
## Conflict Statement

- I have no financial conflict of interest
- This project was supported through data collaboration by the NCAA Research Team and the Datalys Center for Sports Injury Research and Prevention
- All views are my own
- SOME OF THIS INFORMATION IS PRE-PUBLICATION, PLEASE DO NOT DISTRIBUTE.

## Example: Staffing & Injury

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original research

**Pressure on Sports Medicine Clinicians to Prematurely Return Collegiate Athletes to Play After Concussion**

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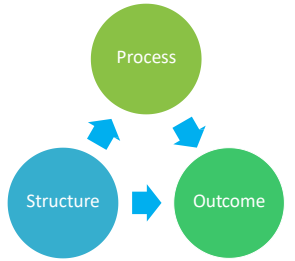
**Key Points**

- More than half of sports medicine clinicians had experienced pressure from coaches and athletes to return athletes to participation prematurely after a concussion.
- Clinicians experienced greater pressure from coaches at schools where the sports medicine department reported to the athletic department than at schools where the sports medicine department reported to an independent medical institution.
- Female clinicians experienced greater pressure from coaches than male clinicians experienced.
- More research is needed to determine how pressure affects clinical practice and whether pressure on clinicians affects return-to-participation decisions.

## HEALTH SERVICES RESEARCH




**Donabedian Model of Health Care Quality**

- Structure
  - Resources, Administration
- Process
  - Checklists, Best Practices
- Outcome
  - Injury rate, patient satisfaction

## HEALTH CARE QUALITY

Structure

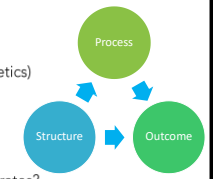
**Apply to Sports Medicine Context**

- Number of health care providers
- Financial oversight model
- Administrative oversight model
- Financial resources available

## Phase Three: Does this generalize?

Are Structural Measures of Health Care Quality Associated with Injury Outcomes in the College Sports Medicine Setting?

- Secondary Data Analysis
  - Injuries & Exposures from NCAA ISP (via DISC)
  - Staffing from NCAA Research
  - School Features from U.S. DOE (Title IX Equity in Athletics)
- Sample
  - NCAA ISP Participants 2009 10 through 2014 15
  - >25,000 injuries from 141 schools over 5 years
- Research Questions
  - Is the average athletes/clinician associated with injury rates?
  - Is the average athletes/clinician associated with re injury rates? Time loss?



## Background

Created by Artem Kovyazin
from Noun Project

DATALYSCENTER
Sports Injury Research
and Prevention

## Structural Measure of Quality

Created by Jidney
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## Data 2009/10 through 2013/14

DATALYSCENTER Sports Injury Research and Prevention

NCAA

U.S. DEPARTMENT OF EDUCATION EADA Equity in Athletics Data Analysis

# Injuries
# Athletic Exposures

# Clinicians
# Athletes

Athletics Revenues

## Sample

12,296 athletes

25 sports

141 schools

144,389 games or practices

Table 1. Team Seasons of Data by Sport

| | Team Seasons of Data | |
|---|---|---|
| Sport | Men's | Women's |
| Baseball/Softball | 62 | 101 |
| Basketball | 129 | 135 |
| Cross Country | 46 | 42 |
| Football | 119 | |
| Field Hockey | | 24 |
| Gymnastics | | 24 |
| Ice Hockey | 106 | 30 |
| Lacrosse | 30 | 65 |
| Soccer | 66 | 133 |
| Swimming | 20 | 25 |
| Tennis | 25 | 37 |
| Indoor Track & Field | 31 | 32 |
| Outdoor Track & Field | 27 | 29 |
| Volleyball | | 127 |
| Wrestling | 32 | |

## Injuries & Injury Rates

25,203 injuries

2,517 reinjuries

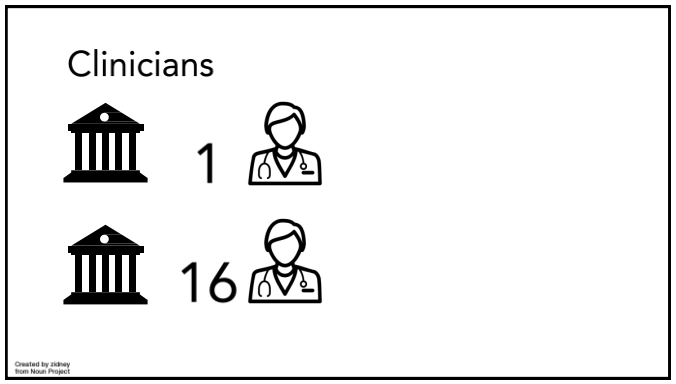
1,566 concussions

52% no time loss

Table 2. Rates of Injury, Re Injury, Concussion and Time Loss in NCAA ISP Injury Data 2009/10 2013/14

| | Injury Rate | Re-injury Rate | Time Loss (days) | Concussion Rate |
|---|---|---|---|---|
| | Rate per 10,000 AEs (25%ile, 75%ile) | | | |
| School-Level Rate of Injury in Sample | 88.5 (58, 108) | 7.2 (2.5, 12.1) | 9.3 (3, 12)* | 5.3 (2.3, 7.1) |

* This is the median time loss for injuries resulting in time loss. Overall, median time loss was 0 days (25%ile=0 days, 75%ile=4days)


Clinicians
1
16
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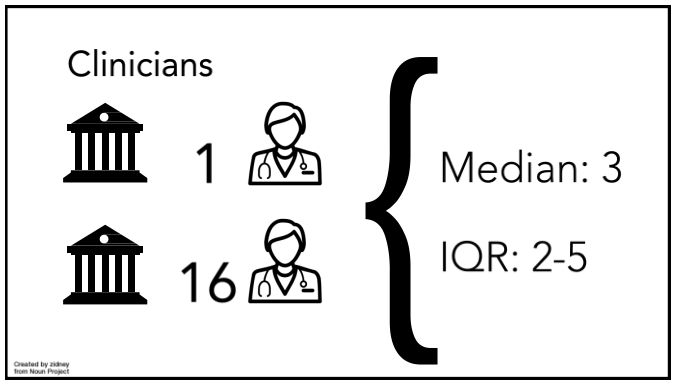
Clinicians
1
16
Median: 3
IQR: 2-5
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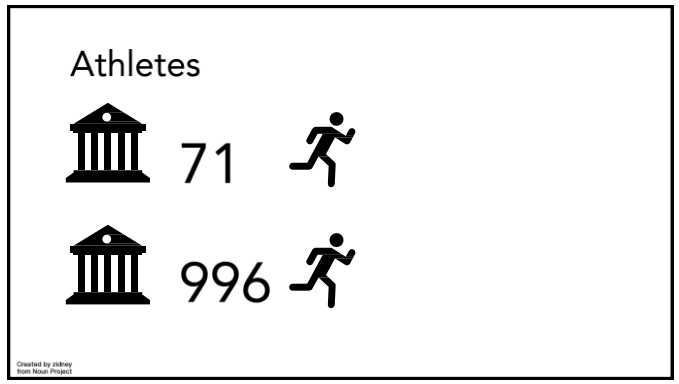
Athletes
71
996
Created by zidney
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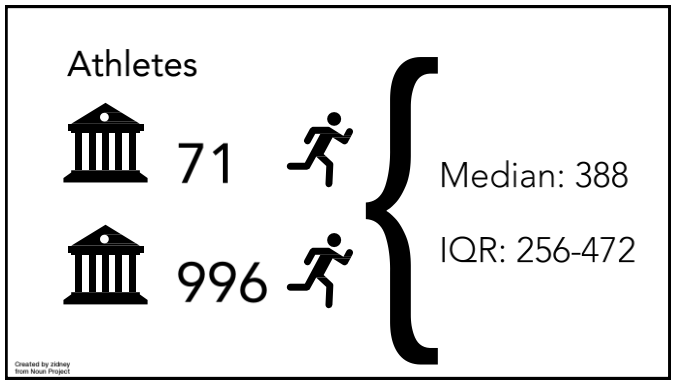
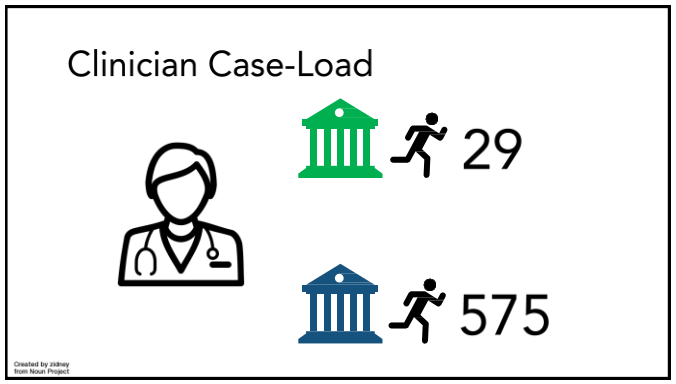
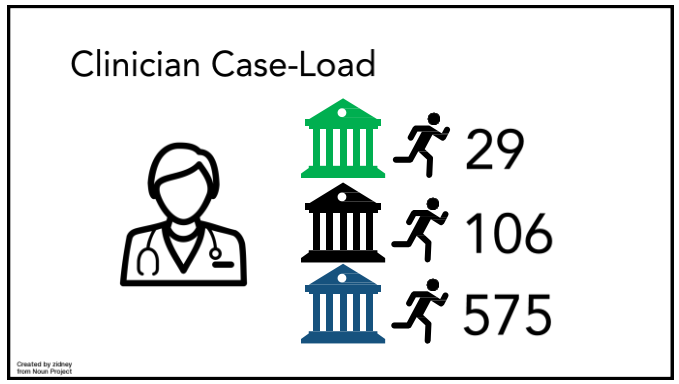

Athletes
71
996
Median: 388
IQR: 256-472


Clinician Case-Load
29
575


Clinician Case-Load
29
106
575

## Methods

Is the number of clinicians per athlete associated with injury rates? Re-injury rates? Concussion rates? Time loss to injury?

Injury Outcome ~ (offset by exposure) + **Clinicians:Athlete** + Sport + Division of Competition + Year + School

Outcomes: Total Injury, Re-Injury, Time loss, Concussion

## Methods

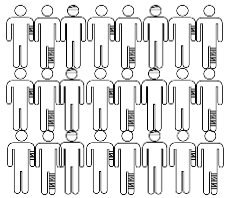
Injury Outcome ~ (offset by exposure) + **Clinicians:Athlete** + Sport + Division of Competition + Year + School

Technical Notes:

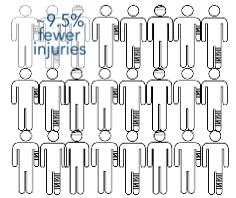
- Zero-inflated Poisson used for TL and Concussion models.
- Clinicians per athlete was standardized for ease of interpretation
- To account for non-independence of teams at the same school, school was included as a random effect. (R packages lme4 and pscl)

## Comparing Injury Rates

Average Clinicians per Athlete

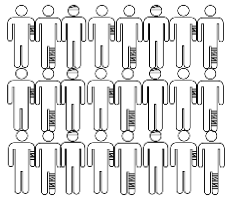


1 SD >Average Clinicians Per Athlete



## Comparing Injury Rates

Average Clinicians per Athlete



1 SD >Average Clinicians Per Athlete

**478** fewer injuries per year in this sample.

**2,394** fewer injuries overall in this sample

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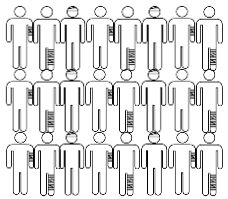
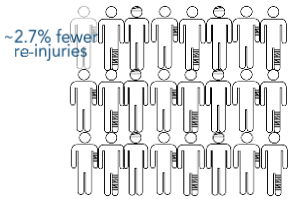
## Comparing Re-Injury Rates

Average Clinicians per Athlete



1 SD >Average Clinicians Per Athlete

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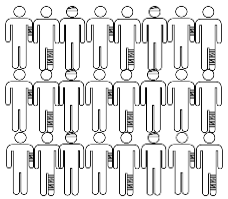
## Comparing Re-Injury Rates

Average Clinicians per Athlete



1 SD >Average Clinicians Per Athlete

13-14 fewer re-injuries annually in this sample.

68 fewer re-injuries overall in this sample.

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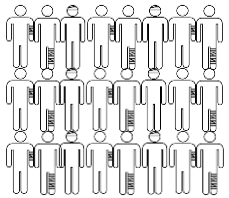
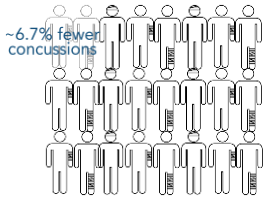
## Comparing Concussion Rates

Average Clinicians per Athlete



1 SD >Average Clinicians Per Athlete

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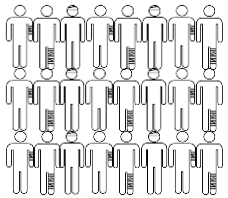
## Comparing Concussion Rates

Average Clinicians per Athlete



1 SD >Average Clinicians Per Athlete

21 fewer concussions annually in this sample.

105 fewer concussions overall in this sample.

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## Comparing Time Loss

Average Clinicians per Athlete


1 SD >Average Clinicians Per Athlete

## Discussion

>Clinicians per athlete associated with

- Fewer injuries
- Fewer re-injuries
- Fewer concussions
- Greater time loss

Limitations:

- Coarse measure of staffing
- Mechanism
- Generalizability?

## Generalizability?

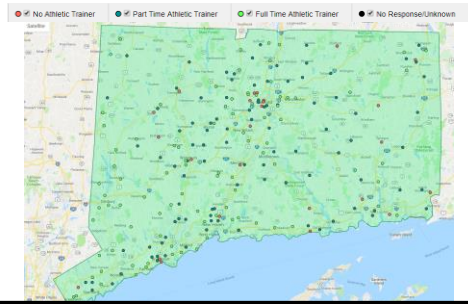
Descriptive Characteristics of Schools that Do and Do Not Contribute Data to NCAA ISP

| | ISP Schools | Non-ISP Schools | Statistic |
|---|---|---|---|
| Total Schools[#] | 271 | 901 | -- |
| | | Mean (SD) | t-value (p-value) |
| Total Athletes | 513 (201) | 399 (176) | -13.97 (<0.001) |
| Clinician patient load* | 139 (100) | 145 (88) | 2.78 (0.005) |
| Total Athletics Revenues* | $15,877,994 ($25,180,796) | $10,581,789 ($19,655,381) | -4.05 (<0.001) |
| | | n (%) | $\chi^2$ value (p-value) |
| Private | 79 (56.8) | 558 (57.9) | 0.04 (0.83) |
| Division of Competition | -- | -- | 65.26 (<0.001) |
| Division 1 | 58 (41.7) | 281 (28.6) | -- |
| Division 2 | 25 (18.0) | 302 (30.8) | -- |
| Division 3 | 56 (40.3) | 398 (40.6) | -- |

[#]Not all variables available for all schools in analyses
*Variable was log transformed for analysis. Raw means and SDs are presented.

3,165 fewer injuries

## High School Context



## High School Context

- Two studies in HS evaluated the relationship between AT presence and SES (WA state: Kroshus et al., WI: Post et al.)
  - Both found ATs less frequently present at schools in lower SES areas
- Kroshus et al. also found a relationship between AT presence and concussion identification

## High School Context

- High School Football Injury Rates and Services by Athletic Trainer Employment Status by Zachary Kerr et al.
- Injury rates and services per injury were greater among full-time school employees compared with outreach ATs.
- Injury rates did not differ when restricted to time-loss only.

## High School Context

**The Influence of Athletic Trainers on the Incidence and Management of Concussions in High School Athletes**
McGuine et al.

- Concussion less frequently diagnosed at schools with fewer ATs.
- Time loss greater at schools with comparatively more ATs.
- RTP protocol less frequently used for concussion at schools with fewer ATs.

## RESEARCH IS A TEAM EFFORT

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