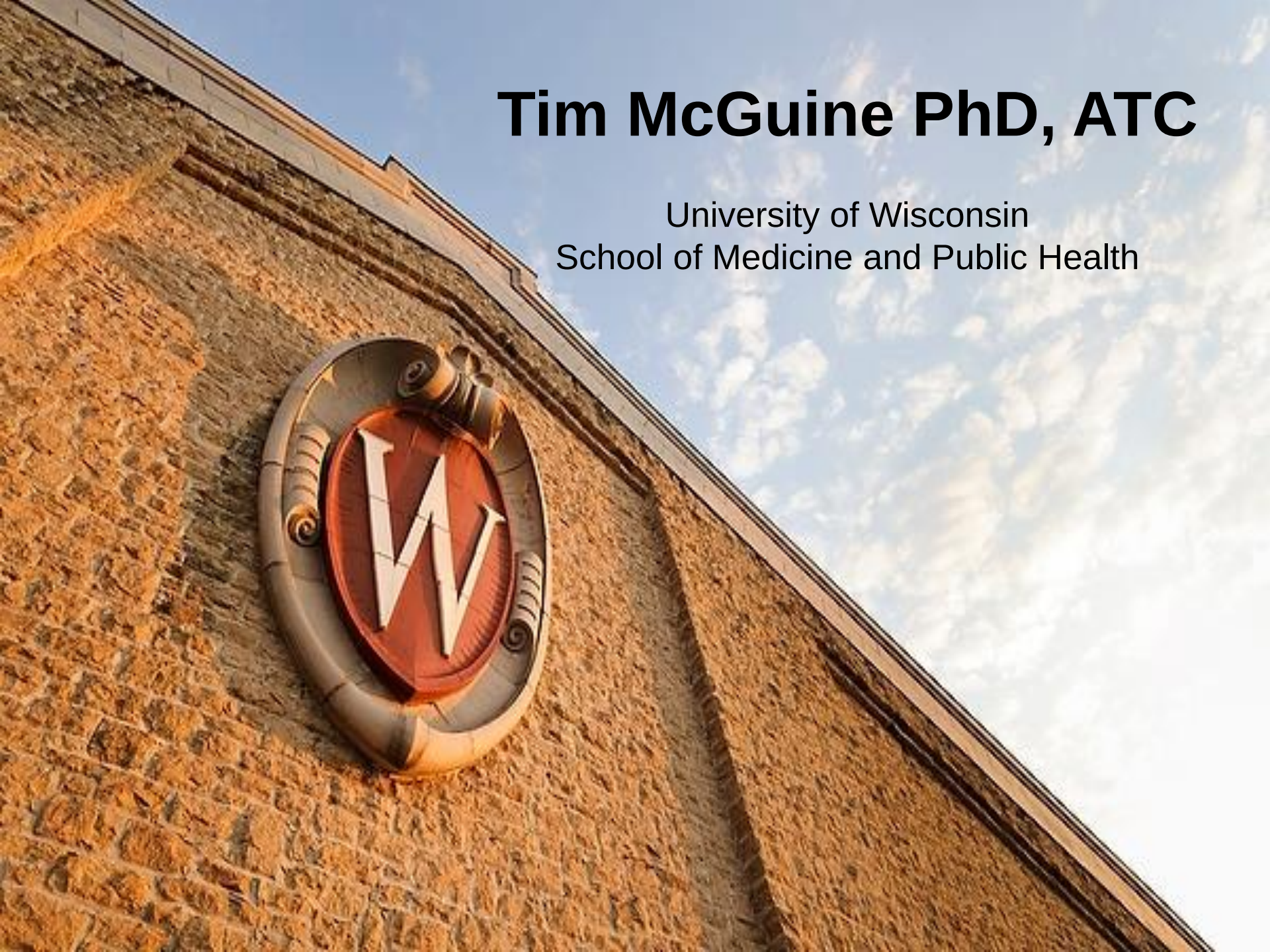
DEPARTMENT OF
Orthopedics
and Rehabilitation
UNIVERSITY OF WISCONSIN
SCHOOL OF MEDICINE AND PUBLIC HEALTH

Sport Specialization:

Prevalence, Attitudes, Behaviors and Injury Risks

mcguine@ortho.wisc.edu



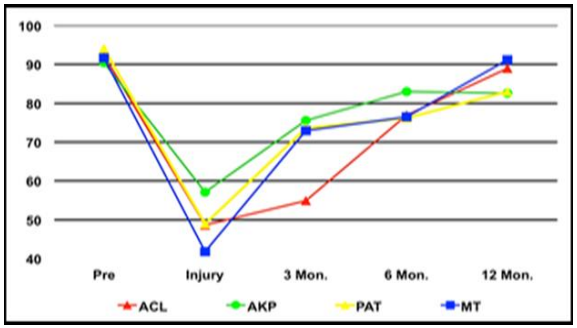
Tim McGuine PhD, ATC

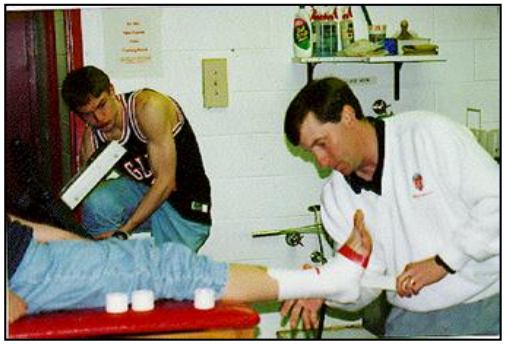
University of Wisconsin
School of Medicine and Public Health

COI – Disclosures

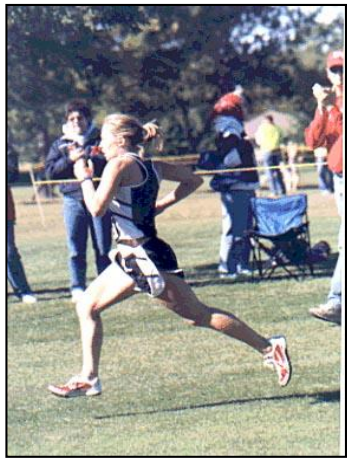
Neither I, nor any family member(s), have any relevant financial relationships to be discussed, directly or indirectly, referred to or illustrated within the presentation.

Background and Perspectives





"Direct" Experience With High School Athletics



mcguine@ortho.wisc.edu

Research Focus

Identifying and understanding:

- ***Risk factors***
- ***Prevention techniques***
- ***Health related outcomes***

For injuries sustained by adolescent and high school athlete populations.

DEPARTMENT OF
Orthopedics
and Rehabilitation
UNIVERSITY OF WISCONSIN
SCHOOL OF MEDICINE AND PUBLIC HEALTH

The Wisconsin Sports Injury Research Network

Collect and report “real time” research data in high schools

16,000+ adolescent athletes,

96 High schools

Cross sectional, prospective cohort and RCT’s

mcguine@ortho.wisc.edu

Sport Specialization……Background

Anecdotes

"Our team's post season has been impacted the last 2 years by club sport injuries…"

"I played in 84 soccer games my senior year...."

"We can't get enough girls to play basketball at our school because of club volleyball…."

"If my son doesn't play baseball in the fall, they won't let him play in the spring…."

'My 12 yr. old was asked to sign a contract to train with her club soccer team all winter and not play other sports…."

My daughter just wants to make her varsity team…."

mcguine@ortho.wisc.edu

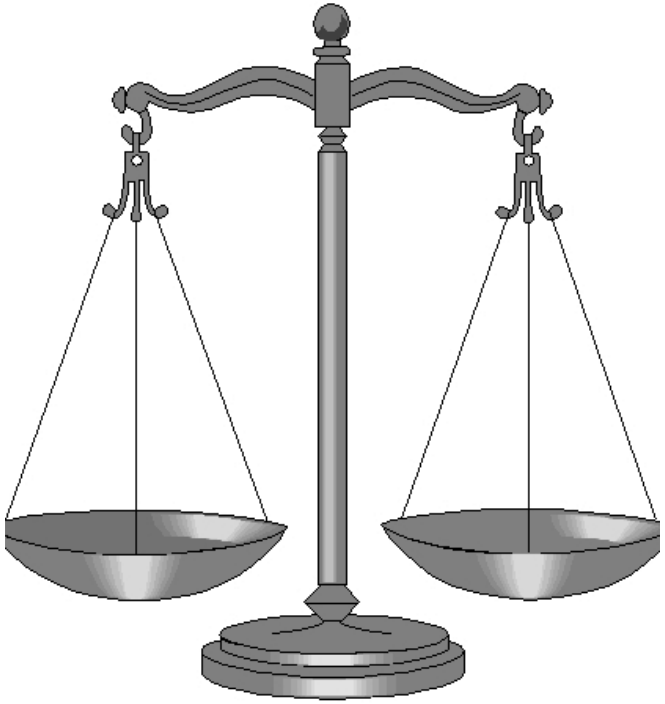
DEPARTMENT OF
Orthopedics
and Rehabilitation
UNIVERSITY OF WISCONSIN
SCHOOL OF MEDICINE AND PUBLIC HEALTH

Sports Specialization

Risks vs Benefits

Multi Sports

- ↓ Injuries
- ↓ Burnout
- \+ Crosstrain
- \+ Late Adoption



Specialization

- Performance
- Adaptive Changes
- Culture
- More Training

mcguine@ortho.wisc.edu

Sport Specialization Defined

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

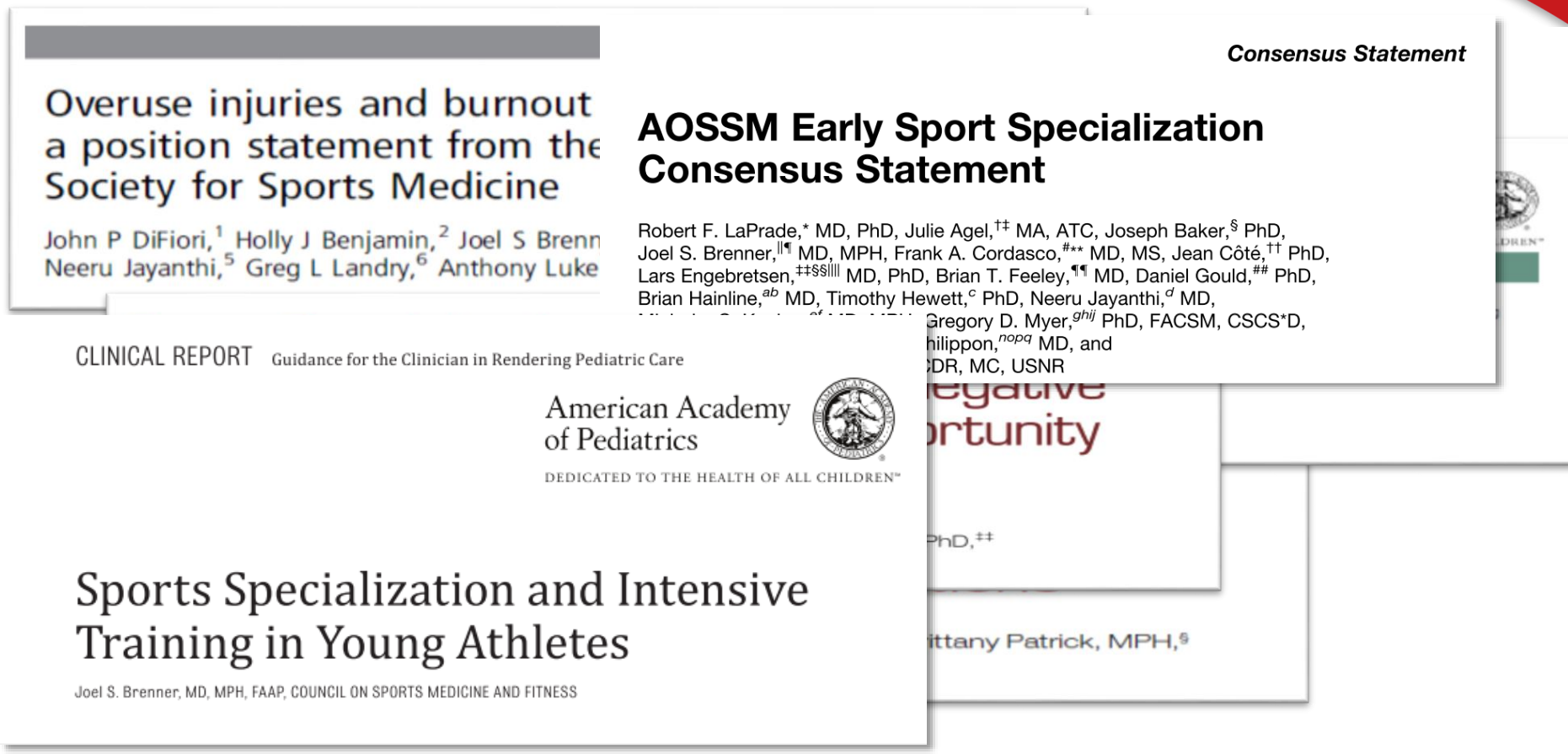
Sport Specialization

≠

Single Sport Participation

Dec 2016

mcguine@ortho.wisc.edu



Overuse injuries and burnout
a position statement from the
Society for Sports Medicine

John P DiFiori,[1] Holly J Benjamin,[2] Joel S Brenn
Neeru Jayanthi,[5] Greg L Landry,[6] Anthony Luke

Consensus Statement

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,[ab] MD, Timothy Hewett,[c] PhD, Neeru Jayanthi,[d] MD, Gregory D. Myer,[ghij] PhD, FACSM, CSCS*D, hilippon,[nopq] MD, and DR, MC, USNR

CLINICAL REPORT Guidance for the Clinician in Rendering Pediatric Care

American Academy of Pediatrics

DEDICATED TO THE HEALTH OF ALL CHILDREN™

Sports Specialization and Intensive Training in Young Athletes

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

egative
ortunity

PhD,[‡‡]

ittany Patrick, MPH,[§]

ATTITUDES AND BEHVIORS

Specialization Scale (Jayanthi)

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

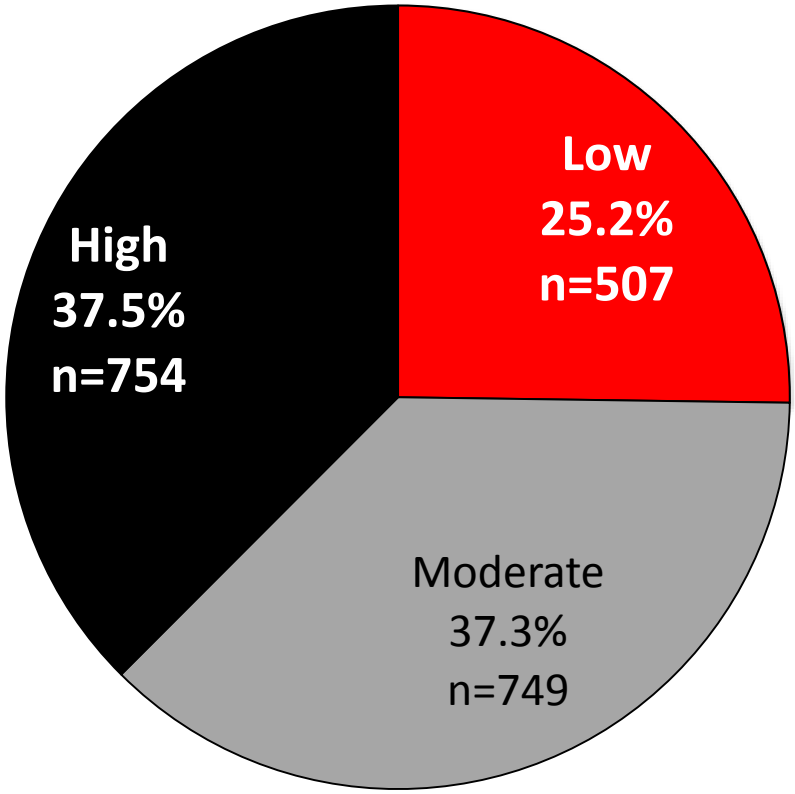
Score: 0 – 3 = Not Specialized (NoSPEC), 4 - 6 = Specialized (YesSPEC)

Have you quit another sport to focus on one sport?	YES NO
Do you consider your primary sport more important than your other sports?	YES NO
Do you train more than eight months a year in your primary sport?	YES NO

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

Jayanthi, *AJSM* 2015

Prevalence of Specialization



Similar youth and high school data

Exploring Attitudes and Behaviors

2016 /17 Parent & Child Survey

Anonymous, Self-administered

3 Sections:

- Background of parent and child
- Sport participation patterns
- Perceptions and knowledge

N = 1000 parents

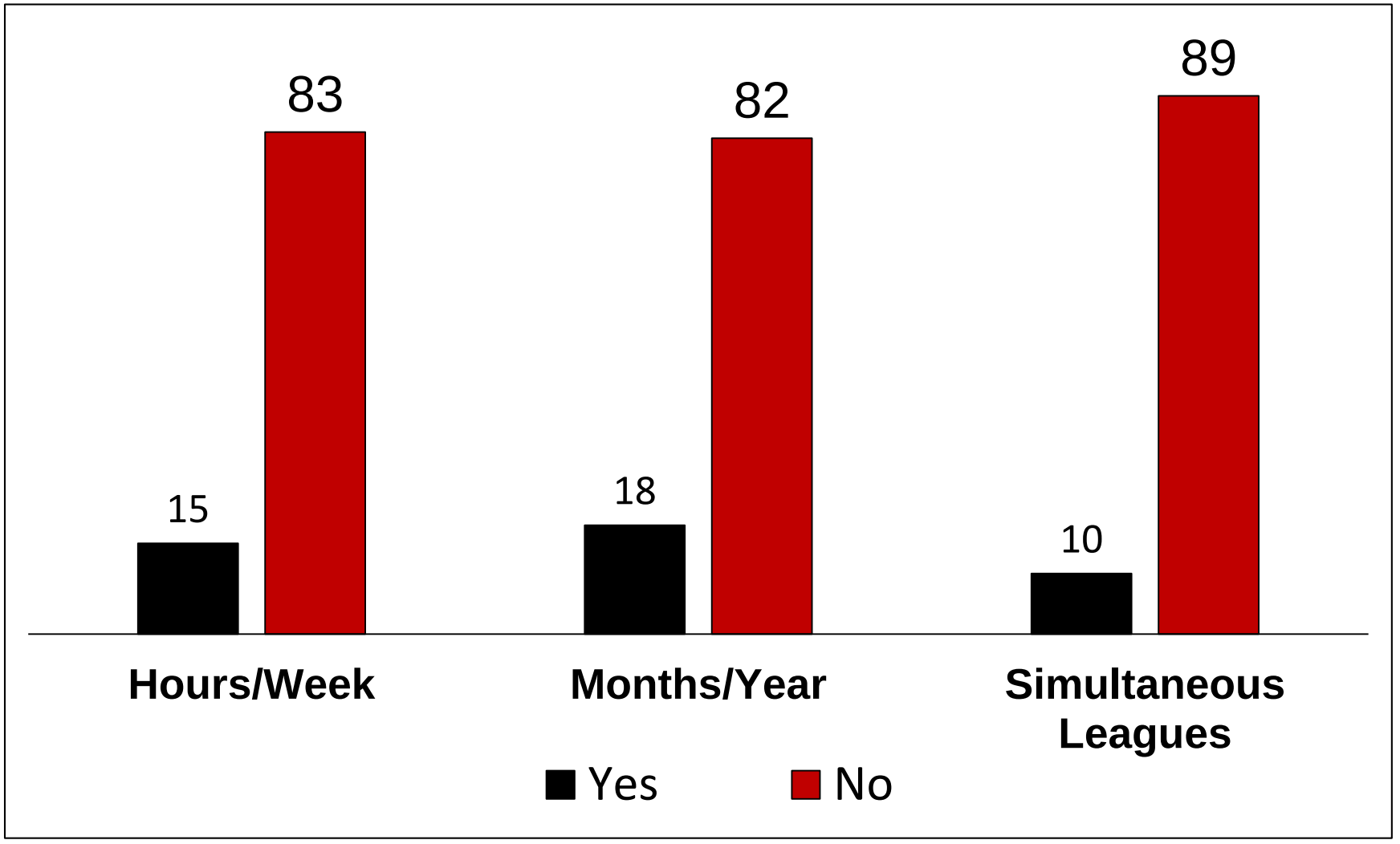
61% female (n=614) 44.5 ± 6.7 yrs

N = 1000 youth athletes

48% female (n=234) 13.1 ± 2.8 yrs

DEPARTMENT OF
Orthopedics
and Rehabilitation
UNIVERSITY OF WISCONSIN
SCHOOL OF MEDICINE AND PUBLIC HEALTH

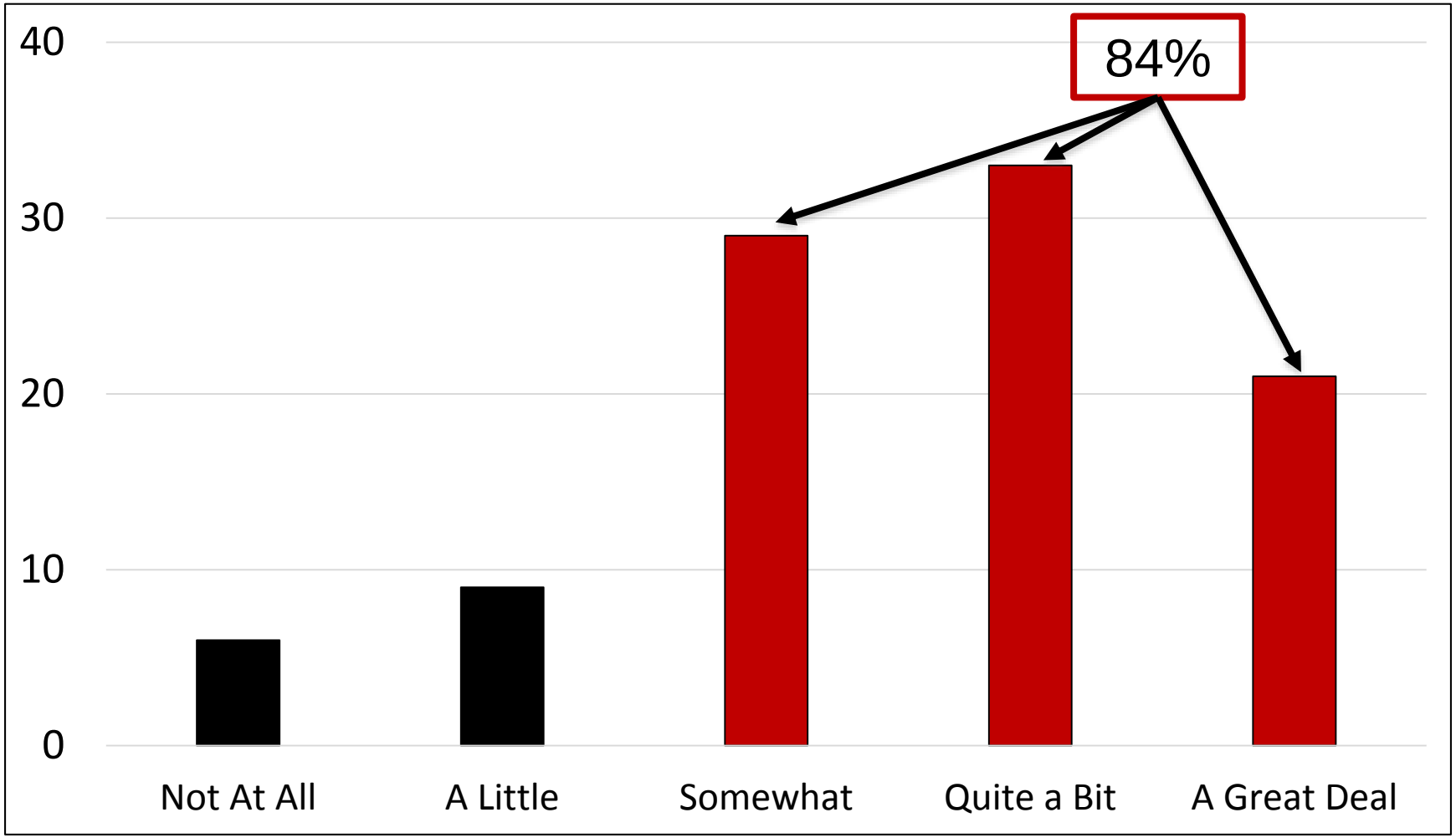
Parents Awareness of Safe Sport Recommendations



mcguine@ortho.wisc.edu

DEPARTMENT OF
Orthopedics
and Rehabilitation
UNIVERSITY OF WISCONSIN
SCHOOL OF MEDICINE AND PUBLIC HEALTH

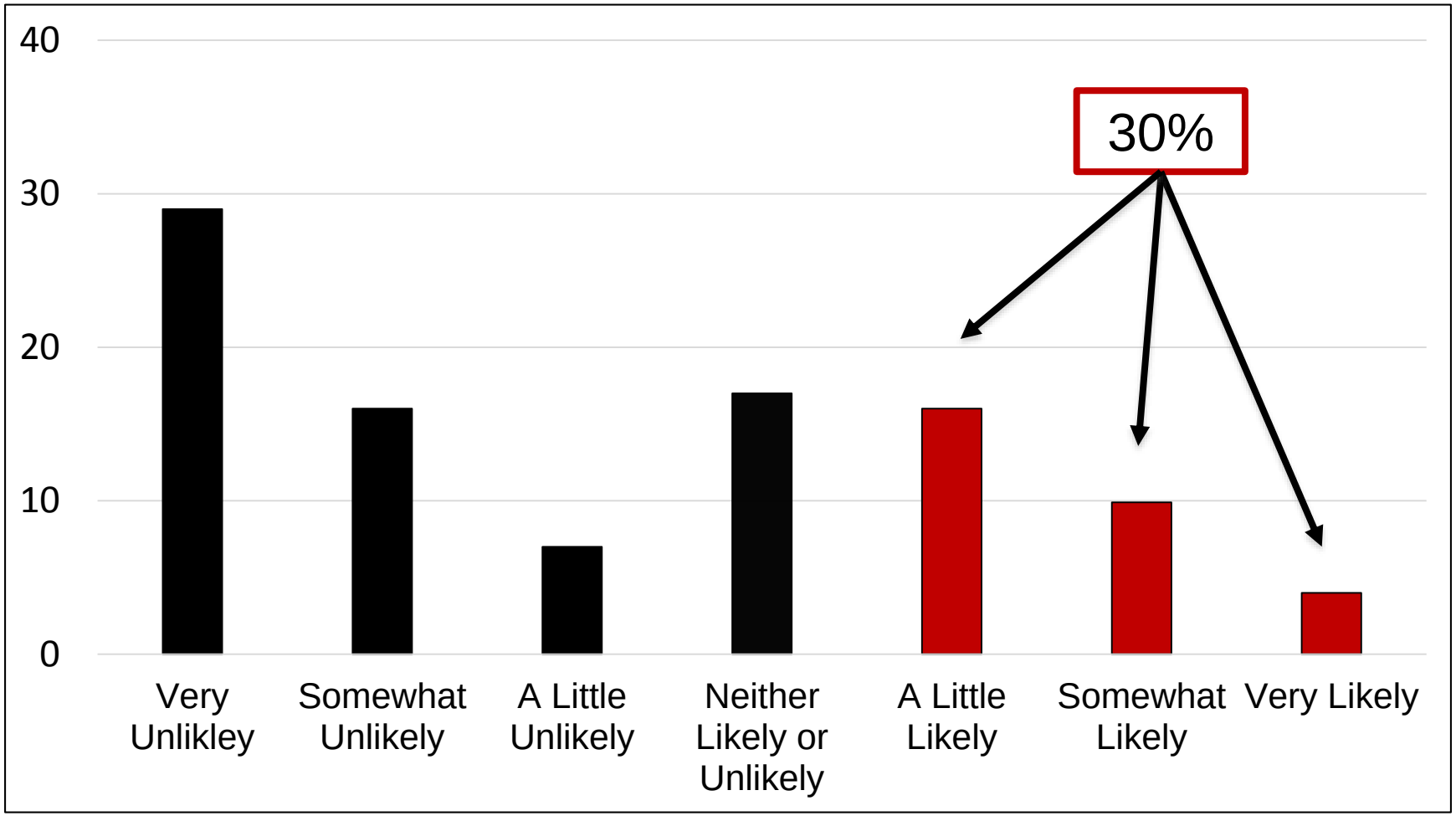
Parent: How much of a problem is early sport specialization in youth sports?



mcguine@ortho.wisc.edu

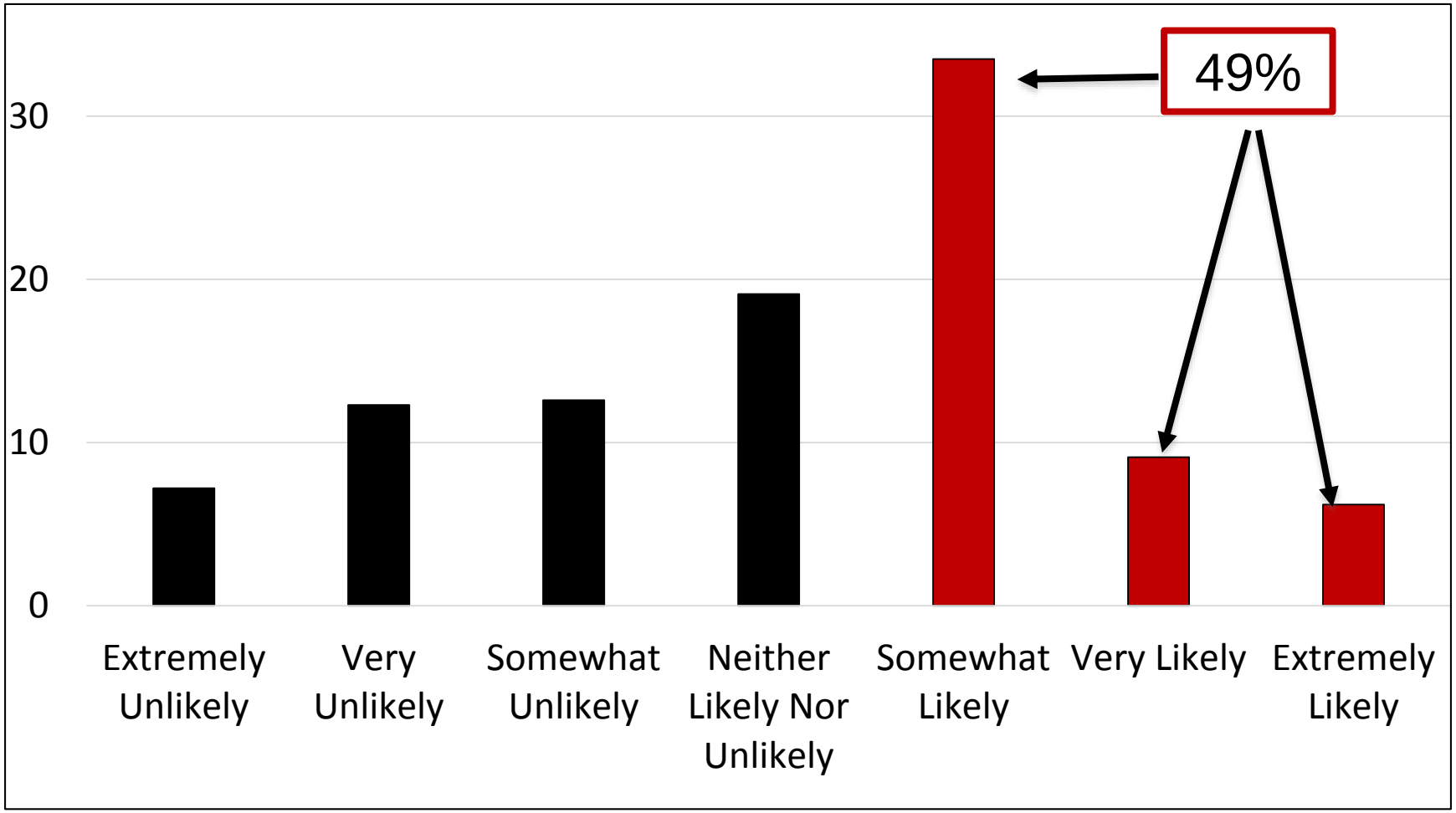
DEPARTMENT OF
Orthopedics
and Rehabilitation
UNIVERSITY OF WISCONSIN
SCHOOL OF MEDICINE AND PUBLIC HEALTH

How likely do you believe <u>your child</u> will receive a college athletic scholarship?



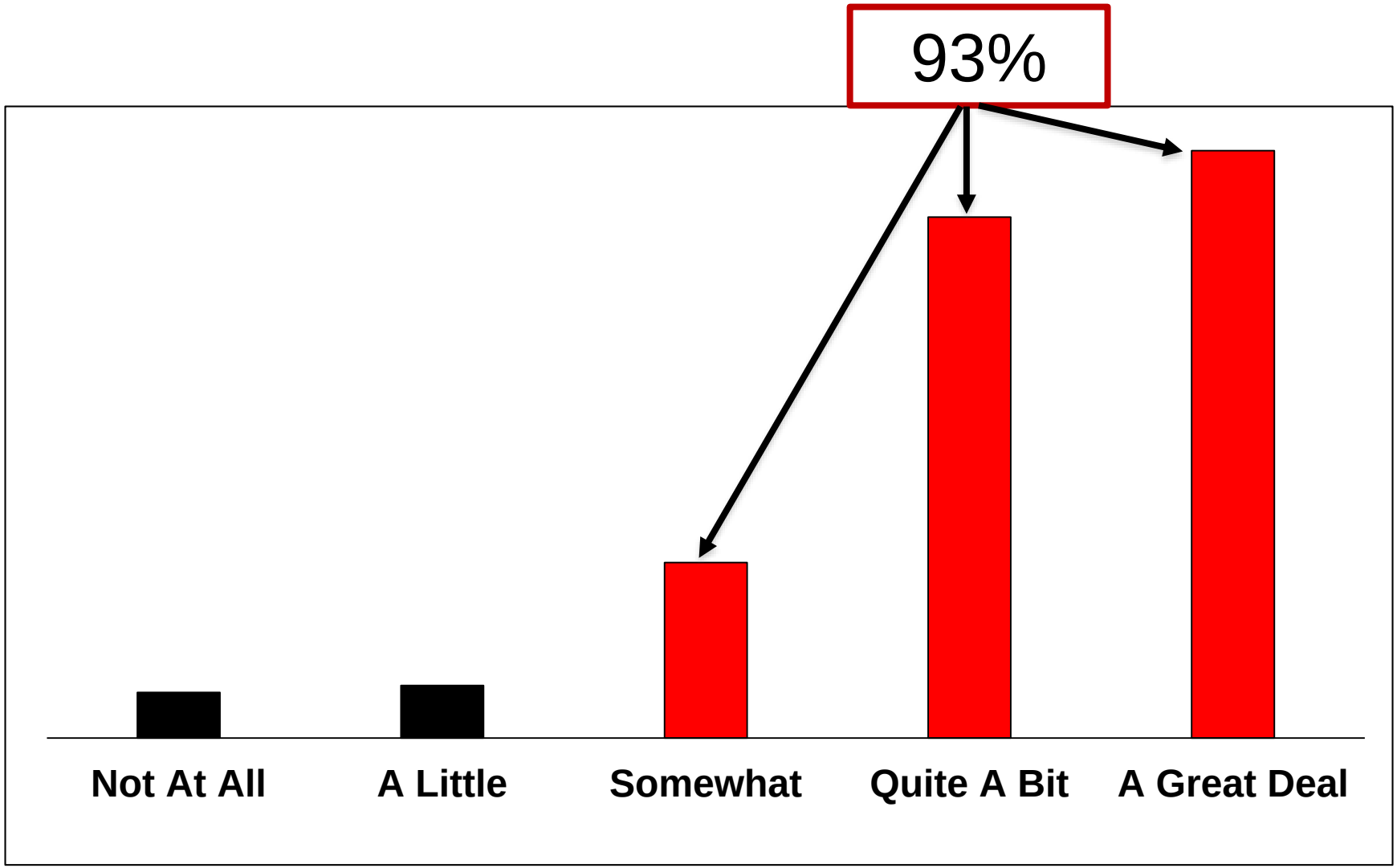
mcguine@ortho.wisc.edu

How likely you will receive a college scholarship that is related to athletic performance?



DEPARTMENT OF
Orthopedics
and Rehabilitation
UNIVERSITY OF WISCONSIN
SCHOOL OF MEDICINE AND PUBLIC HEALTH

Athlete: Does playing one sport year-round increase your chances of making a high school team?



mcguine@ortho.wisc.edu

Exploring Attitudes and Behaviors

200+ Head or Asst. Coaches

78% unaware of recommendations regarding maximum:

- Number of months per year
- Hours per week in one sport
- Number of simultaneous leagues

11% knew the number of months recommended

43.2% were “very” or “extremely” concerned about injuries.

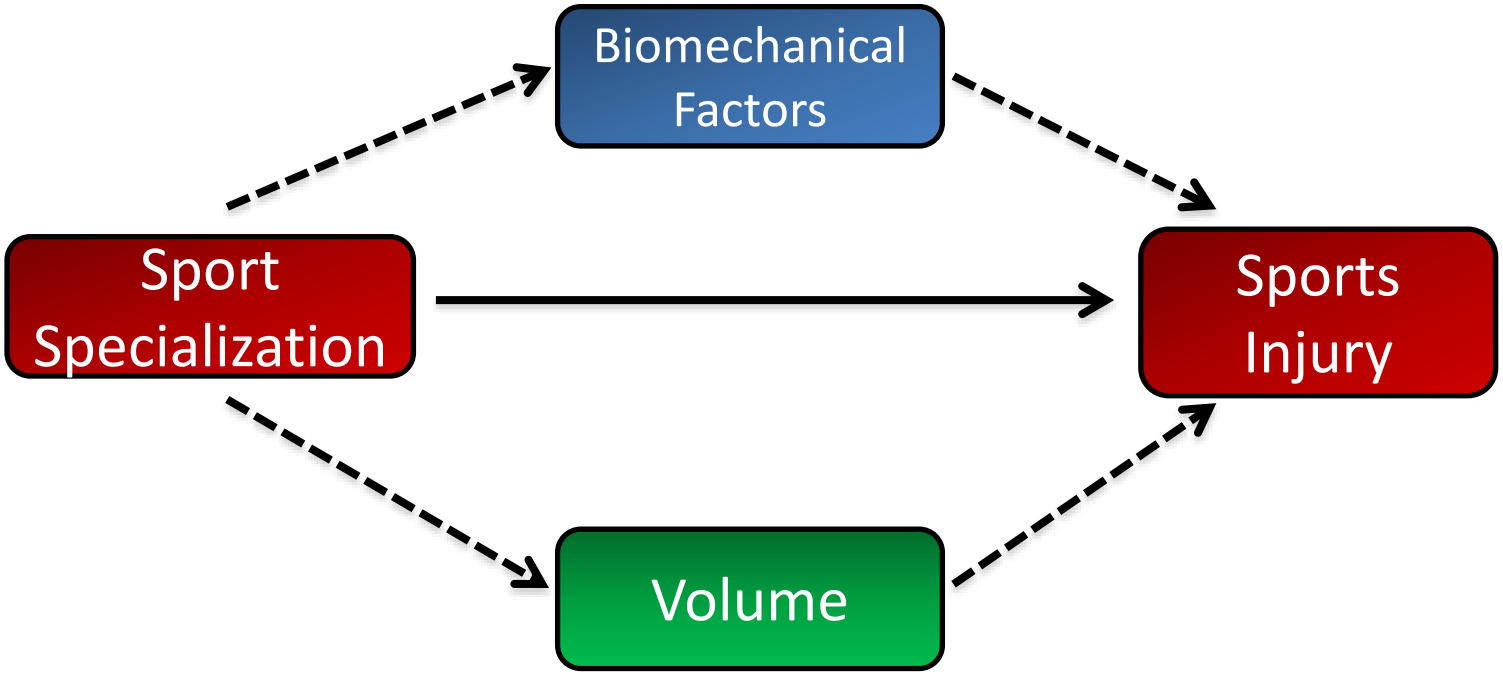
60.1% of believed that sport specialization was a problem

Survey Discussions

- Recommendations associated with youth sport participation are not well known.
- Parents and youth athletes are concerned about…
  - risk of injury (parents more than kids)
  - consider sport specialization a problem
  - playing year round increases chance of overuse injury
- Athletes see specialization as beneficial for making high school team.

INJURY RISKS

Theoretical Model For Specialization and Injury



Previous Evidence

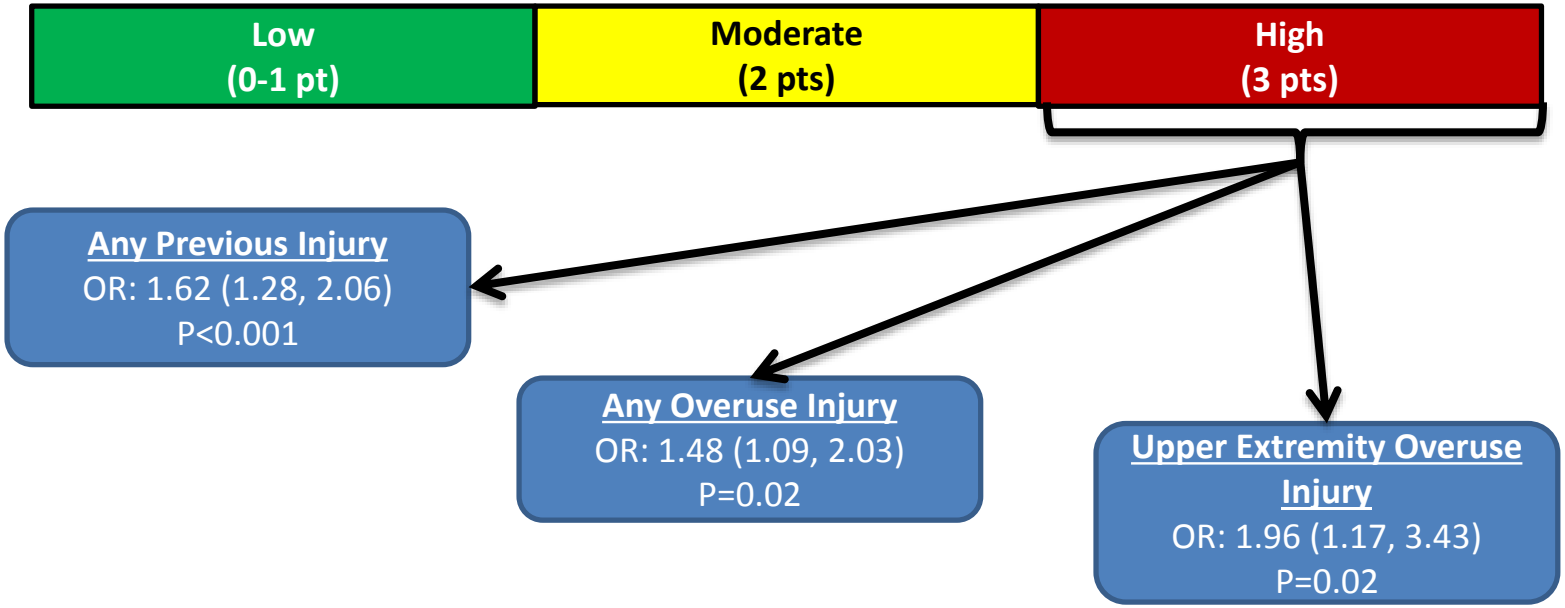
Jayanthi NR and Labella C. Sport specialized training and risk of injury - *Am J Sports Med* 2015

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

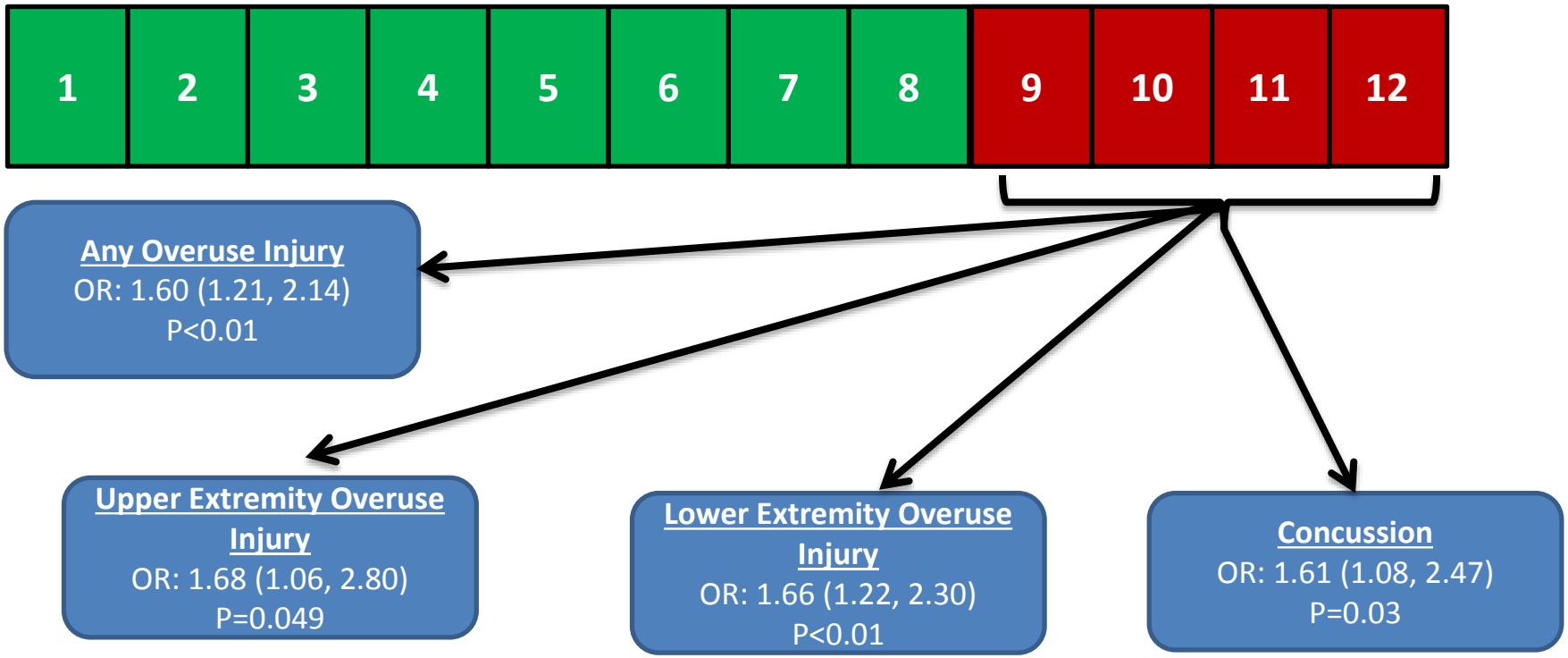
The Association of Sport Specialization and Training Volume With Injury History in Youth Athletes

- 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

Specialization and Injury

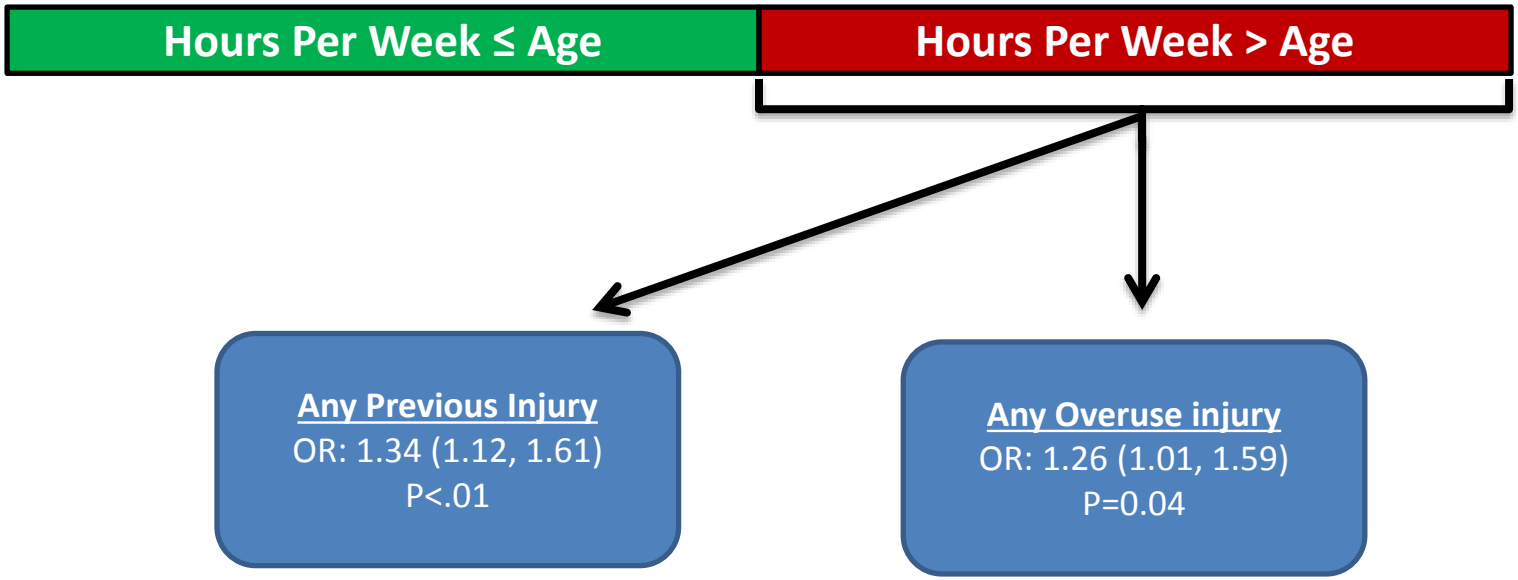


Months Per Year and Injury



*All analyses adjusted for age and gender

Hours per Week and Injury

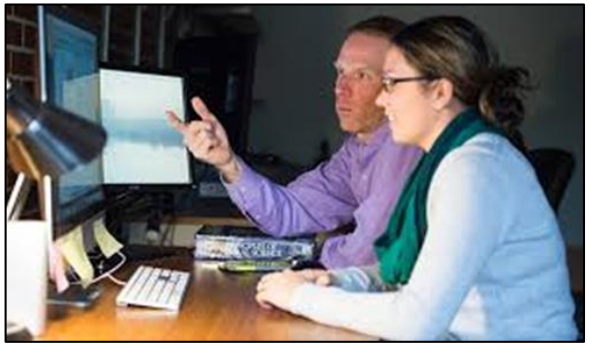


Dec 2016

mcguine@ortho.wisc.edu

Previous Injury 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

Dec 2016

mcguine@ortho.wisc.edu

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

Dec 2016

mcguine@ortho.wisc.edu

Research Support

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 25^{th},75^{th}], Odds Ratios (OR, [95%CI]) Chi Square, Fishers exact tests, Cox hazards models.

DEPARTMENT OF
Orthopedics
and Rehabilitation
UNIVERSITY OF WISCONSIN
SCHOOL OF MEDICINE AND PUBLIC HEALTH

Results

1,544 Subjects

(Female = 50%, Age =16.0 ± 1.1)

2,843 Athletic Seasons

167,349 Athletic Exposures

mcguine@ortho.wisc.edu

DEPARTMENT OF
Orthopedics
and Rehabilitation
UNIVERSITY OF WISCONSIN
SCHOOL OF MEDICINE AND PUBLIC HEALTH

Subject Demographics

Variables	(%)
Sex	
Female	50.5
Male	49.5
Grade	
9	27.1
10	27.1
11	24.7
12	20.1
Primary Sport	
Basketball	21.4
Soccer	20.2
Football	17.0
Volleyball	15.9
Baseball / Softball	8.5
Tennis	4.3
Track / XC	4.0
Wrestling	2.3
Other[1]	11.3

Variables	(%)
Previous LEI*	
No	68.3
Yes	31.7
Primary sport league	
No	50.3
Yes	49.2
Primary sport competitions	
Low (< 30)	52.8
Moderate (30 - 60)	30.0
High (> 60)	17.2

mcguine@ortho.wisc.edu

Quick Hits!

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

Females were more likely to specialize

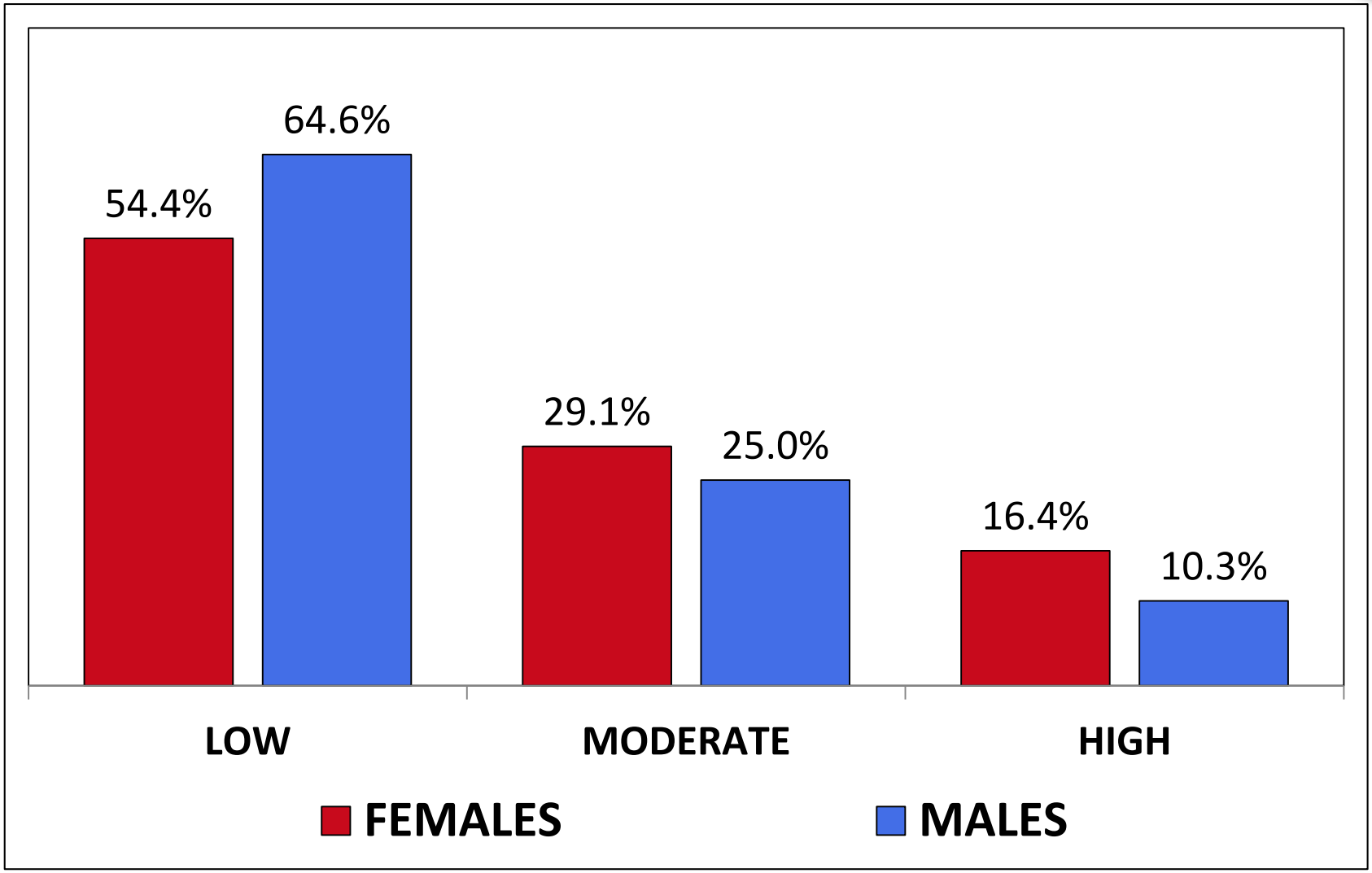
Soccer: highest level of specialization

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

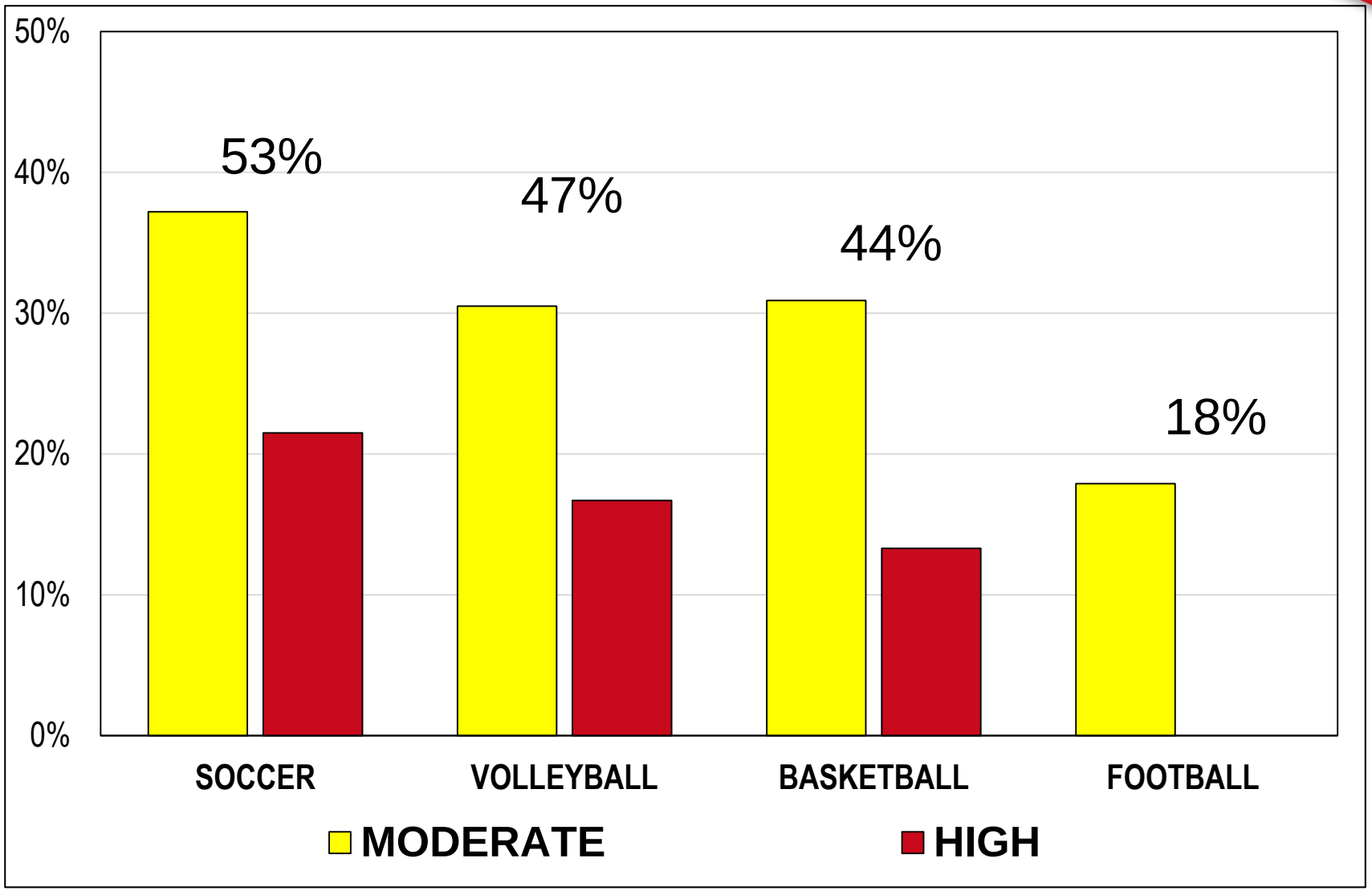
15% competed in a club sport and high school sport **simultaneously**

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

Distribution of Specialization

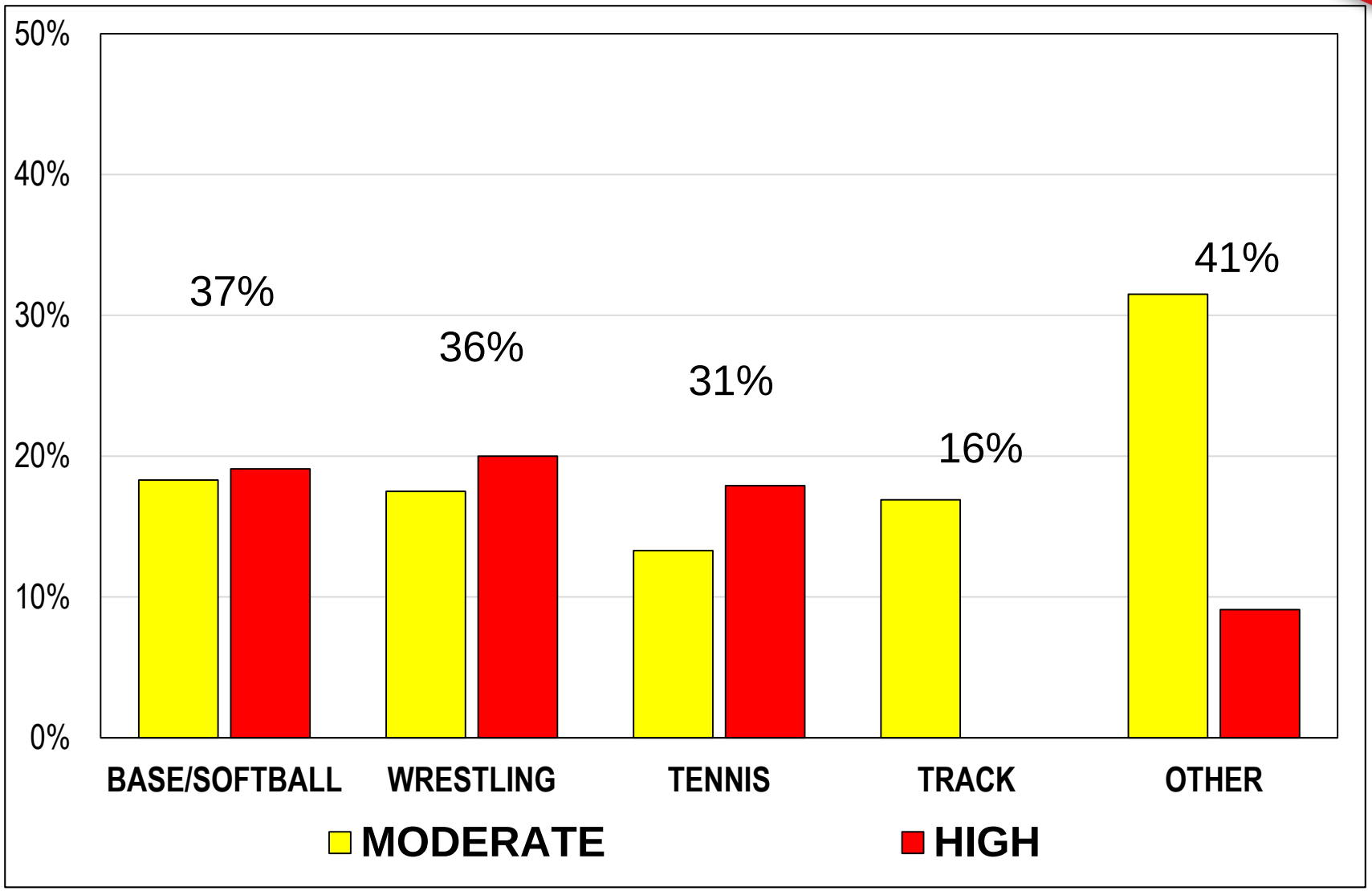


Distribution of Specialization



DEPARTMENT OF
Orthopedics
and Rehabilitation
UNIVERSITY OF WISCONSIN
SCHOOL OF MEDICINE AND PUBLIC HEALTH

Distribution of Specialization



mcguine@ortho.wisc.edu

A Prospective Study on the Impact of Sport Specialization on Lower Extremity Injury Rates in High School Athletes

Am J Sports Med 2017; 45(12): 2706–2712

mcguine@ortho.wisc.edu

DEPARTMENT OF
Orthopedics
and Rehabilitation
UNIVERSITY OF WISCONSIN
SCHOOL OF MEDICINE AND PUBLIC HEALTH

Injury Characteristics

Body Area[1]	%
Ankle	34.4
Knee	25.0
Upper Leg	12.7
Lower Leg	12.0
Hip / Pelvis	8.0
Foot	8.0

Injury Onset	%
Acute	66.3
Gradual	23.1
Recurrent	7.9

Injury Type	%
Ligament Sprain	40.9
Muscle / Tendon Strain	25.4
Tendonitis / Tenosynovitis	19.6
Fracture - Stress	3.6
Fracture - Acute	2.9
Meniscus Tear	1.8
Other	5.8

Surgery	%
Yes	8.3
No	91.7

N = 235 Subjects

N = 276 Injuries

mcguine@ortho.wisc.edu

Actions Taken for New LEI

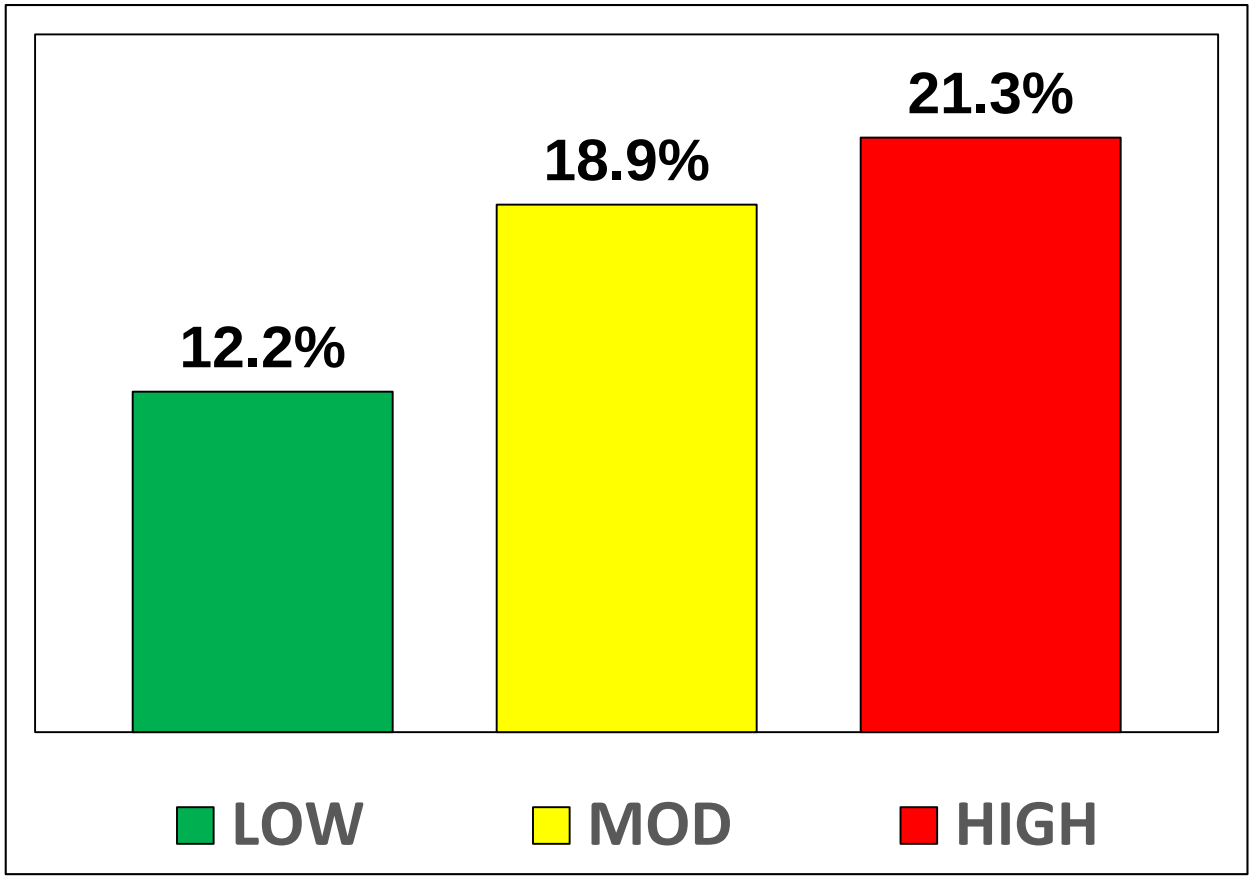
Medical provider	%
School AT	67.6
Primary Care Provider	24.1
ER / ED	8.2
Other	1.1

Diagnostics	
X-RAY	30.9
MRI	15.4
CT	1.2

Surgery	
YES	8.3

DEPARTMENT OF
Orthopedics
and Rehabilitation
UNIVERSITY OF WISCONSIN
SCHOOL OF MEDICINE AND PUBLIC HEALTH

New LEI Incidence (3 pt. scale)

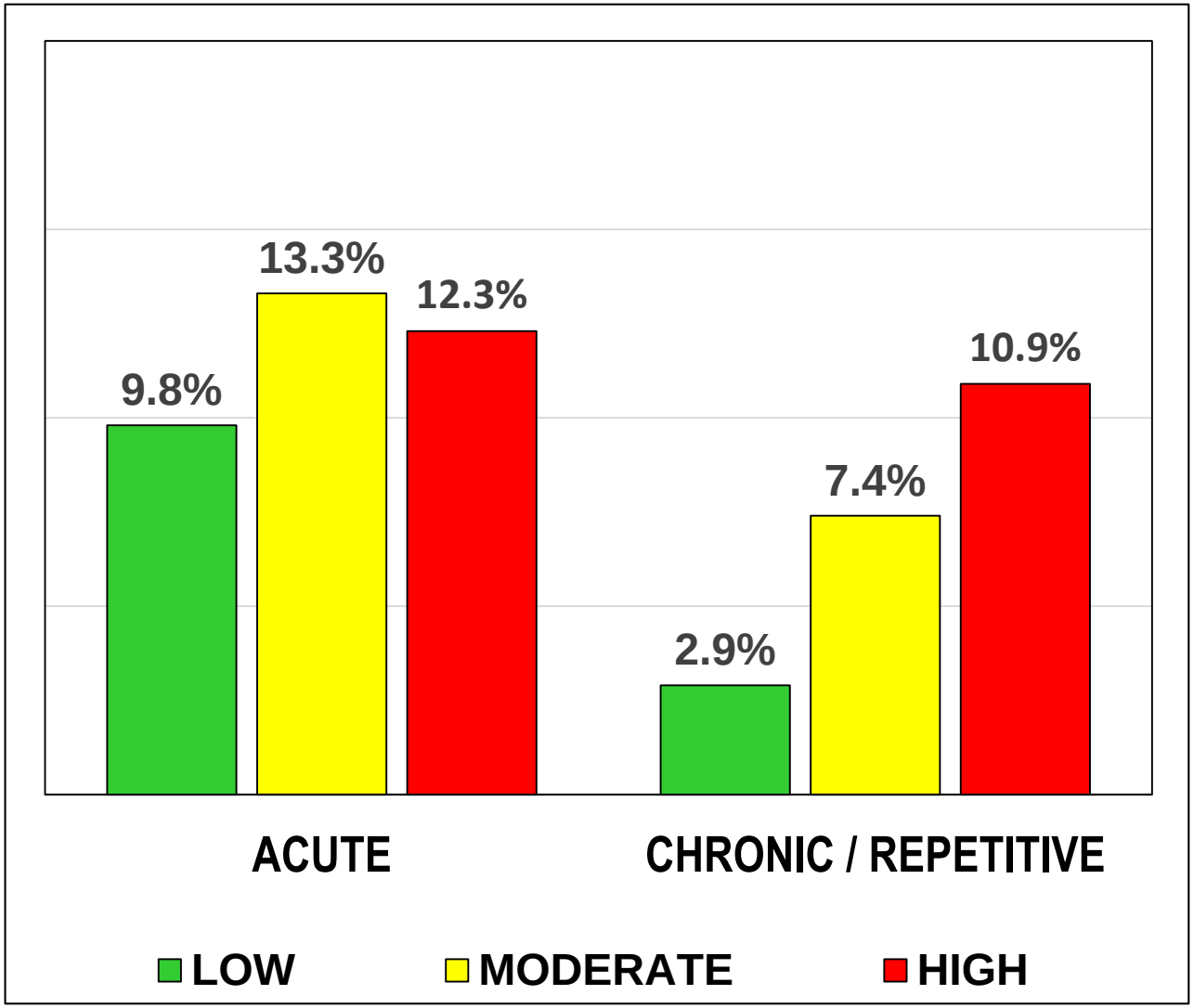


Multivariate Cox Hazards Ratios

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

mcguine@ortho.wisc.edu

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:

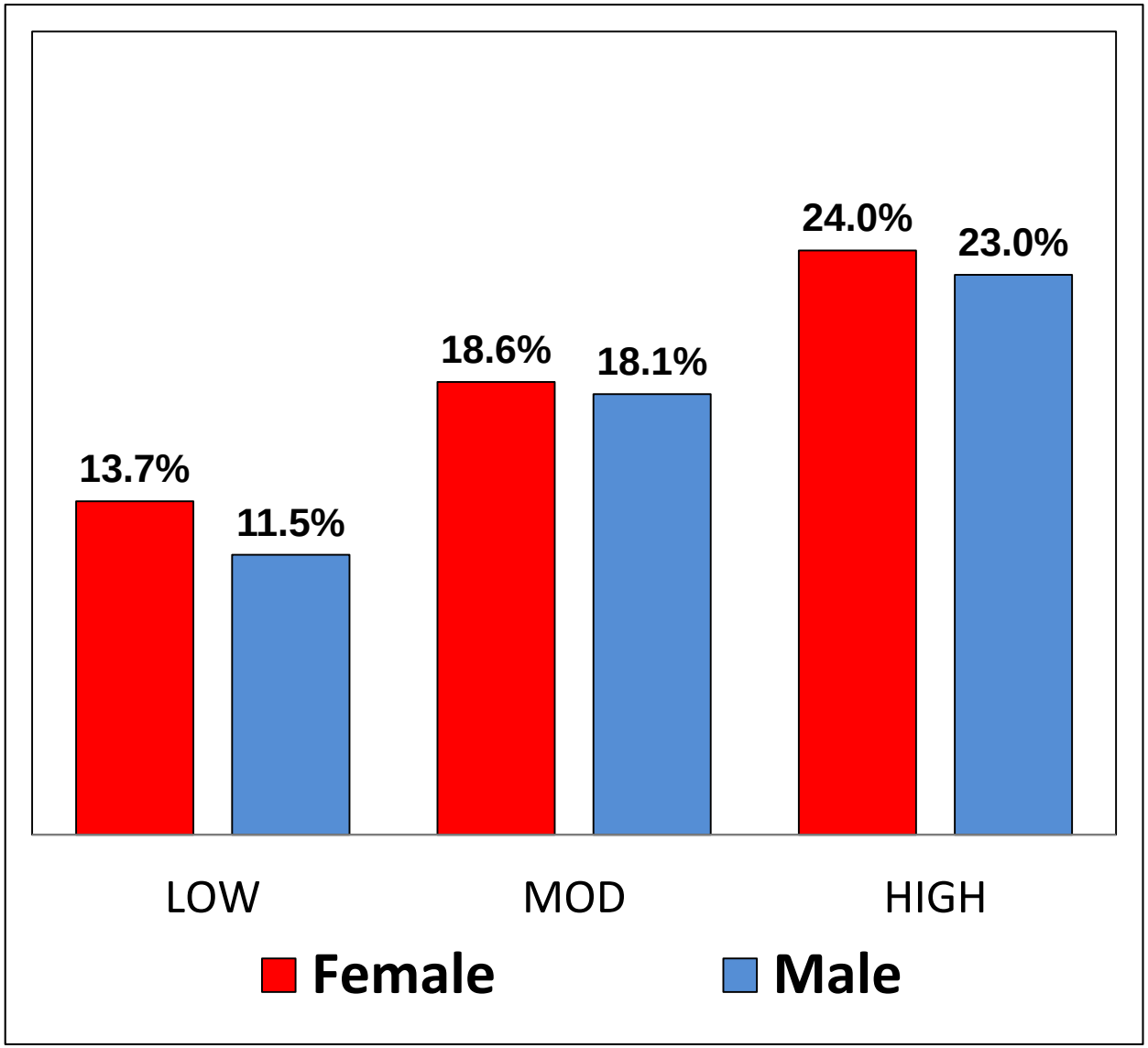
A total of N = 902 subjects in paired sports (Baseball / Softball, Basketball, X–Country, Soccer, Tennis and Track)

95,444 athletic exposures

HIGH subjects was 2X higher than LOW!

DEPARTMENT OF
Orthopedics
and Rehabilitation
UNIVERSITY OF WISCONSIN
SCHOOL OF MEDICINE AND PUBLIC HEALTH

Comparison in Paired Sports

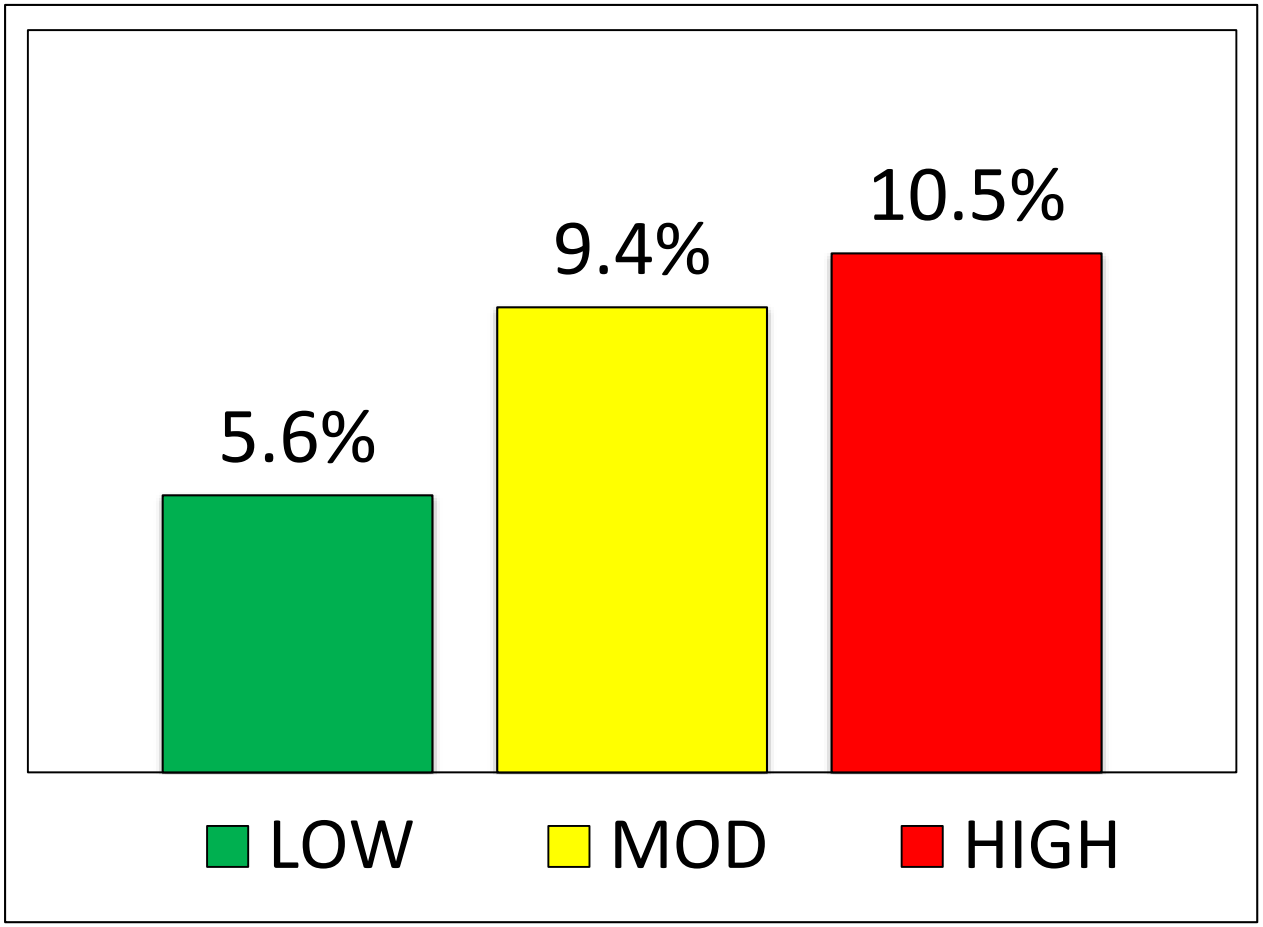


Males: 14.6%,
Female: 16.7%

HR: 0.89 (0.66 -1.20)
p = 0.452

mcguine@ortho.wisc.edu

Ankle Sprain (3 pt. scale)



Multivariate Cox Hazards Ratios

Mod vs Low: 1.66 (1.01 - 2.73) High vs Low: 2.12 (1.06 - 4.26)

DEPARTMENT OF
Orthopedics
and Rehabilitation
UNIVERSITY OF WISCONSIN
SCHOOL OF MEDICINE AND PUBLIC HEALTH

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

mcguine@ortho.wisc.edu

Discussion

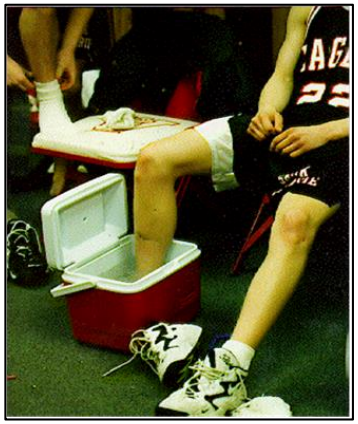
This study supports the findings of previous retrospective and case control (clinic) research.

Highly specialized athletes more likely to sustain recurrent injury or acute ankle sprain than athletes in the low specialized category.

Injury risks increased when controlling for all variables

Economic Costs – Ankle Sprains

US CPSC NEISS 2014 Estimate (ages 14 -18)



n = 186,200 ankle sprains / strains

$283 million (direct)

$2.4 billion (indirect)

Limitations

Recall bias

All data collected in a single state

Some sports not represented

Did not measure injuries in club sports

Future Epidemiology 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

STUDY IMPLICATIONS

Need 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

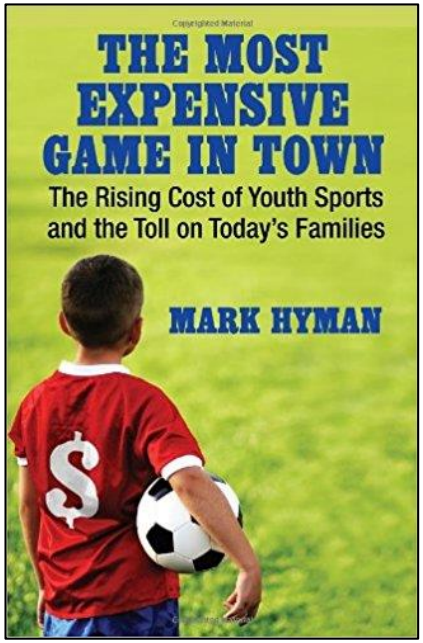
What level of health care is provided to club athletes (not interscholastic)?

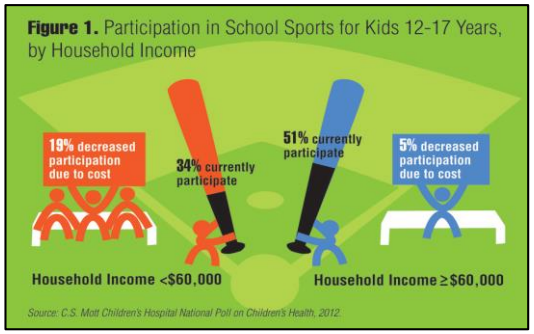
Should club sport teams and associations be required to provide the same level of sports medicine care as US high schools?

Specialization $ Costs

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?





SOULTIONS FOR HIGH SCHOOLS

High School Administrators

Educate your coaches!

Get them on board

Share your concerns and expectations

Booster clubs, parents and athletes

Volume recommendations (months/year, hours/week)

Caution against playing multiple sports/leagues simultaneously

Participate in an injury prevention program!

Consensus Statement

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."

Find your "Multi-Sport" advocates

Wisconsin coaches encourage young athletes to play multiple sports

Tony Cartagena
ESPN Wisconsin

May 4, 2017

Tony Cartagena covers the Wisconsin Badgers for ESPN Wisconsin

MADISON, Wisc. – A public service announcement to prep athletes, coaches and parents.

Don't specialize. Play multiple sports.

On the surface, that should be a pretty easy concept to grasp. As the seasons change, so should the sports that you're playing. But times are evolving too. Competition at the high school level is at an all-time high and doesn't appear to be nearing a plateau.

Sport Specialization Concerns

SPORTS

The Age of Single-Sport Athletes Endures Despite Detractors' Suspicions

By THE ASSOCIATED PRESS APRIL 30, 2016

Harrison Heffley, an Arkansas athlete, is one of a shrinking number of high school students who play multiple sports. Kurt Voigt/Associated Press

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

New York Times: 4/30/16

THANK YOU!

mcguine@ortho.wisc.edu