Welcome to the Poster Session on Concussion and Traumatic Brain Injuries

https://injurycenter.umich.edu/research-symposium-2020/
Head Injury Assessment with Computational Human Models Considering Human Diversity Jiacheng Liu, MS, University of Michigan Transportation Research Institute; Department of Industrial and Operations Engineering, University of Michigan

Sex Differences in Sport-Related Concussion Mechanisms: Findings from the Ivy League-Big Ten Epidemiology of Concussion Study Abby C Bretzin, PhD, ATC, Penn Injury Science Center, Department of Biostatistics, Epidemiology and Informatics, University of Pennsylvania

Symptom Profiles, Severity, and Recovery among Football Athletes in the Ivy League-Big Ten Epidemiology of Concussion Study Bernadette A D’Alonzo, MPH, Penn Injury Science Center, Department of Biostatistics, Epidemiology and Informatics, University of Pennsylvania

Variations in Head Impact Rates in Male and Female High School Soccer Colin M Huber, BS, Department of Bioengineering, University of Pennsylvania; Center for Injury Research and Prevention, Children’s Hospital of Philadelphia

Measuring Recovery with Ecologic Momentary Assessment in a Randomized Trial of Exercise After Sport-Related Concussion Douglas Wiebe, PhD, University of Pennsylvania, Department of Biostatistics, Epidemiology and Informatics

Visio-Vestibular Function of Pediatric Patients Presenting with the First Concussion vs. a Recurrent Concussion Tricia R Roby, PhD, ATC, Center for Injury Research and Prevention, The Children’s Hospital of Philadelphia

Cognitive Dysfunction in Concussed Adolescents During Driving Tasks Divya Jain, BS, Department of Bioengineering, University of Pennsylvania

Cognitive Effects of Repetitive Head Impact in Mexican Collegiate Contact Sport Athletes César Rubén Vuelvas-Olmosa, MsC, Medical Sciences, School of Medicine, University of Colima
Head Injury Assessment with Computational Human Models Considering Human Diversity

Jiacheng Liu, Jingwen Hu, and James T. Eckner

Introduction
- The injury biomechanics field has focused primarily on the midsize male FE head model.
- Significant morphological and biomechanical variations exist in human skull and brain.
- Our study evaluated tissue-level impact responses on 101 adult skull FE models, accounting for the morphological variations.

Methods
- **Subject Geometry Extraction**
  - High-resolution head CT obtained for 101 youth and young adult test subjects
  - Image segmentation performed on CT scans using Mimics (Materialise) by extracting separate geometries for scalp, skull, and brain surfaces
- **Mesh Morphing and Projection**
  - Mapping the template FE meshes onto the detailed geometries of 101 subjects applying Radial Basis Function
- **Impact Simulation**
  - The helmet was fitted on a baseline dummy model to obtain the head impact kinematics under rear, oblique, and side impact conditions, setting speed to 5.5 m/s.
  - The tissue-level impact responses (e.g., strain) were transformed from the head impact kinematics for 101 subject-specific FE head models.

Statistical Analysis
- Different maximum strain concentrated regions were marked as different labels under each impact condition, indicating the influence of the morphological variations among the subjects.
- Linear regression models were built for the global and local maximum strain using subjects covariates and brain volume.
- T-test was conducted to quantify if the subjects with different maximum strain locations are significantly different, accounting for the variation of each covariate.

Results
- **Rear Impact**
  - Rear: top (1, 2), and middle (3, 4)
  - Oblique: Impact loading location (1), the countercoup area (2), and middle
  - Side Impact: only one region in the corpus callosum due to high rigidity of the falx

- **Oblique Impact**
  - Rear: Max Strain located in the top or middle

- **Side Impact**
  - Rear: Max Strain located in the top or middle

Conclusion
- Impact strain responses show positive relationship with brain volume, indicating the influence of morphological head variations on an individual’s concussion risk, which was rarely evaluated previously.
- The linear regression model building for the strain among 101 subject-specific shows the potential to predict the concussion risk based on the individual’s morphological features.
- Different maximum strain concentrated areas provide useful information to explore brain injury mechanisms in the future.

Acknowledgement
- This study was partially funded by the Injury Prevention Center at the University of Michigan.

References
1. [Citation]
2. [Citation]
Introduction

- Sport-related concussion (SRC) is an assumed risk of participation in collegiate sports, with the national incidence estimated at 10,560 SRC annually.1
- Understanding the mechanism of SRC injury by sport may focus prevention efforts.
- However, the nature of SRC between males and females is understudied.

Purpose

To describe the mechanism of injury for sport-related concussion (SRC) and sex differences within four contact sports.

Methods

PROCEDURES
- Athletic Trainers identified, enrolled student-athletes into this prospective cohort study.
- Detailed information is collected on injury and recovery outcomes.

INJURY OUTCOMES
- Sport:
  - Water polo (n = 70)
  - Soccer (n = 267)
  - Lacrosse (n = 212)
  - Basketball (n = 148)

DATA SOURCES
- Data from the Ivy League-Big Ten Epidemiology of Concussion Study; surveillance system, spanning 19 Ivy League and Big Ten universities (2013/14 through 2019/20)
- Data include mechanism of injury, symptoms, and time through the return to play protocol

STATISTICAL ANALYSIS
- Descriptive statistics
- Chi-square analyses were used to identify differences mechanism of injury between male and female student-athletes
- Significance set a priori p ≤ .05

Figure 1. Sport participation (n = 687) stratified by sex.

Mechanism of Injury Within Male and Female Collegiate Sports

<table>
<thead>
<tr>
<th>Mechanism</th>
<th>Basketball</th>
<th>Lacrosse</th>
</tr>
</thead>
<tbody>
<tr>
<td>Person</td>
<td><img src="basketball_person.png" alt="Bar Chart" /></td>
<td><img src="lacrosse_person.png" alt="Bar Chart" /></td>
</tr>
<tr>
<td>Surface</td>
<td><img src="basketball_surface.png" alt="Bar Chart" /></td>
<td><img src="lacrosse_surface.png" alt="Bar Chart" /></td>
</tr>
<tr>
<td>Surface &amp; Person</td>
<td><img src="basketball_surface_person.png" alt="Bar Chart" /></td>
<td><img src="lacrosse_surface_person.png" alt="Bar Chart" /></td>
</tr>
<tr>
<td>Other</td>
<td><img src="basketball_other.png" alt="Bar Chart" /></td>
<td><img src="lacrosse_other.png" alt="Bar Chart" /></td>
</tr>
</tbody>
</table>

2A. Basketball

2B. Lacrosse

p = .02

Figure 2A. Mechanism of injury between males and females participating in Basketball. There were significant differences in mechanism of injury between sexes for basketball (χ²(2)=9.87, p = .02).

Figure 2B. Mechanism of injury between males and females participating in Lacrosse. There were significant differences in mechanism of injury between sexes for lacrosse (χ²(2)=19.88, p ≤ .001).

Conclusions

- Differences in MOI exist within men’s and women’s sports, regardless of similarities and differences in rules and protective equipment.
- SRC preventative strategies should include sex and style of play.
- Innovation & Significance to the Field: Mechanism of injury is a potentially modifiable risk factor of SRC that varies between and within sport. Identifying leading MOI can help to reevaluate or modify rules aimed at preventing injury and making sports safer.

References

Symptom profiles, severity, and recovery among football athletes in the Ivy League–Big Ten Epidemiology of Concussion Study
Bernadette A. D’Alonzo MPH; Abigail C. Bretzin PhD, ATC; Douglas J. Wiebe PhD; Penn Injury Science Center, University of Pennsylvania, Philadelphia, PA

**Background**

- Athletes experience various symptoms following sport-related concussion (SRC). Differences in symptom presentation may influence recovery.
- Concussion reporting is also suggested to vary by gender, contact/non-contact, and sport.15
- Investigating within a sport with high incidence of concussion is warranted.

**Purpose**

We explore differences in symptom type and time to symptom resolution among a large cohort of collegiate football athletes.

**Methods**

**PROcedures**
- Athletic trainers across 19 participating campuses identify and enroll athletes with SRC across 28 sports into this prospective cohort study.
- They collect and record data including symptoms (SCAT3) and dates as they monitor athletes through return to learn (RTL) and return to play (RTP).

**Recovery Outcome**

Symptom resolution: days between injury and resolution of symptoms

N=3,137
(2013-2020)*

2,678 SRC

459 Non-SRC

**Data Source**

Ivy-Big1G study database (2013-2020*)

*Data up to March 2020; Data updated 9/10/2020

**Analysis**

- Descriptive statistics
- Exploratory factor analysis to identify symptom domains
- Survival analysis, Kaplan-Meier curves to determine time to symptom resolution by symptom profile type

**Results (n=520)**

- More symptoms -> up to 11-day delay in symptom resolution.
- Symptom domains & challenges with prediction
- Data reduction method: Polychoric (tetrachoric) factor analysis vs Latent class analysis
- Concussion management is key.
- "Modifiable" symptom domains -> tailored treatment

**Figure 1. Symptom prevalence. Did you experience any of the following symptoms at any point during your recovery?**

**Figure 2. Co-occurrence SRC symptoms; symptom domains.**

**Figure 3. Symptom resolution by symptom profile type.**

**Figure 4. Symptom domain -> symptom resolution in 14 days?**

**Conclusions**

- More symptoms -> up to 11-day delay in symptom resolution.
- Symptom domains & challenges with prediction
- Data reduction method: Polychoric (tetrachoric) factor analysis vs Latent class analysis
- Concussion management is key.
- "Modifiable" symptom domains -> tailored treatment

**References**

4. Leppert B, unpublished data.

**Contact**

@berndalonzocom @PennInjury
Variations in Head Impact Rates in Male and Female High School Soccer

Colin M. Huber1,2, Declan A. Patton PhD2, Divya Jain1,2, Christina L. Masler MD, CAQSM2,3,4
Susan S. Margules PhD2, Catherine C. McDonald PhD, RN, FAAN3,5, Kisty B. Arbogast, PhD,6
1Department of Biomechanics, University of Pennsylvania.; 2Center for Injury Research and Prevention, The Children’s Hospital of Philadelphia.; 3Sports Medicine and Performance Center, The Children’s Hospital of Philadelphia.; 4Perelman School of Medicine, University of Pennsylvania.; 5School of Nursing, University of Pennsylvania.; 6Department of Biomedical Engineering, Georgia Institute of Technology and Emory University.

Background

- >1.6 million sport concussions in U.S. annually1
- Growing concern for the short- and long-term effects of repeated subconcussive head impacts2
- Head impact sensors measure head kinematics and impact severity in sports
- Various methods to quantify head impact exposure rate

Objective

- To use different methodological approaches to quantify and compare head impact rates for male and female high school soccer.

Methods

- Soccer head impact exposure in varsity games during 2017-2019 seasons
- Triax SIM-G sensor2
- Statistics (α = 0.05)
  - Rate ratios (RR) with 95% confidence intervals (CI)
  - Kolmogorov–Smirnov test for distribution

Results

Data Collection Summary

<table>
<thead>
<tr>
<th>Type</th>
<th>Total</th>
<th>Female</th>
<th>Male</th>
</tr>
</thead>
<tbody>
<tr>
<td>Participants</td>
<td>53</td>
<td>21</td>
<td>32</td>
</tr>
<tr>
<td>Games</td>
<td>41</td>
<td>18</td>
<td>23</td>
</tr>
<tr>
<td>Athlete seasons</td>
<td>75</td>
<td>31</td>
<td>44</td>
</tr>
<tr>
<td>Sensor-recorded events</td>
<td>9503</td>
<td>2331</td>
<td>7172</td>
</tr>
<tr>
<td>Confirmed head impacts</td>
<td>1312</td>
<td>271</td>
<td>1041</td>
</tr>
<tr>
<td>Presence (AE)</td>
<td>506</td>
<td>196</td>
<td>410</td>
</tr>
<tr>
<td>Participation (AE)</td>
<td>493</td>
<td>167</td>
<td>326</td>
</tr>
<tr>
<td>Scheduled Time (hr)</td>
<td>601.3</td>
<td>264</td>
<td>337.3</td>
</tr>
<tr>
<td>Play Time (hr)</td>
<td>444.2</td>
<td>167.3</td>
<td>276.9</td>
</tr>
</tbody>
</table>

Head Impact Rates per Player-Hour

- Head Impact Rates per Player-Hour
  - Scheduled vs. Play time
  - Male and female play time rate > scheduled
  - Male head impact rates (per player-hour) > females (* p < 0.05)

Distribution of Impact Rates Across Players

- <20% of both male and female players accounted for >50% of total head impacts
- Female had higher skew toward lower impact rates (p < 0.001)

Conclusions

- Video confirmation is necessary
  - Over 6x overestimation of number of impacts
  - Male soccer players experienced higher head impact rates than females
  - Individual experiences vary
  - High impact rates sustained by only a few players

Significance

- Athlete exposure is not consistent or comparable between all studies
- Head impact exposure rate calculation method significantly affects rate magnitude and comparison between sports and studies
- Soccer players commonly sustain repeated head impacts each game. What are the potential effects on the brain?

Limitations

- Only soccer was studied
  - Principles transfer to other sports
- 16g threshold – threshold affects rates2
- Results taken in context of threshold

References

1. CDC. 2007. MMWR. 56:9. 725-7

Acknowledgements

Support was provided by NIH R01NS097548 and the Pennsylvania Department of Health.

Type | Definition
--- | ---
Presence (per athlete exposure) | Single player present at single session
Participation (per athlete exposure) | Single player playing in single session
Scheduled time (per player-hour) | Scheduled session time (e.g. soccer game = 1.33 hours)
Play time (per player-hour) | Cumulative play time on an individual player basis
Measuring recovery with ecocogic momentary assessment in a randomized trial of exercise after sport-related concussion

Douglas J. Wiebe PhD,1 Eileen P. Storey BS,1 Julia E. Orchinik, MPH,1 Matthew F. Grady MD,2,3 John J. Leddy MD,4 Barry Wilner PhD,4 Mohammad Nadir Haider MD PhD,5 Rebekah Mannix MD MPH,5 William P. Meehan MD,5 Brian Vemau MD,5 Christina L. Master MD,5
1. Department of Biostatistics, Epidemiology and Informatics, Perelman School of Medicine, University of Pennsylvania, Philadelphia, PA. 2. Children’s Hospital of Philadelphia Sports Medicine and Performance Center, Philadelphia, PA. 3. Perelman School of Medicine, University of Pennsylvania, Philadelphia, PA. 4. UBMID Orthopaedics and Sports Medicine, SUNY Buffalo Jacobs School of Medicine and Biomedical Sciences, Buffalo, NY. 5. Division of Emergency Medicine, Harvard Medical School, Boston, MA.

Background

- 1.1-1.9 million children sustain sport- and recreation-related concussions (SRC) annually in the US.[1]
- Most recover within 2-4 weeks[2] but the length of recovery is variable. Effects of concussion last >1 month in 30% of children with persistent post-concussive symptoms (PPCS).[3]
- Since symptoms are non-specific and may be pre-existing, from conditions other than concussion, relying on patient-reported symptoms for recovery from concussion is challenging.[4]
- Symptoms can be more accurately captured via ecological momentary assessment (EMA), assessing symptoms randomly throughout each day, for a “real-time” indicator of a patient’s status and symptom fluctuations in response to activities.[5]

Purpose

Investigate the reliability of concussion symptoms captured through EMA and compared time to recovery based on three definitions of symptomatic recovery, as well as date of clinical clearance to begin the return to play (RTP) process.

Methods

Design
- Randomized controlled trial (PI John Leddy, Funder AM-SSM).

Participants
- Concussion patients age 13-18 at sports medicine clinics.

Procedures
- We used our ReCuUPS EMA protocol and mobile app[6] to monitor concussion symptoms as part of a multicenter randomized controlled trial.
- Patients were prompted daily to complete the Post-Concussion Symptom Inventory (PCSI) daily over 4-weeks.
- We compared time (days) to reach the four outcomes using scatterplots and Kaplan-Meier curves.

Results

- Figure 1. Agreement between paired observations of concussin symptoms reported in person (clinic) and using EMA on the same day.
- Figure 2. Timing and correspondence of the 3 outcome using EMA.
- Figure 3. Timing and correspondence of the outcome measured in clinic vs. 3 outcomes measured using EMA.
- Figure 4. Kaplan-Meier estimates of the proportion of patients experiencing each of the 4 outcomes during 30-day period and changes measured in real-time EMA compared to outcomes measured in clinic.

- In 118 participants, symptoms reported into the app had excellent agreement with symptoms reported at a clinical visit on the same day (intraclass correlation coefficient=0.97).
- Most (>50%) participants reached “Specific Symptom Return to Pre-Injury Levels,” “Overall Symptom Return to Pre-Injury Levels,” and “Current Symptom Resolution” based on EMA symptom reports between several days and one week before achieving “Clinical Clearance to RTP” determined at a clinical visit, which had 100% sensitivity, but between 58% and 78% specificity, relative to the app-scored symptom outcomes.

Conclusions

- Time to symptom recovery varies based on the chosen definition of symptomatic recovery, but is a more precise correlate with clinical clearance to begin the RTP process when defining symptom recovery as a return to a pre-injury baseline level of symptomatology.
- Real-time symptom monitoring may be beneficial clinically, allowing providers to assess patients’ recovery status and make more timely and remote treatment recommendations.

Innovation & Significance to the Field

- Recording symptoms on a daily basis is useful for researchers and clinicians, but questions remain regarding how to best define recovery.
- No one, to our knowledge, has assessed whether a definition of symptom recovery that accounts for pre-injury symptoms is more meaningful.

References


Acknowledgments

We thank Kate Round, Fawzi Mohammed, Andrew Molon, Danielle Hunt, and Rebecca Daniels for their work coordinating and coordinating activities for participants and for managing operations of the study, and Bernadette Clark and Theresa Szy for setting up the ReCuUPS app and protocol for use in this study.
Visco-Vestibular Function of Pediatric Patients Presenting with the First Concussion vs. a Recurrent Concussion

Patricia R. Roby, PhD, ATC1, Eileen P. Sibrey, BA1, Christina L. Masler, MD,CL,2,3, Kristy B. Arbogast, PhD1,4
1Center for Injury Research and Prevention, The Children’s Hospital of Philadelphia; 2Pennsylvania School of Medicine, University of Pennsylvania; 3Sports Medicine Performance Center, The Children’s Hospital of Philadelphia; 4Division of Emergency Medicine, The Children’s Hospital of Philadelphia

Background

- Each year, an estimated 1.1 to 1.9 million sports- and recreation-related concussions occur in pediatric patients.1
- Visco-vestibular deficits are evident in the acute and subacute phases following concussion,2,3 and have been associated with a history of 3 or more previous injuries.2
- It is currently unclear if visco-vestibular function differs between pediatric patients presenting with a recurrent concussion relative to those with their first concussion.

Objective

To investigate visco-vestibular examination (VVE) outcomes in high school-aged patients presenting with their first concussion vs. recurrent concussion.

Methods

Study Design: Prospective observational study

Patients:
- 14-18 years
- Presenting for initial concussion visit

Outcomes:
- Dependent Variables: Age at visit
- Lifetime number of concussions (1 vs. 2+)
- Independent Variables: Visco-Vestibular Examination (VVE) (normal/abnormal)

Results

Table 2. Participant demographics stratified by first vs. recurrent concussion.

<table>
<thead>
<tr>
<th>Sex</th>
<th>Total n=192</th>
<th>First Concussion n=533</th>
<th>Recurrent Concussion n=59</th>
</tr>
</thead>
<tbody>
<tr>
<td>Females</td>
<td>95/2 (49.5)</td>
<td>224/2 (42.0)</td>
<td>296 (50.8)</td>
</tr>
<tr>
<td>Males</td>
<td>97/1 (50.5)</td>
<td>221/1 (42.0)</td>
<td>227 (49.2)</td>
</tr>
<tr>
<td>Age, mean ± SD</td>
<td>15.6 ± 1.2</td>
<td>15.4 ± 1.2</td>
<td>15.6 ± 1.3</td>
</tr>
<tr>
<td>Lifetime concussions, median (IQR)</td>
<td>1.0 (1-3)</td>
<td>1.0 (1-3)</td>
<td>1.0 (1-3)</td>
</tr>
<tr>
<td>Days after injury, mean ± SD</td>
<td>13.5 ± 7.3</td>
<td>14.0 ± 7.4</td>
<td>12.9 ± 7.1</td>
</tr>
<tr>
<td>Sport-related injury, n(%)</td>
<td>274/2 (49.7)</td>
<td>271/2 (54.7)</td>
<td>277 (47.5)</td>
</tr>
</tbody>
</table>

Table 3. When controlling for age, there were no significant associations between first vs. recurrent concussion and VVE outcome on any of the 9 subtests or total VVE score (P>0.05).

Conclusions

- First vs. recurrent concussion is not associated with abnormal VVE outcomes in high school-aged patients.
- Our findings suggest that patients with a concussion history present with similar visco-vestibular function to those with no concussion history at initial visit following injury.

Significance

- This study provides novel insight into the initial presentation of pediatric concussion patients with and without a previous concussion history.
- Additionally, our study adds formative data regarding cumulative clinical effects of concussion in younger athletes.

References


Acknowledgements

Support was provided by NIH R01NS075469 and NIH T32NS043412.
Cognitive Dysfunction in Concussed Adolescents during Driving Tasks

Divya Jain1, Krisy Arbogast2,3, Hasan Ayaz2,4,5, Christina Master2,3,8, Eileen Storey2, Olivia Podolak2, Catherine McDonald2,3,5

1Department of Biomedical Engineering, University of Pennsylvania, 2Center for Injury Research and Prevention, The Children’s Hospital of Philadelphia, 3Perelman School of Medicine, University of Pennsylvania, 4School of Biomedical Engineering, Drexel University, 5School of Nursing, University of Pennsylvania, 6Sports Medicine and Performance Center, The Children’s Hospital of Philadelphia

**Background**

- Adolescents account for over 50% of the 1.9 million children in the US who sustain a concussion annually
- Adolescents are at high risk for motor vehicle crashes
- Concussions cause cognitive deficits that may cause an increase in unsafe driving behaviors or self- or parent-imposed driving limitations

**The goal of this study was to explore how concussed adolescents manage the cognitive demands of driving**

**Why Study Brain Activation?**

- Vasorestriction post-concussion
- Increased neuronal metabolism to restore homeostasis
- Decoupling of neuronal metabolic demands and blood flow
- Cognitive deficits can be quantified via functional near infrared spectroscopy (fNIRS), measuring changes in prefrontal cortical hemoglobin concentrations

**Outcome Measures**

- Mean oxygenated hemoglobin for each task calculated by Modified Beer Lambert Law
- Mean standard deviation of lane position and mean speed as a proportion of speed limit for each task
- Linear mixed models to evaluate effect of group (healthy/concussed) and task condition (simple/complex) on outcome measures

<table>
<thead>
<tr>
<th>Participants</th>
<th>Healthy (n = 5, 5 M)</th>
<th>Concussed (n = 7, 1 M)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age (years)</td>
<td>17.8 (0.9)</td>
<td>17.3 (0.9)</td>
</tr>
<tr>
<td>Average length of licensure (years)</td>
<td>1.35 (0.67)</td>
<td>0.87 (0.49)</td>
</tr>
<tr>
<td>Average number of days since injury</td>
<td>--</td>
<td>28.5 (13.2)</td>
</tr>
<tr>
<td>Post-Concussion Symptom Inventory score</td>
<td>4.0 (5.7)</td>
<td>13.9 (11.2)</td>
</tr>
</tbody>
</table>

**Results**

- Both groups drove significantly slower during the complex driving task (F₁10 = 20.71, **p < 0.01**), differences between the two groups were not significant
- Both groups showed an increase in standard deviation of lane position during the complex task (F₁10 = 27.71, ***p < 0.001**), differences between the two groups during each task were not significant
- The complex driving task showed an increased hemodynamic response across the prefrontal cortex compared to the simple driving task, demonstrating differences in cognitive workload between the tasks (F₁10 = 71.18, **p < 0.001**)
- There was a significant interaction between group and task complexity (F₁82 = 7.15, ***p < 0.001**), indicating that concussion diagnosis modulates the relationship between cognitive workload and the simple and complex task

**Conclusions**

- This exploratory study provides initial evidence that adolescents with a concussion have increased recruitment of the prefrontal cortex to complete a complex driving task as compared to their healthy counterparts
- Increased activation, and thus increased workload, did not translate into differences in driving performance metrics, suggesting concussed adolescents may be at higher risk of workload capacity overload during driving and, therefore, potentially at higher risk for driving errors when presented with consecutive and/or increasingly complex tasks.
- Future work should include investigation of the role of concussion symptom burden and time since injury as well as driver characteristics, such as sex and time since license, on cognitive demand and driver performance across a broader range of driving tasks.

**References**


**Acknowledgements**

Research reported in this presentation was partially supported by National Institute of Neurological Disorders and Stroke of the NIH (R01NS097549) and the National Institute of Nursing Research of the National Institutes of Health (R01NR014243).
Cognitive effects of repetitive head impact in Mexican collegiate contact sport athletes.
César Rubén Vuelvas-Olmos1, Nadia Yanet Cortés-Álvarez2, Pedro Julian Flores-Moreno3, Jorge Guzmán-Muñoz4 Norma Angélica Moy-López4, Fabián Rojas-Larios4

1School of Medicine, University of Colima, 2Department of Nursing and Midwifery, Division of Natural and Exact Sciences, University of Guanajuato, Guanajuato; 3School Sciences of Education, University of Colima; 4School of Psychology, University of Colima.

Background

Contact sport practice has been risen worldwide. According previous studies, head impacts constant while playing contact sports may lead to a variety of worrisome outcomes, even, an increased the susceptibility to concussion, chronic traumatic encéphalopathy risk, changes in the brain with just a season in a sport contact, even when the player is not outward signs of a concussion, including neurocognitive deficits and brain matter changes at magnetic resonance imaging.

Objective

To determine the effects of contact sport practice on cognitive performance in collegiate sport athletes.

Methods

Participants were 30 collegiate soccer players and 30 noncontacts collegiate sport athletes, who practiced along 6 months uninterrupted

1. A meeting was be realized
2. Clinical history
3. Physical evaluation
4. Biomepndence scale
5. Cognitive assessment, using software Cogstate

Results

Socialdemographic and anthropometric characteristics

Exposed group | Unexposed group
---|---
Age (years) | 27.15 ± 6.16 | 25.88 ± 6.28
Relaxation (years) | 1.46 ± 2.01 | 1.48 ± 2.43
Weight (kg) | 70.51 ± 15.80 | 71.46 ± 14.02
BMI | 26.02 ± 4.60 | 24.83 ± 4.26
Body fat percent | 23.30 ± 13.80 | 23.44 ± 7.24

Cognitive assessment: Cogstate

Psychomotor speed

Executive Function

Working memory

Innovation & Significance to the field

Evidence has shown these impacts without a concussion or without TBI record has relationship with long-term health problems, including a persistent decline in cognitive functioning, emotional deficits, and the potential to develop long-term neurological disorders.

Conclusions

Therefore, repetitive head impacts may negatively impact associated peer learning, working memory and attention functions in collegiate athletes; even when there are no outward signs of injury.

Acknowledgments

References
Q&A

Please type your questions in the Q&A box and the moderator will ask the panelists select questions.
- Evaluation survey to follow by email

- Register now for our upcoming summit - The Science of Suicide Prevention: New Strategies for Understanding and Intervening on March 16, 2021 from 12PM – 5PM. Information on how to register and submit abstracts can be found on the event page on our website injurycenter.umich.edu

- Become a member! Sign up at injurycenter.umich.edu/about-us/membership/becoming-a-member/

- Check out the U-M Concussion Center at concussion.umich.edu, and follow us on twitter @UMichConcussion

- All recordings from today will be available on our website in the coming weeks

Thank You!