The Impact of Sport Specialization on Lower Extremity Injury Rates in High School Athletes
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Distinguished Scientist
Division of Sports Medicine
University of Wisconsin
School of Medicine and Public Health
COI – Disclosures

Neither I, nor any family member(s), have any relevant financial relationships to be discussed, directly or indirectly, referred to or illustrated within the presentation.

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Don-Joy Inc. Vista, CA. 2012

Previous Research support
Don-Joy Inc. Vista, CA. 2010
Current Research Support

NATIONAL FEDERATION
STATE HIGH SCHOOL
ASSOCIATIONS

NATA RESEARCH &
EDUCATION
FOUNDATION

NOCSAE
National Operating Committee on Standards for Athletic Equipment

WISCONSIN
UNIVERSITY OF WISCONSIN–MADISON
Affiliations

WIAA – Medical Advisory Committee

NATA – REF - Research Review Panel

NFHS – Sports Medicine Advisory Committee
Admitting “my bias”
Family Experience with High School Athletics

36 Varsity Sport Seasons,
Hundreds of athletic competition

9 years of: Baseball, Basketball, X Country, Football, Gymnastics, Lacrosse, Swimming, Track, Wrestling
Benefits of High School Athletics
Anecdotes from the “Front Lines”

“Our team’s post season has been negatively impacted each the last 2 years by club sport injuries…”

“I competed in 84 soccer games my senior year....”

“We can’t get enough girls to play basketball at our school because of club volleyball....”

“Club sports always make my job more difficult…”

“If my son doesn’t play baseball in the fall, they won’t let him play in the spring....”

“My daughter just wants to make her varsity team....”
Specialization “is not about getting a college scholarship anymore,” he said, adding: “It’s about just getting playing time at their high school with their peers now. That’s the way we’ve made it, and it’s a real shame.”

-Tim McGuine

AOSSM Early Sport Specialization Consensus Statement

Robert F. LaPrade,* MD, PhD, Julie Agel,†‡ MA, ATC, Joseph Baker,§ PhD, Joel S. Brenner,‖ MD, MPH, Frank A. Cordasco,*** MD, MS, Jean Côté,‖¶ PhD, Lars Engebretsen,‖‖ MD, PhD, Brian T. Feeley,‖¶ MD, Daniel Gould,‖¶ PhD, Brian Hainline,‖¶ MD, Timothy Hewett,‖¶ MD, Neeru Jayanthi,‖¶ MD, Gregory D. Myer,gh PhD, FACSM, CSCS*D, Philippon,h MD, and
Brittany Patrick, MPH,§

Sports Specialization and Intensive Training in Young Athletes

Joel S. Brenner, MD, MPH, FAAP, COUNCIL ON SPORTS MEDICINE AND FITNESS

mcguine@ortho.wisc.edu
Encourage children to participate in a variety of different unstructured (i.e., deliberate play) and structured age-appropriate sport-related activities and settings, to develop a wide range of athletic, social skills and attributes………
AOSSM Early Sport Specialization Consensus Statement

Robert F. LaPrade,† MD, PhD, Julie Agel,‡‡ MA, ATC, Joseph Baker,§ PhD,

“Early sport specialization has not been shown to be beneficial for high-caliber athletic performance at the national team / Olympic / professional levels, and in fact may be detrimental.”

“Specialized athletes are subject to overuse injury and burnout from concentrated activity.”
AMSSM Position Statement

Sport Specialization, Part I: Does Early Sports Specialization Increase Negative Outcomes and Reduce the Opportunity for Success in Young Athletes?

Gregory D. Myer, PhD,§§ Neeru Jayanthi, MD,§§ John P. Difiori, MD,§§

“Increased degree of specialization is positively correlated with increased serious overuse injury risk.”

“Youth should be encouraged to participate in a variety of sports during their growing years to influence the development of diverse motor skills....”
Recent Evidence


Hall. Sports Specialization and Anterior Knee Pain in Females - *J Sport Rehab* 2015
Sport Specialization - Defined

“year-round intensive training in a single sport at the exclusion of other sports”.

Sport Specialization ≠ Single Sport Participation
Theoretical Model For Specialization and Injury

Biomechanical Factors

Sport Specialization

Volume

Sports Injury
Research

The effects of specialization and sex on anterior Y-Balance performance in high school athletes - *In review*

High School Sport Specialization Patterns of Current Division I Athletes - *Sports Health* 2016

### Specialization Scale (Jayanthi)

<table>
<thead>
<tr>
<th>Question</th>
<th>YES</th>
<th>NO</th>
</tr>
</thead>
<tbody>
<tr>
<td>Do you train more than 75 percent of the time in your primary sport?</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Do you train to improve skill and miss time with friends as a result?</td>
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<td></td>
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<tr>
<td>Have you quit another sport to focus on one sport?</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Do you consider your primary sport more important than your other sports?</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Do you regularly travel out of state for your primary sport?</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Do you train more than eight months a year in your primary sport?</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Score:** 0 – 3 = Not Specialized (NoSPEC),  4 - 6 = Specialized (YesSPEC)

<table>
<thead>
<tr>
<th>Question</th>
<th>YES</th>
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</thead>
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<td>Have you quit another sport to focus on one sport?</td>
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<td></td>
</tr>
</tbody>
</table>

**Score:** 0,1 = Low Specialization (LOW)  
2 = Moderate Specialization (MOD)  
3 = High Specialization (HIGH)  

Jayanthi, AJSM 2015
The Association of Sport Specialization and Training Volume With Injury History in Youth Athletes

- 2011 youth athletes
- 12-18 years of age
- 49% (n=989) female and 51% (n=1022) male
- Mean age 13.7 ± 1.6 years
- Anonymous survey at local youth sport tournaments
  - Sport specialization scale
  - Sport participation volume
  - Injury history in the previous year
Similar to high school data, where 36.4% (n=110) of participants were highly specialized.
Statistical Analysis

- Logistic regression to calculate odds ratios between specialization/volume and injury history (past 12 months)

All analyses adjusted for age and gender
Specialization and Injury

Low (0-1 pt)  Moderate (2 pts)  High (3 pts)

Any Previous Injury OR: 1.62 (1.28, 2.06) P<0.001

Any Overuse Injury OR: 1.48 (1.09, 2.03) P=0.02

Upper Extremity Overuse Injury OR: 1.96 (1.17, 3.43) P=0.02

Post et al, AJSM, In Press
*All analyses adjusted for age and gender

Post et al, AJSM, In Press
Hours per Week and Injury

Hours Per Week ≤ Age

Any Previous Injury
OR: 1.34 (1.12, 1.61)
P<.01

Any Overuse injury
OR: 1.26 (1.01, 1.59)
P=0.04

Hours Per Week > Age

Post et al, AJSM, In Press
Summary

• Prevalence of specialization depends on multiple factors
  – Female
  – Peaks around age 15
  – Large school

• High levels of specialization increase:
  – Chances of burnout (Jayanthi 2013)
  – High sport volume training
  – Movement asymmetry
  – Overuse injury risk
Previous Research

Limitations: Small studies
Convenience samples
Retrospective designs
Descriptive findings
Limited injury focus
Simple analyses

Alternatives: Prospective design
Population samples
Direct data collection
Broad injury focus
Rigorous data analyses
Solution….. a New study

Prospective

Diverse school sample

Enroll actual athletes from multiple sports

Collect baseline data and record all exposures

Licensed medical providers (AT’s) collect data on specific injuries (lower extremity).

Analyses include: Multivariate analyses with Cox Proportional Hazard Modeling
Funding

![National Federation of High School Associations](image1)

![American Medical Society for Sports Medicine](image2)

![Wisconsin University of Wisconsin-Madison](image3)
METHODS
Data collection: 2015/16 academic year

Sites: 29 WI high schools ATs in with WISIRN

Subjects: (male and female, interscholastic athletes in grades 9-12).

Baseline Data: Previous time loss LEI

Club and interscholastic sports
Primary Sport
Competition volume
Specialization Scale (Jayanthi)

Daily Athletic Exposures (AE): All practices and games.

Injury Data: AT’s record onset, injury type, days lost etc.

Analyses: %, days lost due to injury (Med [IQR 25th,75th], Odds Ratios (OR, [95%CI]) Chi Square, Fishers exact tests, Cox hazards models.
## Specialization Scale (Jayanthi)

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### Additional Specialization Scale

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<tr>
<th>Question</th>
<th>YES</th>
<th>NO</th>
</tr>
</thead>
<tbody>
<tr>
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<tr>
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<td></td>
<td></td>
</tr>
<tr>
<td>Do you train more than eight months a year in your primary sport?</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Score:**
- 0,1 = Low Specialization (LOW)
- 2 = Moderate Specialization (MOD)
- 3 = High Specialization (HIGH)
Results

1,544 Subjects
(Female = 50%, Age = 16.0 ± 1.1)

2,843 Athletic Seasons

167,349 Athletic Exposures
## School Size and Setting

<table>
<thead>
<tr>
<th>School size (Enrollment)</th>
<th>Rural</th>
<th>Suburban</th>
<th>Urban</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>SMALL (&lt; 500)</td>
<td>8</td>
<td>1</td>
<td>1</td>
<td>10</td>
</tr>
<tr>
<td>MEDIUM (501 - 1000)</td>
<td>5</td>
<td>4</td>
<td>1</td>
<td>10</td>
</tr>
<tr>
<td>LARGE (&gt; 1,000)</td>
<td>1</td>
<td>7</td>
<td>1</td>
<td>9</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>14</strong></td>
<td><strong>12</strong></td>
<td><strong>3</strong></td>
<td><strong>29</strong></td>
</tr>
</tbody>
</table>
# Subject Demographics

<table>
<thead>
<tr>
<th>Variables</th>
<th>(%)</th>
<th>Variables</th>
<th>(%)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Sex</strong></td>
<td></td>
<td><strong>Previous LEI</strong>*</td>
<td></td>
</tr>
<tr>
<td>Female</td>
<td>50.5</td>
<td>No</td>
<td>68.3</td>
</tr>
<tr>
<td>Male</td>
<td>49.5</td>
<td>Yes</td>
<td>31.7</td>
</tr>
<tr>
<td><strong>Grade</strong></td>
<td></td>
<td><strong>Primary sport league</strong></td>
<td></td>
</tr>
<tr>
<td>9</td>
<td>27.1</td>
<td>No</td>
<td>50.3</td>
</tr>
<tr>
<td>10</td>
<td>27.1</td>
<td>Yes</td>
<td>49.2</td>
</tr>
<tr>
<td>11</td>
<td>24.7</td>
<td></td>
<td></td>
</tr>
<tr>
<td>12</td>
<td>20.1</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Primary Sport</strong></td>
<td></td>
<td><strong>Primary sport competitions</strong></td>
<td></td>
</tr>
<tr>
<td>Base / Softball</td>
<td>8.5</td>
<td>Low (&lt; 30)</td>
<td>52.8</td>
</tr>
<tr>
<td>Basketball</td>
<td>21.4</td>
<td>Moderate (30 - 60)</td>
<td>30.0</td>
</tr>
<tr>
<td>Football</td>
<td>17.0</td>
<td>High (&gt; 60)</td>
<td>17.2</td>
</tr>
<tr>
<td>Soccer</td>
<td>20.2</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Tennis</td>
<td>4.3</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Track / XC</td>
<td>4.0</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Volleyball</td>
<td>15.9</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Wrestling</td>
<td>2.3</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Other¹</td>
<td>11.3</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Quick Hits!

20% of high school athletes participated in a **single sport**

**Females** were more likely to specialize

**Soccer:** highest level of specialization

50% played in a **league outside of school**

15% competed in a club sport and high school sport **simultaneously**

17% took part in **60 or more primary** sport competitions (school and club) per year
% YesSPEC

- Female: 41%
- Male: 29%
Distribution of Specialization

- **LOW**
  - **FEMALES**: 54.4%
  - **MALES**: 64.6%

- **MODERATE**
  - **FEMALES**: 29.1%
  - **MALES**: 25.0%

- **HIGH**
  - **FEMALES**: 16.4%
  - **MALES**: 10.3%
Distribution of Specialization

<table>
<thead>
<tr>
<th>Sport</th>
<th>MODERATE</th>
<th>HIGH</th>
</tr>
</thead>
<tbody>
<tr>
<td>SOCCER</td>
<td>53%</td>
<td>18%</td>
</tr>
<tr>
<td>VOLLEYBALL</td>
<td>47%</td>
<td></td>
</tr>
<tr>
<td>BASKETBALL</td>
<td>44%</td>
<td></td>
</tr>
<tr>
<td>FOOTBALL</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Distribution of Specialization

- BASE/SOFTBALL: 37%
- WRESTLING: 36%
- TENNIS: 31%
- TRACK: 16%
- OTHER: 41%
Previous LEI – Retrospective Data

Increased previous injuries:
- 60 primary sport competitions
- + Club sport team,
- Highly specialized

“Females more likely to participate in high competition volume, club teams, and be highly specialized, potentially placing them at greater risk for injury.”

The Association of Competition Volume, Club Sports, and Sport Specialization with Sex and Lower Extremity Injury History in High School Athletes. Eric Post et. al. SportsHealth 2017
New Injuries

### Characteristics of New LEI

<table>
<thead>
<tr>
<th>Body Area</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Foot</td>
<td>8.0</td>
</tr>
<tr>
<td>Ankle</td>
<td>34.4</td>
</tr>
<tr>
<td>Lower Leg</td>
<td>12.0</td>
</tr>
<tr>
<td>Knee</td>
<td>25.0</td>
</tr>
<tr>
<td>Upper Leg</td>
<td>12.7</td>
</tr>
<tr>
<td>Hip / Pelvis</td>
<td>8.0</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Injury Onset</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Acute</td>
<td>66.3</td>
</tr>
<tr>
<td>Gradual</td>
<td>23.1</td>
</tr>
<tr>
<td>Recurrent</td>
<td>7.9</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Injury Type</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ligament Sprain</td>
<td>40.9</td>
</tr>
<tr>
<td>Muscle / Tendon Strain</td>
<td>25.4</td>
</tr>
<tr>
<td>Tendonitis / Tenosynovitis</td>
<td>19.6</td>
</tr>
<tr>
<td>Fracture - Stress</td>
<td>3.6</td>
</tr>
<tr>
<td>Fracture - Acute</td>
<td>2.9</td>
</tr>
<tr>
<td>Meniscus Tear</td>
<td>1.8</td>
</tr>
<tr>
<td>Other</td>
<td>5.8</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Surgery</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Yes</td>
<td>8.3</td>
</tr>
<tr>
<td>No</td>
<td>91.7</td>
</tr>
</tbody>
</table>

N = 235 Subjects
N = 276 Injuries
# Actions Taken for New LEI

<table>
<thead>
<tr>
<th>Medical provider</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>School AT</td>
<td>67.6</td>
</tr>
<tr>
<td>Primary Care Provider</td>
<td>24.1</td>
</tr>
<tr>
<td>ER / ED</td>
<td>8.2</td>
</tr>
<tr>
<td>Other</td>
<td>1.1</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Diagnostics</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>X-RAY</td>
<td>30.9</td>
</tr>
<tr>
<td>MRI</td>
<td>15.4</td>
</tr>
<tr>
<td>CT</td>
<td>1.2</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Surgery</th>
<th></th>
</tr>
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<tr>
<td>YES</td>
<td>8.3</td>
</tr>
</tbody>
</table>
## Injury rates for each sport

<table>
<thead>
<tr>
<th>Primary Sport</th>
<th>n</th>
<th>Injured (%)</th>
<th>Cox Hazard Ratio (95% CI)</th>
<th>P-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Base / Softball</td>
<td>131</td>
<td>16 (12.2)</td>
<td>reference</td>
<td>--</td>
</tr>
<tr>
<td>Basketball</td>
<td>330</td>
<td>70 (21.2)</td>
<td>1.88 (1.20-2.95)</td>
<td>0.006</td>
</tr>
<tr>
<td>Football</td>
<td>262</td>
<td>47 (17.9)</td>
<td>2.21 (1.22-4.02)</td>
<td>0.009</td>
</tr>
<tr>
<td>Soccer</td>
<td>312</td>
<td>46 (14.7)</td>
<td>1.75 (1.12-2.75)</td>
<td>0.02</td>
</tr>
<tr>
<td>Tennis</td>
<td>67</td>
<td>1 (1.5)</td>
<td>0.21 (0.03-1.39)</td>
<td>0.11</td>
</tr>
<tr>
<td>Track / X Country</td>
<td>62</td>
<td>9 (14.5)</td>
<td>1.38 (0.51-3.74)</td>
<td>0.53</td>
</tr>
<tr>
<td>Volleyball</td>
<td>246</td>
<td>29 (11.8)</td>
<td>1.10 (0.65-1.88)</td>
<td>0.72</td>
</tr>
<tr>
<td>Wrestling</td>
<td>35</td>
<td>5 (14.3)</td>
<td>1.29 (0.47-3.54)</td>
<td>0.63</td>
</tr>
<tr>
<td>Other¹</td>
<td>99</td>
<td>13 (7.5)</td>
<td>0.87 (0.37-2.07)</td>
<td>0.76</td>
</tr>
</tbody>
</table>
## Sex, Competitions and Specialization

<table>
<thead>
<tr>
<th>Variable</th>
<th>n</th>
<th>Injured (%)</th>
<th>Cox Hazard Ratio (95% CI)</th>
<th>P-value</th>
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<tbody>
<tr>
<td><strong>Sex</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Female</td>
<td>780</td>
<td>119 (15.3)</td>
<td>reference</td>
<td>--</td>
</tr>
<tr>
<td>Male</td>
<td>764</td>
<td>116 (15.2)</td>
<td>0.84 (0.62-1.15)</td>
<td>0.28</td>
</tr>
<tr>
<td><strong>Sport Competitions</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Low (&lt; 30)</td>
<td>816</td>
<td>112 (13.7)</td>
<td>reference</td>
<td>--</td>
</tr>
<tr>
<td>Moderate (30-60)</td>
<td>463</td>
<td>63 (13.6)</td>
<td>0.82 (0.58-1.15)</td>
<td>0.25</td>
</tr>
<tr>
<td>High (&gt; 60)</td>
<td>265</td>
<td>60 (22.6)</td>
<td>1.18 (0.83-1.69)</td>
<td>0.36</td>
</tr>
<tr>
<td><strong>Specialization level</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Low</td>
<td>918</td>
<td>112 (12.2)</td>
<td>reference</td>
<td>-</td>
</tr>
<tr>
<td>Moderate</td>
<td>418</td>
<td>79 (18.9)</td>
<td>1.51 (1.04 - 2.20)</td>
<td>0.03</td>
</tr>
<tr>
<td>High</td>
<td>207</td>
<td>44 (21.3)</td>
<td>1.85 (1.12 - 3.06)</td>
<td>0.02</td>
</tr>
</tbody>
</table>
New LEI Incidence  (3 pt. scale)

<table>
<thead>
<tr>
<th></th>
<th>LOW</th>
<th>MOD</th>
<th>HIGH</th>
</tr>
</thead>
<tbody>
<tr>
<td>12.2%</td>
<td>18.9%</td>
<td>21.3%</td>
<td></td>
</tr>
</tbody>
</table>

Multivariate Cox Hazards Ratios

MOD: 1.51 (1.04 - 2.20), $p = 0.029$  
HIGH: 1.85 (1.12 - 3.06) $p = 0.017$
# LEI Characteristics

<table>
<thead>
<tr>
<th></th>
<th>n</th>
<th>Injured (%)</th>
<th>Cox Hazard Ratio (95% CI)</th>
<th>P-value</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Acute LEI</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Low</td>
<td>895</td>
<td>88 (9.8)</td>
<td>reference</td>
<td>-</td>
</tr>
<tr>
<td>Moderate</td>
<td>391</td>
<td>52 (13.3)</td>
<td>1.25 (0.78-1.99)</td>
<td>0.35</td>
</tr>
<tr>
<td>High</td>
<td>187</td>
<td>24 (12.8)</td>
<td>1.25 (0.71-2.18)</td>
<td>0.44</td>
</tr>
<tr>
<td><strong>Chronic / Repetitive</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Low</td>
<td>831</td>
<td>24 (2.9)</td>
<td>reference</td>
<td>-</td>
</tr>
<tr>
<td>Moderate</td>
<td>366</td>
<td>27 (7.4)</td>
<td>2.61 (1.34-5.07)</td>
<td>0.005</td>
</tr>
<tr>
<td>High</td>
<td>183</td>
<td>20 (10.9)</td>
<td>4.74 (2.04-11.05)</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td><strong>Surgery - Yes</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Low</td>
<td>817</td>
<td>10 (1.2)</td>
<td>reference</td>
<td>-</td>
</tr>
<tr>
<td>Moderate</td>
<td>344</td>
<td>5 (1.5)</td>
<td>1.04 (0.35-3.10)</td>
<td>0.951</td>
</tr>
<tr>
<td>High</td>
<td>168</td>
<td>5 (3.0)</td>
<td>1.39 (0.30-6.36)</td>
<td>0.675</td>
</tr>
</tbody>
</table>
Injury Onset and Sport Specialization

Chronic / Repetitive

MOD > LOW
HR: 2.61 (1.34 – 5.07)
$p = 0.005$

HIGH > LOW
HR 4.74 (2.04–11.05)
$p < 0.001$
Question:
Does sport specialization increase the incidence of LEI equally in both males and female athletes?

New Analyses:
A total of N = 902 subjects in paired sports (Baseball / Softball, Basketball, X–Country, Soccer, Tennis and Track)

95,444 athletic exposures

LEI for MOD subjects was not higher than LOW subjects (HR = 1.39 [0.89-2.15], p = 0.144)

LEI for HIGH subjects was higher than LOW subjects (HR = 2.10 [1.32-3.35], p = 0.002)
Comparison in Paired Sports

Males: 14.6%, Female: 16.7%

HR: 0.89 (0.66 - 1.20)  
\( p = 0.452 \)
Discussion

The first Study to prospectively document the association between sport specialization and risk of LEI

MOD specialized > 50% incidence of LEI than LOW

HIGH specialized > 85% incidence of LEI than LOW

Relationships existed even after controlling for sex, grade in school, primary sport, competition volume, and previous history of LEI.
Discussion

This study supports the findings of previous retrospective and case control (clinic) research.

Highly specialized athletes more likely to sustain a non-acute (gradual or recurrent) injury than athletes in the low specialization category.
Why is this important?

Sports Injury Economics

North Carolina High School Athletic Injury Study (Knowles 2013)

Direct Costs = $709

Human Capitol Costs = $2,223

Comprehensive Costs = $10,432

Ankle = $11,925  Knee = $8,868

Shoulder = $13,254  All other = $15,985
Economic Costs – Ankle Sprains

US CPSC NEISS 2013 Estimate (ages 14 -18)

n = 186,200 ankle sprains / strains

$283 million (direct)

$2.4 billion (indirect)
Who is this patient?
Limitations

Recall bias

All data collected in a single state

Some sports not represented
Limitations

Specialized athletes may = more skill
May played > % of a game or
a more intense level

Did not record club sport injuries

Did not measure “total sport volume” for
multi sport athletes
Key Points

Specialized athletes:

2X more likely to report sustaining a previous injury

Much higher injury “new” rate

More likely to sustain a gradual onset / repetitive use injury

More likely to sustain an injury when controlling for all variables
Implications to consider

50% athletes competed in their primary sport outside of school

These athletes have 1/2 to 2/3 of their primary competitions outside of school

What level of health care is provided to club athletes (not interscholastic)?

Should club sport teams and associations be required to provide the same level of sports medicine care as US high schools?
Costs of Club Sports
2014 Texas

**Volleyball**: $7,000 to $10,000 year.

**Soccer**: $4,000 or $5,000 up to $7,000 to $10,000

**Girls basketball**: $3,500 year – no travel

**Softball**: $6,000 to $8,000 per summer player

**Baseball**: $2,000 year - no travel
Specialization Costs to Consider

What about kids who “can’t afford” to play on a club team?

Are these kids given the message they shouldn’t participate in high school sports?
NEXT STEPS
Dissemination of Findings

Recent Mass Media:

Presentations

Manuscripts

The Association of Competition Volume, Club Sport Participation, and Sport Specialization with Sex and History of Lower Extremity Injury in High School Athletes. *SportsHealth*

Future Research

Upper Extremity Injuries
Target: Baseball, Softball, Swim, Tennis & Volleyball
Sample: US high schools (50 states)
Subjects: N = 5000+
Data Collection: Web based

Longitudinal Studies
Target: 10,000 youth athletes
Sample: Multi-state
Subjects: 8 yr. – 10yr. male and female
Data Collection: 10 Years
Thank You!

Wisconsin River, Sauk County WI, USA
mcguine@ortho.wisc.edu

5/6/2017
New LEI Incidence

Odds Ratio = 1.73 (1.29 - 2.31), $p = 0.01$
Multivariate Cox Hazards Ratio = 1.52 (1.11 – 2.06) $p = 0.008$
% YesSPEC by Sport

- Soccer: 46.9%
- Volleyball: 42.6%
- Basketball: 36.6%
- Base / Softball: 35.1%
- Wrestling: 28.5%
- Tennis: 25.3%
- Football: 16.0%
- Track / X Country: 14.5%