

Baseball Basketball and Bones

A story influenced by Title IX (aka 52 years of Ortho and 50 years of Title IX)

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Objectives

1. Learn the background and import of Title IX
2. Learn the influence Title IX had on speaker's life
3. Present examples of differences between female and male athletic injuries

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Part I: Pre Title IX

- Born in Wethersfield, Connecticut
- Early affinity for sports
- First Love was Baseball



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Pre Title IX

- Every day after school played baseball
- One Sunday Mr. F was watching and commented he would pick me for his team
- All I needed to hear

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Pre Title IX

- Wrote to Williamsport Pennsylvania
- Told if I played Wethersfield would lose it's LL Charter




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My Battle with Williamsport

Before



After



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Needed new approach!

Alternate Plan:

- Torment the Head of Parks and Recreation to start a Girl's Little League including a petition*.
- with a little help from Elaine Johnson and the Harford Courant

*There may have been a cocktail party involved



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Conclusion Pre Title IX

- Mr. Pitkin agreed to have a tryout
- If enough for 4 teams we could have a league

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The league lasted 3 years and then

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Part 2: Title IX

- “No person in the United States shall, on the basis of sex, be excluded from participation in, be denied the benefits of, or be subjected to discrimination under any education program or activity receiving Federal financial assistance.”

The U.S. Department of Education’s Title IX of the Education Amendments of 1972


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Title IX and The early 70s

- Title IX
- NOW vs Little League
- Billie Jean King vs Bobby Riggs

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The early 70s
NOW/Pepe vs Little League



In 1972, Sylvia Feinstein, a New Jersey 14-yr, decided to play for Maria Pepe (pictured above) in her case against Little League Baseball, removing the gender clause from the original Little League Federal Charter.

<https://baseballhall.org/discover/short-stops/nothing-little-about-it>

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Effect of this verdict

1972

2.25 million boys

1 girl

1975

30,000 girls

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The Battle of the sexes: Billie Jean King vs Bobby Riggs 6-4,6-3,6-3

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Back to our heroine


- Armed with Title IX we petitioned our Board of Education for a Basketball Team
- We lost our first game 81-16
- But were just happy to have a team and get to play in these snazzy 100% polyester uniforms



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As a result of Title IX I was able to play

- Basketball
- Tennis
- Softball
- And in college...



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Bates College

- I wanted to play soccer....
- So armed with Title IX



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And a little help from a friend



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First 40 years of Title IX

- High school female athletic participation went from
 - 294,000 to over 3 million! (Poertner 2012)

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Results of Title IX at the collegiate level

Increase participation of females in sport

- 1971 = 29,977
- 2011 = 193,232
- Ratio of men/women collegiate athletes
 - 1982 = 5.6
 - 2021 = 1.3

- www.NCAA.org

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Title IX revolution

The Founding Mothers of Title IX were just looking for a more level playing field in academics. "We had no idea," says Bernice "Bunny" Sandler, who helped draft the legislation and now works as a senior scholar for the Women's Research and Education Institute in Washington, D.C. "We had no idea how bad the situation really was -- we didn't even use the word sex discrimination back then -- and we certainly had no sense of the revolution we were about to start."

Steven Wulf: Title IX: 37 words that changed everything; March 2012

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Part 3: Nancy is introduced to the world of Orthopedics



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1970 was the year I had my first of 7 surgeries on my left hip



Harry R. Gossling, MD

- I loved my orthopedic surgeon
- He listened to me
- I clearly was not going on in sports
- I decided to keep others active

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I discovered I liked to build things!



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After Bates

- Columbia College of Physicians and Surgeons
- Harvard Combined Orthopedic Residency
- Fellowship in Orthopedic Sports Medicine with Dr Arthur M. Pappas
- Practiced Orthopedic Sports Medicine for close to 30 years

But enough about me! How did Title IX effect the treatment of female athletes?

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Part 4: Title IX's effect on female sports science:

- Increase participation = injuries in female athletes
- Injury patterns appeared different between female and male athletes raising the question

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An AAOS/NIH Workshop Report

DOES SEX MATTER IN MUSCULOSKELETAL HEALTH?

THE INFLUENCE OF SEX AND GENDER ON MUSCULOSKELETAL HEALTH*

BY LAURA L. TOSI, MD, BARBARA D. BOYAN, PHD, AND ADELE L. BOSKEY, PHD

“Medical researchers in virtually every discipline are now beginning to realize that every organ in the body is capable of responding differently based on sex as the result of chromosomes as well as hormones.”

A Workshop Report based on a meeting of the American Academy of Orthopaedic Surgeons and the National Institutes of Health, Hunt Valley, Maryland, April 22 through 25, 2004.
THE JOURNAL OF BONE & JOINT SURGERY • JBJS.ORG
VOLUME 87-A • NUMBER 7 • JULY 2005

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Does Sex Matter: Are the female and male musculoskeletal systems different

- Sex as defined by chromosomal make up and reproductive organs
- Historically in studies it was assumed women were just “little” men
- Until the 21st century it was not possible to study the differences in disease prevalence, morbidity and mortality based on genetic and molecular differences

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Yes! Sex does matter

“Every female cell is different from every male cell—different chromosomes, different mitochondrial properties, different mosaicism. Men and women are intrinsically different. It is a surprise when they are similar!”

Michael Lockshin MD

THE JOURNAL OF BONE & JOINT SURGERY · JBJS.ORG
VOLUME 87-A · NUMBER 7 · JULY 2005

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Why?

Genetic Stand point

- Females are a Genetic Mosaic
- Two copies of all genes on the X chromosome

Cellular level

- Female and male cells respond to steroid hormones differently
- More than one type of receptor
- Different #s of receptors

Matrix Biology

- Bone, muscle, tendon, and ligament

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Sexual Dimorphism

- Exhibited by
 - Bone
 - Tendon
 - Muscle
 - Ligament

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In the general population females have more

- Osteoarthritis
- Osteoporosis
- Spinal disorders
- Fractures
- Autoimmune disorders
- Ligamentous Laxity

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In male and female athletes there are differences in

- Non-contact ACL Tears
- Glenohumeral instability
- Concussion

To name a few

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Part 5 specific examples

Anterior Cruciate Ligament

Female athletes participating in same sport as their male counterpart are at 4-8 Xs the risk of a non-contact ACL tear

Arendt EA, Agel J, Dick R: Anterior cruciate ligament injury patterns among collegiate men and women. J Athl Train 1999;34:86-92



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Factors in increased risk of ACL in females

- Biomechanical
- Neuromuscular
- Anatomic
- Hormonal

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ACL tear occurs

Applied Load > intrinsic ability of the ligament to withstand the load

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Factors affecting the intrinsic load to failure

- Sex Hormones
- Neuromuscular control
- Internal composition
- Direction of applied load

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Another terrible triad

- Hip internal rotation
- Landing with high force
- Valgus knee collapse

Tim Hewett, PhD

Hewett TE, Myer GD, Ford KR, et al: Biomechanical measures of neuromuscular control and valgus loading of the knee predict anterior cruciate ligament injury risk in female athletes: A prospective study. Am J Sports Med 2005;33:492-501

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ACL waiting to happen



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Four components to a non contact ACL injury

- Deceleration
- Knee Buckles inward
- Weight on single extremity
- Trunk tilted laterally

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Up close view



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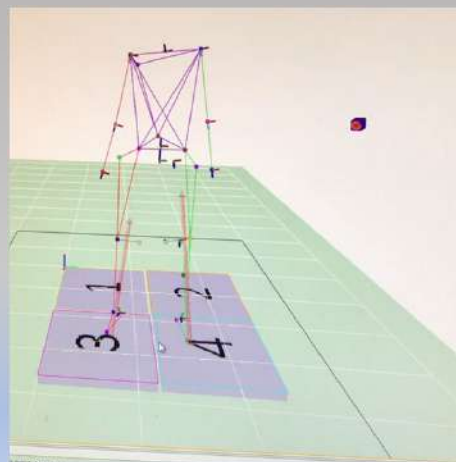
ACL injury: What can we change?

- Modifiable factors
 - Neuromuscular imbalance
 - Movement patterns
 - Conditioning
 - Trunk Strength i.e. core

All components of ACL prevention programs which can decrease the incidence of ACL tears in trained female athletes.

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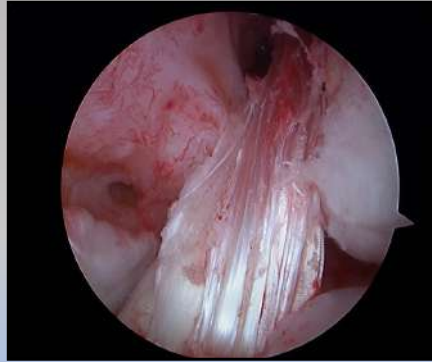
Analyzing movement patterns to change modifiable factors in ACL tears



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If the unthinkable happens we now have new and improved techniques of reconstruction

- Also techniques to handle cartilage and meniscal injuries



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Glenohumeral instability

- Traumatic dislocations appear to be similar
- Multidirectional more common
 - Cohorts of studies less than 50% women

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Concussion

- Females had a 1.4 times greater incidence in sex comparable sports*
 - Girth of female neck is 30% smaller than male
 - Female brains are thought to have faster metabolism
 - Sex hormones
 - Is it progesterone? Dopamine? We don't know

*Covasson et al. NCAA

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Attempts at prevention



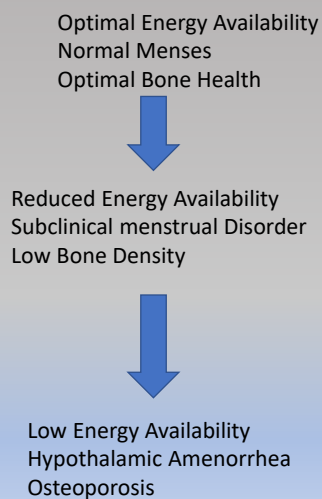
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Female Athletic Triad

- Defined 1992
- 3 inter-related entities
 - Disordered eating
 - Amenorrhea
 - Osteoporosis
- Greatest risk in young female athletes in lean physique sports

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Spectrum of F.A.T



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Energy Availability

- Amount of dietary energy available for other bodily functions after exercise
 - Example:
 - Dietary energy intake of 2000 kcal/day
 - Exercise energy expenditure of 600 kcal/day
 - Fat-free mass of 51 kg
- $EA = (2000 - 600)/51 = 27.5 \text{ kcal/kg FFM/day}$

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Energy availability

- Energy **availability** of at least 30 kcal/kg FFM is considered sufficient to support normal reproductive function
- Energy availability less than 30 kcal/kg FFM is associated with disruption of normal menstrual cycles
- Energy availability of 35 to 45 kcal/kg FFM or likely greater than 45 kcal/kg FFM is desired for resumption of menses in females with either oligomenorrhea or amenorrhea




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Risk Factors

- 1st menstrual period after age 15
- Infrequent menstrual periods (< 9 periods/yr)
- Low body mass index-BMI ($\leq 18.5 \text{ kg/m}^2$)
- Disordered eating or an eating disorder
 - Restrictive eating
 - Binge/purge behaviors
 - Excessive training

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The decreased estrogen leads to

-  Bone mineral density  Osteoporosis
-  Risk of Fracture – stress or traumatic

Life long issue

Peak bone mass achieved @ age 30

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Prescription for F.A.T

- Increase awareness
- Prevention
- Multimodal eating disorder prevention/treatment Programs
 - Peer-led
 - Address body image and cognitive dissonance

Temme KE, Hoch AZ, Jonardi M, et al. Prevalence of the female athlete triad and effect of a peer-based mentoring program on triad knowledge in high school girls. Clin J Sport Med 2013;23:134–5.

Brown KN, Wengreen HJ, Beals KA, et al. Effects of peer-education on knowledge of the female athlete triad among high school track and field athletes: a pilot study. Women Sport Phys Activity J 2016;24:1–6.

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Title IX has “helped” male athletes: REDS

IOC consensus statement on relative energy deficiency in sport (RED-S): 2018 update

Margo Mountjoy,¹ Jorunn Kaiander Sundgot-Borgen,² Louise M Burke,^{3,4} Kathryn E Ackerman,^{5,6} Cheri Blauwet,⁷ Naama Constantini,⁸ Constance Lebrun,⁹ Bronwen Lundy,³ Anna Katarina Melin,¹⁰ Nanna L Meyer,¹¹ Roberta T Sherman,¹² Adam S Tenforde,¹³ Monica Klungland Torstveit,¹⁴ Richard Budgett¹⁵

Mountjoy M, et al. Br J Sports Med 2018;**52**:687–697. doi:10.1136/bjsports-2018-099193

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Low Energy availability in the athlete

- Identifies **low energy availability** - IOC coined RED-S
- Spectrum of symptoms & conditions between health & disease
 - May occur unintentionally
 - Happens in male and female athletes
 - May involve disordered eating/eating disorders

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In this journey science is now realizing that females are not just small males

- We are recognizing different injury susceptibilities/patterns
- NIH is now requiring cohorts of women in funded studies
- Multidisciplinary Sports Clinics dedicated to female athletes
 - Endocrine
 - Non op Sports Medicine
 - Nutrition
 - Surgeon

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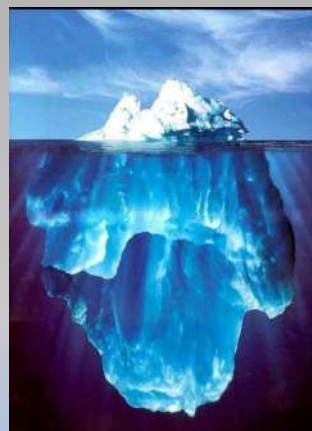
The Vision and Mission of the Harvard Female Athlete Program

“To Inspire, empower, educate, and convene researchers, clinicians, and the sports community to advance our understanding of female athletes, improve the way we care for them, change the culture of female sports, and ultimately, transform the state of women’s health overall.”

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Part 6: The future

Tip of the iceberg!



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Title IX provided the foundation on which the field of Female Sport Science/Medicine could stand.

THURSDAY MORNING, MARCH 19, 1970



Nancy Sue Madsen
(Portrait photo by Maurice Murray)





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50 years in and we still have a long way to go towards equality

NCAA and the disparity of training facilities at March Madness

As does Orthopedics



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©AllinaHealthSystems

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References

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- *Covasson et al. NCAA
- Mountjoy M, et al. Br J Sports Med 2018;**52**:687–697. doi:10.1136/bjsports-2018-099193
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