

# Gendered Innovations in Orthopaedic Science

## The Sports Bra, the ACL, and Title IX — The Game in Play

Amy L. Ladd MD

It pretty much started with the sports bra. Well, not really, but the history of the sports bra makes a good metaphor for the evolution of youth athletics in America since the passage of Title IX in 1972. Its rich history even parallels my own pathway in orthopaedics.

With the exception of private girl's high schools and women's colleges, girls and women typically played organized sports on club teams in the 1960s and 1970s. Occasionally, a girl played with the boys; I competed on the high school boy's ski team. It was a time when ACL injuries were unheard of — or perhaps untreated — in

women. The sports bra was not developed until 1977, when a team of women (spurred by the suggestion of one of the inventor's husbands) sewed two jockstraps together and marketed the Jockbra, later changed to the Jogbra [2]. In my first years as a runner, I cinched bra straps with a shoelace and safety pins to provide some semblance of support, using a sturdy Playtex®-equivalent of the time. How liberating, not to have to literally suit up once that Jogbra came along.

The sports bra revolutionized support for the defining anatomic feature of the class Mammalia, and, paradoxically gave freedom for women

athletes of all shapes and sizes to participate in sports unforeseen just a few years earlier. As amendments were passed and cases tried, the implications and consequences of Title IX became clearer. At first, the National Collegiate Athletic Association tried to block its institution, but later competed with the Association for Intercollegiate Athletics for Women for championships, and with a better edge on lucrative media coverage, caused its demise. Orthopaedic surgeon Dr. Tamara Scerpella joined her University of Iowa gymnastics team in a letter writing campaign to support Title IX and its implications; her Senator wrote back a short and terse explanation of how he could never and would never support it.

Fast-forward 40 years, though, and we find schools like the previously all-male Dartmouth College (my alma mater) performing well in women's Ivy League athletics. Stanford University, my employer for 25 years, routinely steamrolls the Directors' Cup, awarded for most success in college athletics, on large account due to women's team wins that tip the scales.

Not so long ago, many diehard sports fans openly grumbled about the decline of men's college sports, due to

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Note from the Editor-in-Chief: *We are pleased to present to readers of Clinical Orthopaedics and Related Research® the latest installment of "Gendered Innovations in Orthopaedic Science" by Amy L. Ladd MD. Dr. Ladd is a Professor in the Department of Orthopaedics at Stanford University, and is the Past-President of the Ruth Jackson Orthopaedics Society. She will provide commentary on sex and gender similarities and differences in orthopaedics. This column is the first of a two-part series on Title IX. The first part discusses athletics; the second part of the series will emphasize education.*

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A. L. Ladd MD (✉)  
Chase Hand and Upper Limb Center,  
Stanford University, 770 Welch Rd. Suite  
400, Palo Alto, CA 94304-1801, USA  
e-mail: alad@stanford.edu

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the redistribution of funding to start women's teams. This required dissolving men's teams, so the grumbling went, and thus, the decline of sports in general. Today, this argument is less common (or the grumblers are quieter), and perhaps this indicates that the diversity provided with both men's and women's sporting events is not so bad after all. Since this is a column about science, and represents an opportunity for discovery as it relates to sex and gender in orthopaedics, I bring to you a few myths and facts that will serve as a primer for understanding Title IX and its implications.

## Myths and Facts

### Myth 1: Title IX is about college athletics

**Fact:** Title IX was introduced as a tiny part of the Education Amendments of 1972, which expanded upon the Civil Rights Act of 1964. Here are the specific details of Section 1681 related to sex: "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 educational program or activity receiving Federal financial assistance." [10].

Yes, that is just 37 words of legalese that do not explicitly mention athletics.

In contrast, the nine exceptions following this proclamation contain 881 words.

As backstory, the Civil Rights Act focused on discrimination of race and sex in regard to employment [3]. Once President Lyndon Johnson set forth an Executive Order in 1967 clarifying that antidiscrimination included all federally funded domains, a series of events and lawsuits followed that culminated with Indiana Senator Birch Bayh and Hawaii Representative Patsy Mink's introduction of the Education Amendment in February 1972 [5, 12]. (It was enacted in June of that year, an amazing feat to contemplate in the face of our current bipartisan climate). As with all hot topics in legislation, the amendment has been modified, contested, and expanded since its introduction, particularly the issue of whether sex antidiscrimination applied to all programs at an institution, not just the ones receiving funding. Athletics did not enter the equation until 1979 as a result of a Policy Interpretation introduced concomitant with the restructuring of the Department of Health, Education, and Welfare to the Department of Health and Human Services, which included a newly separated Department of Education.

In the policy's current form, one of three main points must be met in order for an academic institution that receives federal funds (to any part of the institution) to be considered in compliance as it relates to athletics:

1. Providing athletic participation opportunities that are substantially proportionate to the student enrollment;
2. demonstrating a continual expansion of athletic opportunities for the underrepresented sex; and
3. accommodating the interest and ability of underrepresented sex [11, 12].

Like most laws and policies, these are broad enough that interpretation varies and contention often exists. The most contentious is the first, with the term "substantially proportionate." Which brings me to Myth #2.

### Myth 2. Men's sports have suffered because of Title IX

**Fact:** The number of sports in U.S. high schools and universities has increased dramatically for both sexes since 1972. The number of girls playing high school sports since 1972 have increased more than 1000%, and women playing varsity sports in universities rose more than 600% [13]. This is the obvious effect from such sweeping legislation. Sports teams expanded for boys and men (22% increase for high school, and 46% increase for college sports) in that same time frame [13]. Although seemingly disproportionate growth for the purported fairer sex, the current ratio stands at two female to three male participants across the board [13].

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Today, the inequality lies not so much in the number of women playing sports at colleges and universities, but the amount of funding each sports team not named football receives [14]. Division I-A sports teams for both sexes typically in the budgetary crosshairs include cross-country, track, golf, tennis, rowing, swimming, and wrestling [14]. In fact, the vast majority of Division I-A universities have larger football budgets than all of their women's teams combined [14].

### Myth 3. ACL injuries are more common in boys and men

**Fact:** Certainly, this was true prior to Title IX, but now with an integrated athletic landscape, the rate of ACL injuries is more common in women [1, 4, 8]. The rate of ACL surgery, however, is more common in men [4, 6]. The reasons behind these differences expand the confines of this column, but deal both with sex (biology) and gender (society's ascribed role of sex) [7]. Inherent ligamentous laxity and a woman's phase in the menstrual cycle probably contribute to the higher incidence, which is a question of sex. The type of playing turf, sports specific equipment and game rules, which are different, for example, in men and women's lacrosse, could also contribute to higher rates of ACL injuries (findings we could attribute to gender).

According to Holy Cross University Hall of Fame lacrosse player and orthopaedist, Dr. Jeanne DelSignore, the contrast in style of play between men's and women's lacrosse may inadvertently predispose women to joint injuries. A woman lacrosse player running at full speed precluded, by rules, of entering the goal circle (the "crease"), may abruptly pivot and shift direction and blow out her knee or ankle.

### Myth 4. Return to sport after injury is the end game

**Fact:** Whereas return to sport is often a desire, especially in high profile and profitable sports like football, it may be dangerous and unrealistic to the health of the athlete. Concussions and delayed traumatic brain injury are but one example; ACL reconstructions with graft pullout and posttraumatic knee arthritis are another. The overall health of the athlete may be obscured in the day-to-day world of the training room, the sports agent's portfolio, and the scholarship of an institution receiving federal funding. Not well understood are scientific parameters for return to play that are athlete and sport specific — regardless of sex and gender. This, like most subjects of interest to the orthopaedic surgeon and scientist, will improve with further investigation of the role that sex (or

gender) plays in the particular sport or injury. Thorough systematic reviews that identify a need for investigation, and longitudinal studies that follow pertinent topics will, as it were, improve the playing field.

But first, a clinical pearl from the female orthopaedist's perspective. For those who have not lived their lives with the daily activity of putting on a traditional bra that clasps in back, please know it requires a fair amount of shoulder internal rotation, shoulder extension, and wrist flexion with radial deviation. Any female patient suffering from rotator cuff tendinitis, adhesive capsulitis, or DeQuervain's tenosynovitis will, if asked, let you know that the task is impossible to perform. She will tell you she dons her brassiere by hooking it in the front and rotates it around. In the case of the less endowed, she may opt for a simple, over-the-head prototype sports bra item that is less flattering to the human form, but also less painful in starting the rituals of the day.

The sports bra now has had many refinements, adjustments, and innovations that are touted as sport-specific and body-dependent, just like the array of sports available to a young woman with athletic prowess or the simple desire to participate. It is emblematic of the athletic industry targeting women as consumers that one of the leading retail stores noted for its sports bras bears the

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name of Title Nine [9]. Sports bras now provide support for the nursing mom to those struggling with the effects of gravity, offering comfort for those whose goal is to get out and get moving, a goal that our orthopaedic profession, likewise, seeks to support. We are now better equipped to address the capabilities and vulnerabilities of our elite athletes and weekend warriors — with many examples inconceivable just a generation or two ago. I invite you to share the desire to move the game ball forward.

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