

## **ISLAND B.R.A.I.N. Lab**

Behavioral Research and Instructional Neuroscience  
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# **Post-Concussive Syndrome (PCS) Group**

## **DESCRIPTION**

Research is an on-going process it doesn't stop and start with the academic year. In fact, much of the most important work occurs during the calendar year when there is no class. During this time, the winter and summer months, investigators have more dedicated time to: read the literature, write strong bibliographies and introductions for papers, submit Institutional Review Board proposals, collect data on nonhuman subjects, and conduct analyses. This project explores post-concussive syndrome and the breadth of athletes affected by head injury, how each population is uniquely affected and the variability in medical, behavioral, psychological, and academic (where it applies) support each population receives.

## **Six Empirical Ws**

### **Who?**

College athletes, professional dancers, veterans

### **What?**

Post-Concussive Syndrome

### **When?**

Fall and Spring Semester

### **Where?**

Online surveys and laboratory assessments/questionnaires; EEG (we need to discuss this)

### **Wherein? (i.e., How?)**

Concussion measures (TBA) and neuropsychological assessments

### **Why?**

To better understand the epidemiology of concussion, how it differs across athletic and professional groups, and recommendations for support (academic, counseling, and preventative).

### **IRB Approval?**

*Head Injury Among College Students (091-13), on-going investigation.*

## PSC PROJECT READING LIST

### Texts

Boyd, W. D. (2014). *Post-Concussion Syndrome: An Evidence Based Approach*. Carroll, Linda and Rosner, David (2012). *The Concussion Crisis: Anatomy of a Silent Epidemic*. New York, NY: Simon and Schuster.

Stoller, Diane Roberts and Hill, Barbara Albers (2013). *Coping with Concussion and Mild Traumatic Brain Injury: A Guide to Living with the Challenges Associated with Post Concussion Syndrome and Brain Trauma*. New York, NY: Avery, Penguin Publishing Group.

### Films

*League of Denial*, Copyright 2013. Frontline. 114 minutes.

\*Available on Netflix, Also online here:

<http://www.pbs.org/wgbh/pages/frontline/league-of-denial/>

*Concussion*. Release Date: Christmas Day, 2015

<http://www.slashfilm.com/will-smith-football-movie-release-date/>

### Articles and Reports

AANS. Sport-related Head Injury. Retrieved on June 14, 2015:

<http://www.aans.org/Patient%20Information/Conditions%20and%20Treatments/Sports-Related%20Head%20Injury.aspx>

Carson, J., Snow, C., Lawrence, D., Kraft, S., Chatterjee, A., MacKenzie, H., Moineddin, R. & Frémont, P. (2013). Advances in concussion management: Academic accommodation for post concussion student athletes: can physicians do better? *British Journal Sports Medicine*, 47 (5), e1 . doi: 10.1136/bjsports-2012-092101.24

Daneshvar, D. H., Riley, D. O., Nowinski, C. J., McKee, A. C., Stern, R. A., & Cantu, R. C. (Nov. 2011). Long Term Consequences: Effects on Normal Development Profile after Concussion. *Physical Medicine & Rehabilitation Clinics of North America*, 22 (4), 683–700. doi:10.1016/j.pmr.2011.08.009.

Echemendia, R. J., Grant L Iverson, G. L., McCrea, M., Macciocchi, S. N., Gioia, G. A., Putukian, M., & Comper, P. (2013). Advances in neuropsychological assessment of sport-related concussion. *British Journal of Sports Medicine*, 47, 294–298. doi:10.1136/bjsports-2013-092186

Galetta, K. M., Barrett, J., Allen, M., Madda, F., Delicata, D., Tennant, A. T., Maguire, M. G., Branas, C. C., Maguire, M. G., Messner, L. V., Devish, S., Galetta, S. L., & Balcer, L. J. (2011). The King-Devick test as a determinant of head trauma and concussion in boxers and MMA Fighters. *Neurology*, 76, 1456–1462.

Gessel, L. M. Fields, S. K., Collins, C. L., Dick, R. W., Comstock, R. D. (2007). Concussions Among United States High School and Collegiate Athletes. *Journal of Athletic Training*, 42 (4), 495–503.

Giza, C. C., Kutcher, J. S., Ashwal, S., et al. (2013). Summary of evidence-based guideline update: Evaluation and management of concussion in sports: Report of the Guideline Development Subcommittee of the American Academy of Neurology. *Neurology*, 80, 2250-2257. DOI 10.1212/WNL.0b013e31828d57dd

Hayes, H. M. (2014). Your Body: Concussions, Not Your Everyday Injury *Dance Magazine*, May 2014. Retrieved June 14, 2015: <http://www.dancemagazine.com/issues/May-2014/Your-Body-Concussions-Not-Your-Everyday-Injury#sthash.5bQHjs9k.dpuf>

Jen-Kai Chen, Karen M Johnston, Alex Collie, Paul McCrory, Alain Ptito (2007). A validation of the post concussion symptom scale in the assessment of complex concussion using cognitive testing and functional MRI. *Journal of Neurology and Neurosurgical Psychiatry*, 78, 1231–1238. doi: 10.1136/jnnp.2006.110395.

Kontos, A. P., Elbin, R.J., Schatz, E. P., Covassin, T., Henry, L., Pardini, J., & Collins, M. W. (2012). A Revised Factor Structure for the Post-Concussion Symptom Scale: Baseline and Post-concussion Factors. *American Journal of Sports Medicine*, 40, 2375–2384. DOI: 10.1177/0363546512455400

Kutcher, J. S., McCrory, P., Davis, G., Ptito, A., Meeuwisse, W. H., , Broglio, S. P. (2013). What evidence exists for new strategies or technologies in the diagnosis of sports concussion and assessment of recovery? *British Journal of Sport Medicine*, 47 (5), 299–303. doi:10.1136/bjsports-2013-092257

Laker, S. R. (2011). Epidemiology of concussion and mild traumatic brain injury. *American Academy of Physical Medicine and Rehabilitation*, 3, S354-S358. DOI: 10.1016/j.pmrj.2011.07.017

Lovell, M. R., & Solomon, G. S. (Oct. 2013). Neurocognitive Test Performance and Symptom Reporting in Cheerleaders with Concussions. *The Journal of Pediatrics*, 163 (4), 1192–1195.

Lovell, M. R., & Solomon, G. S. (July 2011). Psychometric Data for the NFL Neuropsychological Test Battery. *Applied Neuropsychology*, 18 (3), 197-209. doi: 10.1080/09084282.2011.595446.

Luke, A., Kinney, S. A., D’Hemecourt, P. A., Baum, J., Owen, M. & Micheli, L. J. (2002). Determinants of injuries in young dancers. *Medical Problems of Performing Artists*, 17 (3), 105–112.

Makdissi, M., Davis, G., Jordan, B., Patricios, J., Purcell, L., Putukian, M. (2013). Revisiting the modifiers: how should the evaluation and management of acute concussions differ in specific groups? *British Journal of Sports Medicine*, 47 (5), 314–320. doi:10.1136/bjsports-2013-092256

McCrory, P., Meeuwisse, W. H., Aubry, M., Cantu, A., Dvořák, J., Echemendia, R. J., Engebretsen, L., Johnston, K., Kutcher, J. S., Raftery, M., Sills, A., Benson, B. W., Davis, G. A., Ellenbogen, R. G., Guskiewicz, K., Herring, S. A., Iverson, G. L., Jordan, B. D., Kissick, J., McCrea, M., McIntosh, A. S., Maddocks, D., Makdissi, M., Purcell, L., Putukian, M., Schneider, K., Tator, C. H., & Turner, M. (2013). Consensus statement on concussion in sport: the 4th International Conference on Concussion in Sport held in Zurich, November 2012 *British Journal of Sport Medicine*, 47 (5), 250–258. doi:10.1136/bjsports-2013-092313

McCrory, P., et al. (2013). Sport Concussion Assessment Tool, 3<sup>rd</sup> Edition (SCAT 3). *British Journal of Sport Medicine*, 47 (5), 259–262.

Meehan, W.P., Mannix, R. C., O’Brien, M. J., & Collins, M. W. (2013). The Prevalence of

Undiagnosed Concussions in Athletes. *Clinical Journal of Sport Medicine*, 23, 339–342.

Nationwide Children's Hospital. *A School Administrator's Guide to Academic Concussion Management*. Columbus: OH, Nationwide Children's Hospital. Retrieved June 14, 2015: <http://www.nationwidechildrens.org/academic-concussion-management>.

Ragan, B. G., Herrmann, S. D., Kang, M., & Mack, M. G. (2009). Psychometric Evaluation of the Standardized Assessment of Concussion Evaluation of Baseline Score Validity Using Item Analysis. *Athletic Training & Sports Health Care*, 1 (4), 180–187.

Schneider, K. J., Iverson, G. L., Emery, C. A., McCrory, P., Herring, S. A., Meeuwisse, W. H. (2013). The effects of rest and treatment following sport-related concussion: a systematic review of the literature. *British Journal of Sports Medicine*, 47 (5), 304–307. doi:10.1136/bjsports-2013-092190

Stein, C.J., Kinney, S.A., McCrystal, T., Carew, E .A., Bottino, N. M., Meehan, W. P., and Micheli, L. J. (2014). Dance-related Concussion A Case Series. *Journal of Dance Medicine & Science*, 18 (2), 54–61.

### **Concussion Assessments**

\*Be familiar with these measures (they are also available on DropBox)

#### *Concussion Grading Scale*

Cantu, R. C. (2001). Posttraumatic Retrograde and Anterograde Amnesia: Pathophysiology and Implications in Grading and Safe Return to Play. *Journal of Athletic Training*, 36 (3), 244–248.

#### *Concussion New Patient Medical History.*

2013, Coastal Orthopedics & Sports Medicine/Pain Management.

#### *Concussion Symptom Inventory (CSI)*

Randolph, C., Millis, S., Barr, W. B., McCrea, M., Guskiewicz, K. M., Hammeke, T. A., & Kelly, J. P. (2009). Concussion Symptom Inventory: An Empirically Derived Scale for Monitoring Resolution of Symptoms Following Sport-Related Concussion. *Archives of Clinical Neuropsychology* 24, 219–229.

#### *Concussion Symptom Log*

[www.nationwidechildrens.org/sports-medicine](http://www.nationwidechildrens.org/sports-medicine)

#### Concussion Vital Signs (2012). Pearson

[www.concussionvitalsigns.com](http://www.concussionvitalsigns.com)

#### ImPACT Concussion Management Tool.

<https://www.impacttest.com/about/?Concussion-Management-Model-3>

#### *King-Devick Test for Concussion*

<http://kingdevicktest.com>

Oakbrook Terrace: IL, Mayo Foundation for Medical Education and Research

#### *Military Acute Concussion Evaluation (MACE)*

Defense and Veterans Brain Injury Center. Retrieved on June 14, 2015:  
<https://dvbic.dcoe.mil/material/military-acute-concussion-evaluation-mace-pocket-cards>

#### *NFL Neuropsychological Test Battery*

Lovell, M. R. (1999). Evaluation of the professional athlete. In J. E. Bailes, M. R. Lovell, & J. C. Maroon (Eds.), *Sports-related MTBI* (pp. 200–214). St. Louis, MO: Quality Medical Publishers.

#### *Post-Concussion Symptom Scale (PCSS)*

Pardini D., Stump, J. E., Lovell, M. R., Collins, M.,W., Moritz, K., Fu, F.H. (2004). The post-concussion symptom scale (PCSS): a factor analysis. *British Journal of Sports Medicine*, 38, 661-662.

#### *Rivermead Post Concussion Symptoms Questionnaire Modified (Rpq-3 And Rpq-13)*

Eyres, S., Carey, A., Gilworth, G., Neumann, V., Tennant, A. (2005). Construct validity and reliability of the Rivermead Post Concussion Symptoms Questionnaire. *Clinical Rehabilitation*, 19, 878-887.

#### *The Standardized Assessment of Concussion (SAC)*

McCrea M, Kelly JP, Randolph C. (1997). *The Standardized Assessment of Concussion (SAC): Manual for Administration*. Waukesha, WI: Comprehensive Neuropsych Services.

### **Neuropsychological Assessments**

- Brain Injury Vision Symptom Survey (BIVSS) (Laukkanen, 2012)
- The Rey-Osterrieth Complex Figure Test (Spreen & Strauss, 1998)
- The Controlled Word Association Test (Benton & Hamsher, 1947; Spreen & Strauss, 1998)
- The Trail Making A and B test (Lezak, 1995)
- The Stroop Test (Golden & Freshwater, 1998; Spreen & Strauss, 1998)
- Distance-Rock Assessment (Haynes, 1979; Coffey & Reichow, 1990).

## B.R.A.I.N. Lab Relevant Dates

DATE		To Submit
Friday August 14, 2015	Student End-of-Summer Report - As per your PRISM Award	Report
Friday August 24, 2015	AZA Poster Due to Cheryl Wallen: <a href="mailto:cwallen@aza.org">cwallen@aza.org</a>	Poster
Monday August 31, 2015	Week I: First Day of Fall Semester	
<b>Tuesday September 1, 2015</b>	<b>Week I: First Lab Meeting at 11:30 – 12:30 pm (2<sup>nd</sup> and 4<sup>th</sup> Tuesday of each month)</b>	<b>Pac Thai or 1910 Main</b>
Saturday & Sunday September 19 <sup>th</sup> & 20 <sup>th</sup>	2015 AZA Annual Conference <a href="https://www.aza.org/annualconference/">https://www.aza.org/annualconference/</a>	Salt Palace Convention Cntr, Salt Lake City, UT
Tuesday Nov. 10, 2015	PRISM Conference, MPR 3:30 – 6:00	
Wednesday, Nov. 11, 2015	American Evaluation Society Conference: <a href="http://www.eval.org/Evaluation2015">http://www.eval.org/Evaluation2015</a>	Chicago, IL
Nov. 16, 2015	WPA Abstract and Registration deadline: <a href="http://westernpsych.org/convention/">http://westernpsych.org/convention/</a>	Abstract and Registration
Monday February 1, 2016	OAS Abstract, Registration Due via Email <a href="http://www.oas.pdx.edu">http://www.oas.pdx.edu</a>	Abstract Due and Registration
Friday February 19	OAS Presentations Deadline	OAS PowerPoint
Saturday February 27, 2016	Oregon Academy of Science (OAS) Conference <a href="http://www.oas.pdx.edu">http://www.oas.pdx.edu</a>	Pacific University Forest Grove, OR
Friday April 15, 2016	WPA Poster Deadline	Posters Due
Thursday April 21, 2016	SPD PowerPoint Presentation Deadline	Presentations Due
Friday April 22, 2016	Senior Project Day Presentation Practice, Round I	Presentations
Monday April 25, 2016	Senior Project Day Presentation Practice, Round II	Presentations
Wednesday April 27, 2016	Senior Projects Day	Presentations
April 28 – May 1, 2016	Western Psychological Association Conference <a href="http://westernpsych.org/convention/">http://westernpsych.org/convention/</a>	Westin Long Beach, CA

### Other deadlines

Graduation Registration	January 30, 2016
SPD Registration	TBA
SPD Abstract Submission	TBA

