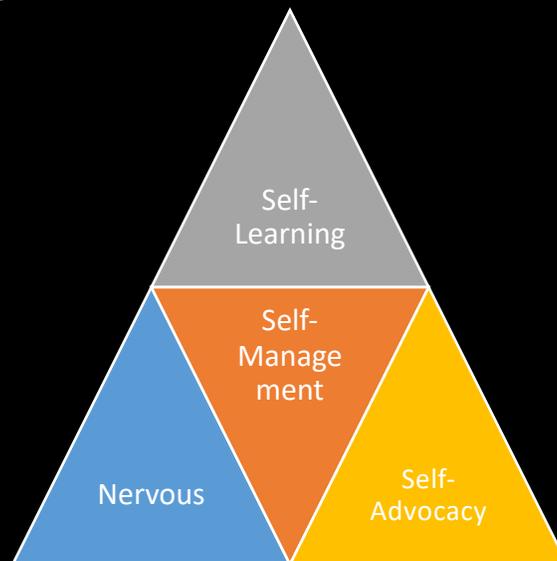


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Self-Management is Core Skill



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Methods: Intervention Program

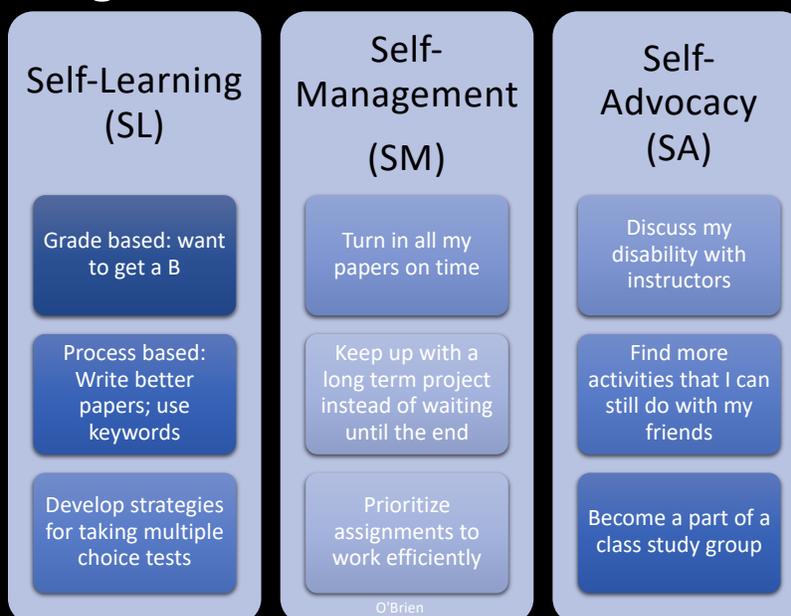
- Return to College Program
 - Each student assigned one primary coach, with whom they met one-on-one over two semesters
 - Number of sessions ranged from 19-25
 - Average length of session ranged from 44 minutes to 88 minutes, depending on student needs

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Goal Setting



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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	5) Keeping Records and Monitoring	9) Seeking Social Assistance – Peers	12) Reviewing Records – Tests	15) Other (Non-strategic)
2) Organizing and Transforming	6) Environmental Structuring	10) Seeking Social Assistance – Teachers	13) Reviewing Records – Notes (including audio)	16) Too Vague or Unable to Code
3) Goal Setting and Planning	7) Self-Consequences	11) Seeking Social Assistance – Adults and DS	Reliability across the two coders was good (Cohen's kappa, $K = .828$).	
4) Seeking Information	8) Rehearsing and Memorizing			

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Summary of Findings: Proximal

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

Total #	• Increased for 3 of 5 participants
Variety	• Increased for 4 of 5 participants
Specificity	• Increased for 4 of 5 participants
Acad. Challenges	• Increased for 3 of 5 participants

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Summary of Findings: Distal

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

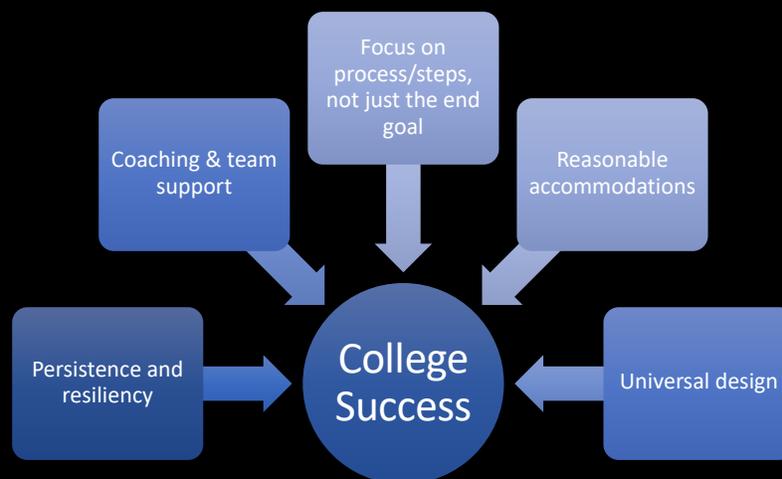
Grades	• Maintained or improved for 4 of 5
Credit Hours	• All continued to earn credits
Graduation	• Extended timeline for 4 of 5
Employment	• All employed or seeking graduate degrees

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Factors that contribute to College Success



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Concussion and mTBI

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What is concussion?

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

American Academy of Neurology. Practice parameter: the management of concussion in sports (summary statement). Report of the Quality Standards Subcommittee. *Neurology*. 1997;48(3):581–585.

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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.

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What is concussion?

*Rarely loss of consciousness
(~10%)*

Rarely identifiable on neuroimaging

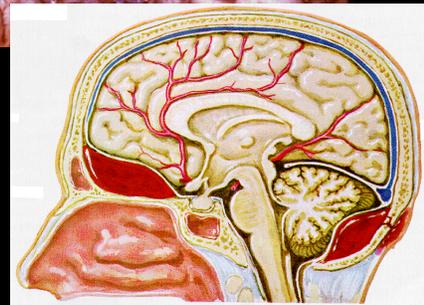
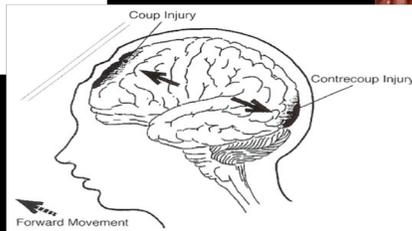
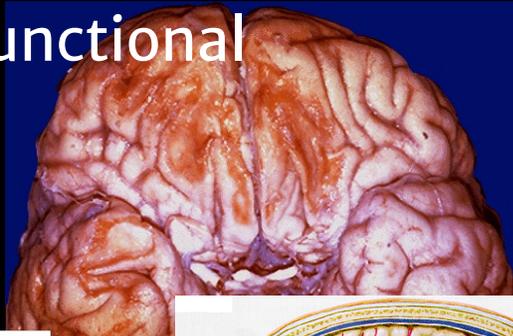
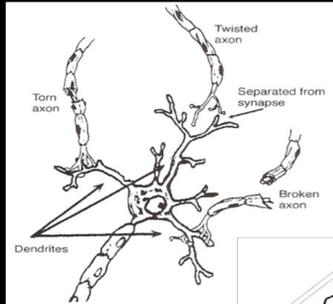
Impaired function rather than structural changes

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Structural versus Functional



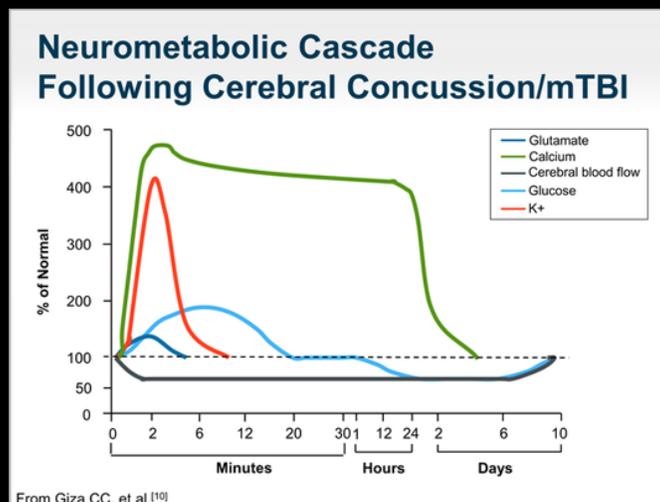
Ylvisaker, Szekeres, & Feeney, 2001

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Neurometabolic Cascade



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Physical Effects Over Time

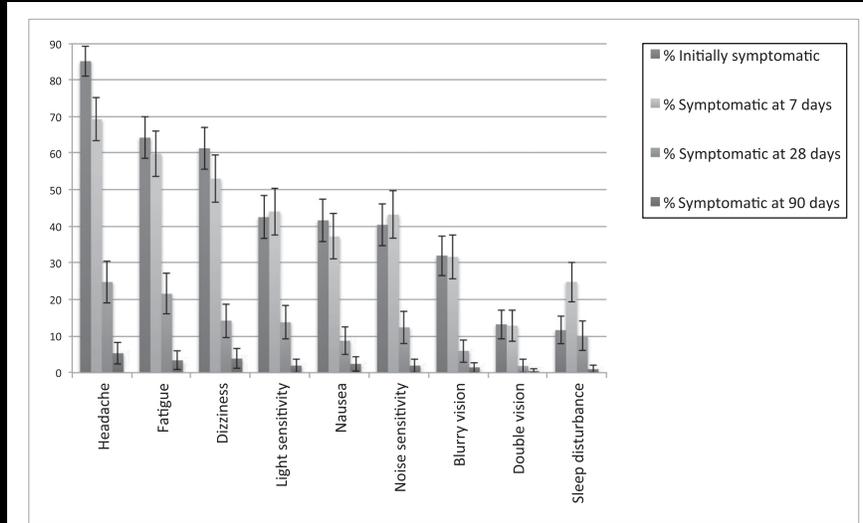


FIGURE 1
Percent of patients reporting individual physical symptoms during study period. Bars represent 95% CI.

2019 Eisenberg, M. A., Meehan, W. P., & Mannix, R. (2014). Duration and Course of Post-Concussive Symptoms. *Pediatrics*, 133(6), 999–1006. O'Brien

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Cognitive and Emotional Effects Over Time

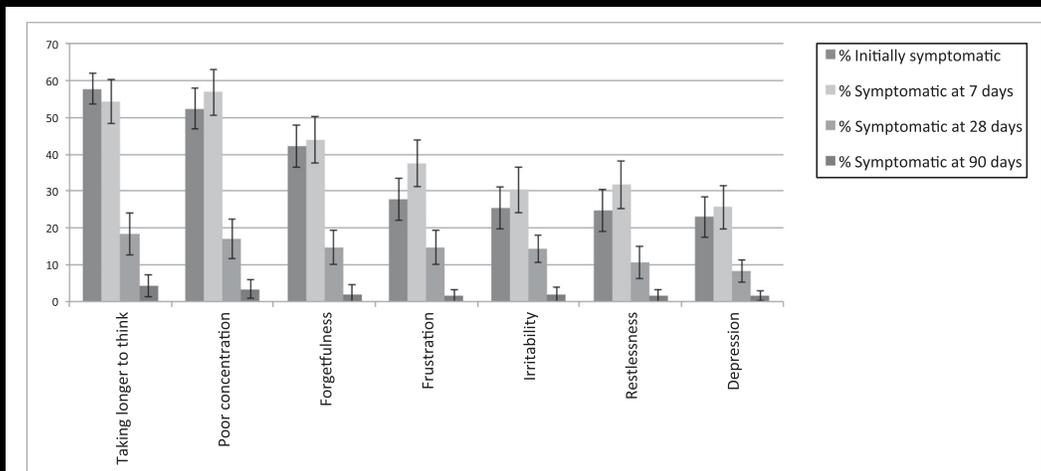
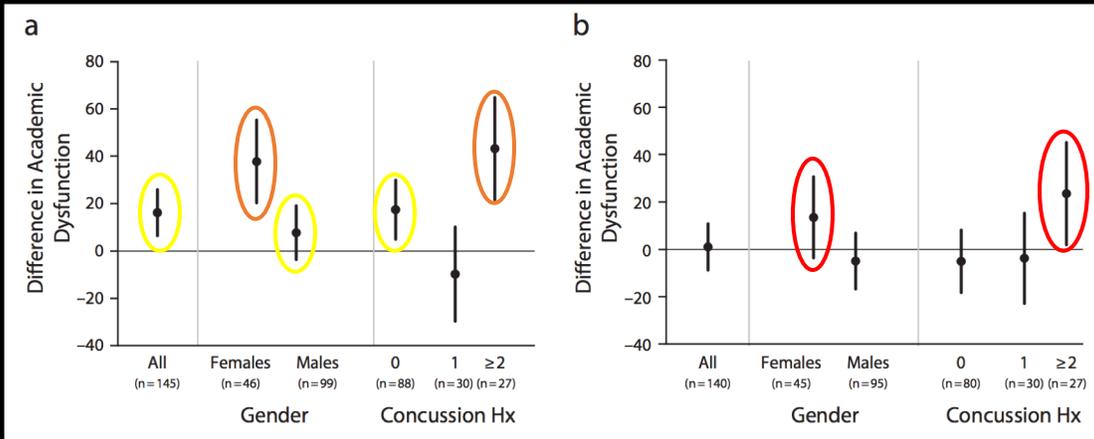


FIGURE 2
Percent of patients reporting individual cognitive and emotional symptoms during study period. Bars represent 95% CI.

2019 Eisenberg, M. A., Meehan, W. P., & Mannix, R. (2014). Duration and Course of Post-Concussive Symptoms. *Pediatrics*, 133(6), 999–1006. O'Brien

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Academic Recovery



Wasserman, E. B., Bazarian, J. J., Mapstone, M., Block, R., & van Wijngaarden, E. (2016). Academic dysfunction after a concussion among US high school and college students. *American Journal of Public Health, 106*(7), 1247–1253.

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“Cocooning”

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Downsides to Cocooning

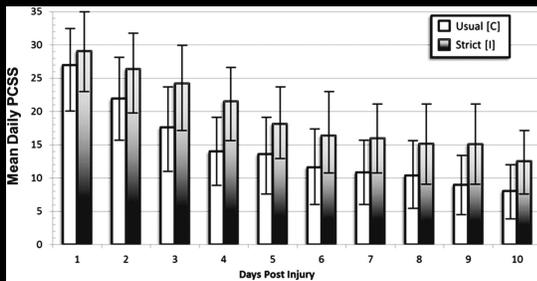
- Physical deconditioning (Silverberg & Iverson, 2013)
- Mood dysregulation (Wells et al., 2015)
- Increased Depression and Anxiety/Nocebo Effect (DiFazio et al., 2015)
- Conflicts with standard of care for more severe TBIs

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PEDIATRICS®



Danny George Thomas et al. Pediatrics 2015;135:213-223

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Effect of Cognitive Activity Level on Duration of Post-Concussion Symptoms

AUTHORS: Naomi J. Brown, MD,* Rebekah C. Mannix, MD, MPH,[†] Michael J. O'Brien, MD,^{††} David Gostine, BS,* Michael W. Collins, PhD,[‡] and William P. Meenan III, MD,^{§,¶,||}

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WHAT'S KNOWN ON THIS SUBJECT: Cognitive rest is recommended for the management of sport-related concussions. There are limited data to support this recommendation.

WHAT THIS STUDY ADDS: This study adds empirical data supporting the recommendation for cognitive rest after a sport-related concussion.

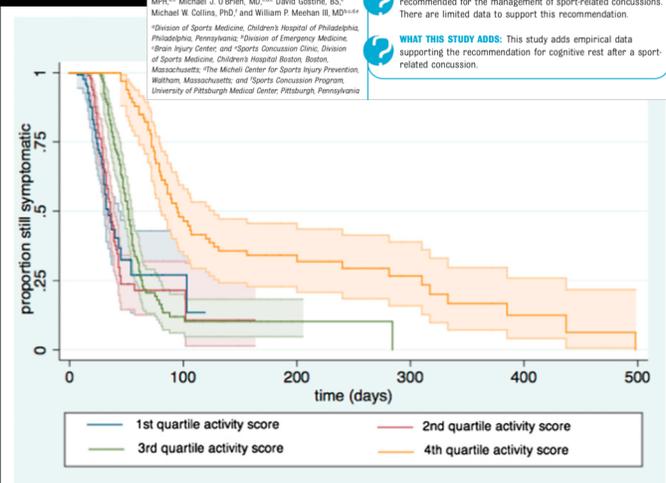
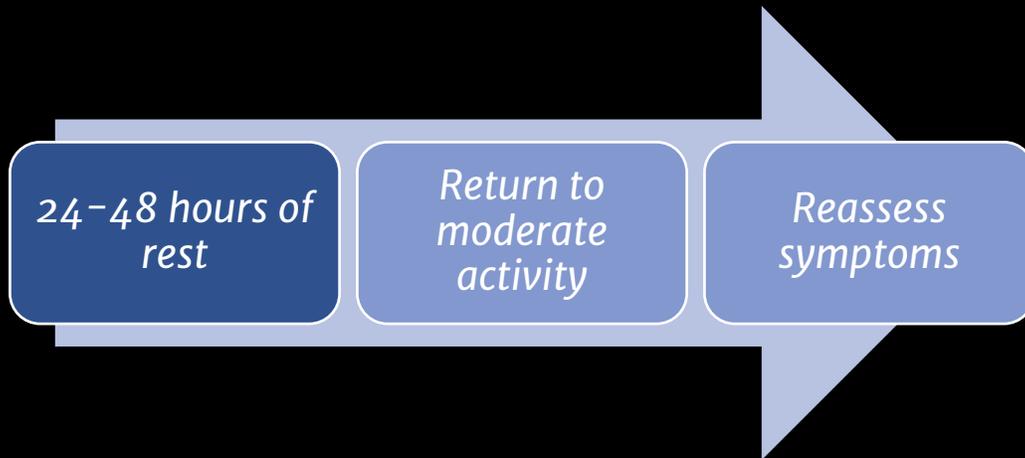


FIGURE 1
Duration of symptoms by quartile of cognitive activity-days. Shaded area represents 95% confidence intervals for the curve.

Rest Recommendations (McCrory et al., 2017)



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Concussions in College

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