

GETTING STARTED IN PER: GENDER AND ETHNIC MINORITIES

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WELCOME!

- Introduction to gender and under-represented minorities (URMs) in Physics Education Research (PER)

WHERE I STARTED / WHY I CARE

- Supportive upbringing for going into science
- Grad school: 24 men and 1 woman (mostly white)
- Secondary grad school research: Gender disparity on the FCI
- Faculty research: Gender “stuff”

WHERE WE START/WHY WE (SHOULD) CARE

1/5 of bachelors go to women

Percent of Physics Bachelor's Degrees Earned by Women, Classes 1981 through 2010.



Minority and Ethnic Profile of Physics Bachelor's, Classes of 2008 through 2010. (3-Year Average)

	Number	Percent of all Physics Bachelor's
White	4,808	81
Asian American	310	5
Hispanic American	221	4
African American	157	3
Other US citizens	70	1
Non-US citizens	333	6
Total	5,899	100%

<http://www.aip.org/statistics>

1/5 of bachelors go to URM's

WHAT CAN PER DO ABOUT IT?

- Physicist socialization starts in the classroom
- Good or bad teaching has strong effect on decision to join or stay in a field (Seymour & Hewitt's *Talking about Leaving*)
- Pedagogy, curriculum, in-class experiences shape future generations of physicists and others
- Need to study how the classroom affects women and URM

WOMEN & URMS IN PER



Image from <http://www3.jjc.edu/ftp/wdc11/provy8/pond.jpg>

HUMBLE BEGINNINGS

- Earliest gender & PER article: 1976!
- Next in 1992: tucked into a problem-solving article
- First URMs discussed in a 1999 AJP article describing program for at-risk students
- Not even dipping toe into pond yet; more like discovering there IS a pond

CONCEPTUAL TESTS

- Just as PER started with figuring out student misconceptions, gender in PER started with gender gaps on conceptual tests
- 1994 gender part of article introducing TUG-K
- 1996 AAPT talk on gender gap on FCI in university students
- 2004 DIRECT gender gap noted in article introducing test
- 2006 CLASS survey article noted gender discrepancies
- (dipping toe into the pond)

URMS & CONCEPTUAL TESTS

- <searching>
- <searching>
- <searching>
- one dissertation in 2010 (URMs perform worse on FCI)

EXPANDING HORIZONS

- Gender differences in online homework performance
- Gender effects of student-centered pedagogies
- Validating CLASS for URM

THE “FRESHMAN FIFTEEN”

- Subfield getting bigger; no longer fitting into narrow categories (wading into the pond and finding out how deep it is)
- Gender and URM studies standing on their own instead of tag-alongs to other PER work (early 2000s)

BLOSSOMING POSSIBILITIES

- Deeper looks at gender & URM effects of student-centered pedagogies (different populations, different pedagogies)
- When do gender differences in the classroom really arise?
- Are gender differences in the classroom innate? or are they an accumulation of smaller biases?
- What types of interventions can help boost performance of women and URMs?
- (discovering just how big the pond is!)

SO YOU WANT TO JUMP IN THE POND?

- Where do you jump in?
- What do you need before you jump?
- Why are you jumping in this pond?

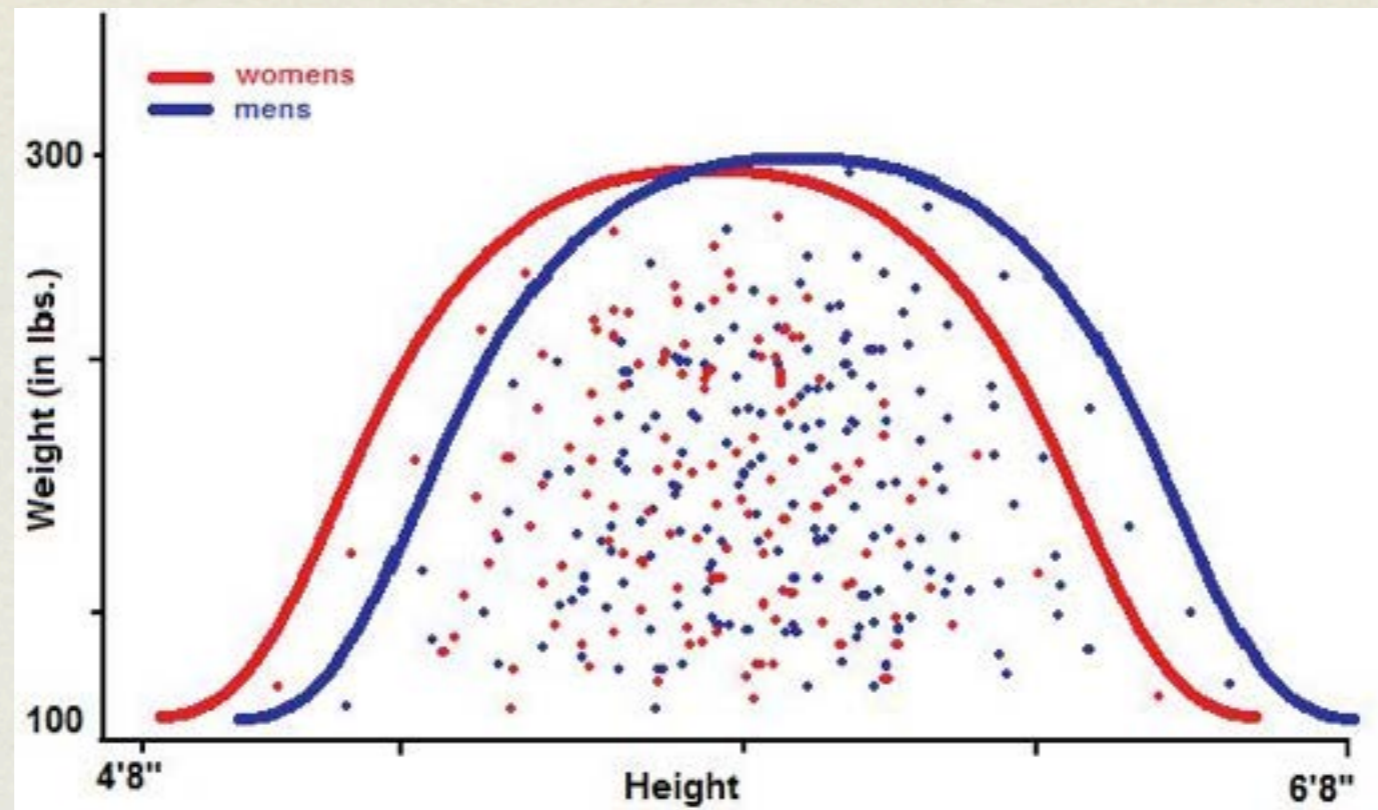
METHODOLOGIES

- Most early work quantitative (t-test men and women)
- Still strong quantitative work (grades, performance measures, retention rates)
- Qualitative work and mixed-methodologies growing
- Expanding along with PER

LIES, DAMNED LIES, AND...

- Statistical significance vs. educational significance
- If 40 studies show men do better than women, though none statistically significantly: is there a problem?
- If a statistically significant gap shows up in a sample of 2000 students, but the gap is a half-question out of 30 questions: is there a problem?
- Looking at the data different ways tells different stories
- Don't run statistical tests on everything willy-nilly!

HEADLINE: MEN BETTER THAN WOMEN AT $\langle X \rangle$!



“Men are bigger than women.”

Image from <http://drjon.livejournal.com/1335860.html>

SCIENCE OR ENGINEERING?

- What's your approach?
 - Figure out a fix to the problem
 - Understand the problem to develop a solution
- We need both! But different POVs, different methods, different goals.

LIMITATIONS AND CONCERNS

- Sample size: *tiny*
- Personal experience can cause implicit/explicit bias
- Marginalized subfield (gender) in a marginalized field (PER)
- May make search committees uncomfortable

RECOMMENDED READING

- *Whistling Vivaldi* by Claude Steele
- Implicit Association Test from Harvard
- Willoughby & Metz article on different gain calculations

WHERE WE SHOULD GO FROM HERE

- Everywhere! Figure out how big this pond is!
- “Institutionalize” looking at gender and race in all studies; don’t let researchers extrapolate to all people from primarily white male populations
- Broaden definition of gender (M/F to M/F/other to spectrum); broaden definition of race/ethnicity
- Look at other marginalized/under-represented groups
- Look at intersectionality (e.g. black women)

WHY SHOULD YOU CARE?

- Physics as field needs to keep evolving to survive
- Proportion of old white guys is decreasing
- Physics needs to change its attitude towards the “other”
- PER is a good place to start; we’re already telling physicists they have to do things differently; they’re starting to listen!

WHY DO I CARE?

- More diverse systems are stronger systems
- More viewpoints in our fields (PER and physics)
- Don't want others to feel isolated
- I am invested in physics

IN SUMMARY...

- Studying gender & URMs is open to anyone
 - Add it to your current research
 - Have it be primary focus
- Need to keep studying it
- Will help both PER and physics evolve and thrive

Thank you!