WISELI

Women in Science & Engineering Leadership Institute
University of Wisconsin-Madison

What is WISELI?

- Research Center located in the College of Engineering, formed in 2002
- Mission: To promote the participation and advancement of women in academic science and engineering
  - Focus mainly on issues for women faculty in STEM at UW-Madison

What is WISELI?

- People
  - Co-Directors: Molly Carnes & Amy Wendt
  - Research/Executive Director: Jennifer Sheridan
  - Others—Evaluation Director Christine Pribbenow; Researcher and Workshop Developer Eve Fine; Graduate Student Assistant Jessica Winchell
- Funding
  - 2002-2006, funded by National Science Foundation ADVANCE Institutional Transformation grant (co-PIs Carnes, Handelsman, Sheridan)
  - 2006-Present, funded by NSF ADVANCE: PAID grant, contributions from campus, gifts, and generated revenue from dissemination activities

What is WISELI?

- Activities:
  - Workshops
    - Searching for Excellence & Diversity
    - Enhancing Department Climate: A Chair's Role
    - Running a Great Lab: Workshops for PIs
    - Breaking the Prejudice Habit Through Bias Literacy—*in development*
  - Grants
    - Vilas Life Cycle Professorship Program
    - Celebrating Women in Science & Engineering Grants

What is WISELI?

- Activities (cont'd)
  - Networks and Information
    - Website
    - Listserv
    - Library
  - Research
    - Gender Equity Indicators
    - Study of Faculty Worklife at UW-Madison
    - Study of Faculty Attrition
    - Project to Assess Climate in Engineering (PACE)

PACE Study

- Motivation
  - “The goal is to identify and address university climate issues to improve retention for all undergraduate engineering students”
    - Special emphasis on women and under-represented minority students
    - Provides benchmarking with other “peer” universities

PACE Study

- PI is Suzanne Brainard at the University of Washington
- 24 Engineering schools participated
  - University of Wisconsin-Madison and University of Washington participated on a pilot basis
- Funded by Alfred P. Sloan Foundation and The Engineering Information Foundation
- Student survey, follow-up interviews, written climate-improvement plans, and follow-up tracking of actions taken are elements of the project

PACE Study—UW-Madison

- WISELI was asked to implement the survey for the College of Engineering (CoE)
  - Useful for ABET (Accreditation Board for Engineering & Technology)
  - Data for improving climate for women, minority students

PACE Study—UW-Madison

- WISELI's interest
  - Find out more about the climate experienced by women, minority students at UW-Madison in the CoE
  - Learn whether Society of Women Engineers (SWE) is adequately helping women find mentors and decrease isolation, or whether more needs to be done
  - Create a longitudinal study?

PACE Survey Content

- **Academic experiences**
  - Satisfaction with teaching
  - Satisfaction with professors
  - Satisfaction with TAs
  - Satisfaction with resources
- **Interpersonal experiences**
  - Interactions among students
  - Participation in student organizations
  - Experiences based solely on gender or race/ethnicity
- **Intrapersonal experiences**
  - Confidence
  - Career goals
- **Perceptions of Engineering**
- **Experiences of Transfer Students**

PACE Implementation

- Human subjects
  - Concerns with accessing student records
- Timing
  - April-May 2008
- Response Rate Boosters
  - Invitation from Dean Paul Peercy to participate
  - 3 reminder emails
  - $100 incentive to 1 randomly-selected respondent
  - Encouragement emails sent from Diversity Affairs Office, Student Leadership Center, and many leaders of individual student organizations

Table 1. Characteristics of PACE Sample, UW-Madison

	PACE Respondents	All CoE Students
Gender		
Female	24.4%	17.5%
Male	75.6%	82.5%
Race/Ethnicity		
African American/Black	1.3%	1.8%
American Indian/Alaska Native/Native Hawaiian/Pacific Islander	1.1%	0.7%
Asian American/Asian	3.8%	6.3%
Hispanic/Latino	1.6%	2.4%
White/Caucasian	75.5%	78.5%
Other/Unknown	11.9%	3.2%
International Student	4.8%	7.2%
Targeted Minority	*4.8%*	*6.4%*
Rank		
Freshman	23.3%	10.4%
Sophomore	22.9%	21.9%
Junior	21.3%	24.8%
Senior+	32.4%	41.0%
Mean GPA	2.83	3.11
High GPA*	37.0%	27.5%
Transfer Student	10.9%	11.3%
Student Works	58.5%	Unknown
Financial Need	14.9%	Unknown
CoE Student Organization	40.2%	Unknown

* A High GPA is defined as 3.5 or higher.

Response Rates

- Overall response rate: 36.3%
  - Women over-represented
  - Most non-white racial/ethnic groups under-represented
  - Freshmen over-represented/Seniors and super-seniors over-represented
  - GPA—strange patterns of self-reported GPA

Analysis Variables

- Gender
- Race/Ethnicity
  - Under-represented minority (African American, Hispanic, American Indian)
  - Some separate analyses by individual groups
- Freshmen/sophomores
- GPA 3.5+
- Transfer student
- Student works
- Financial need
- Belongs to CoE student organization

Analysis

- Within-CoE comparisons
  - T-tests, differences between means
  - $p<.05$ for significance
  - Open-ended responses to highlight significant findings
- CoE vs. peer institutions
  - Purdue University, University of Michigan, Pennsylvania State University
  - Response rates are 33%, 35%, and 23%
  - Only means reported. Differences between peers and UW-Madison are considered “significant” if a ±0.2 difference in means was reported for at least two of the schools (in the same direction)

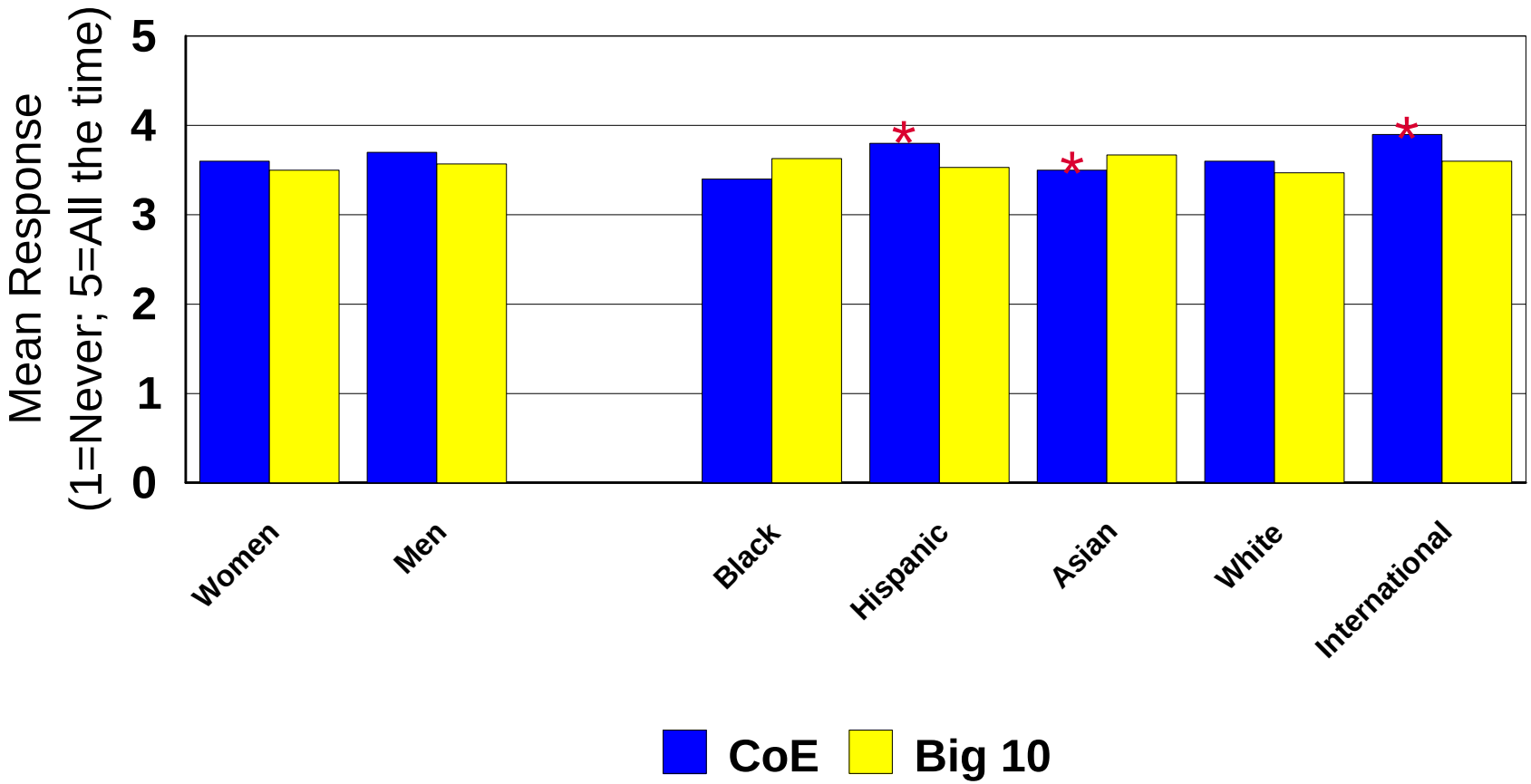
Findings: Academic Experiences

- All CoE Students
  - Math courses singled out as poor, both overall and compared to Big-10 peers
  - A culture of not asking professors for help is evident in data
  - TAs are given high marks by students
  - CoE study centers and job placement help are very highly rated, relative to Big-10 peers

Findings: Academic Experiences

- Women have slightly more negative experiences than men in the CoE, but similar experiences to other Big-10 women
  - Except—CoE women more likely to say that professors think they have lower ability than they actually have, compared to other Big-10 women
- URM students have some good, some bad experiences, generally happier than their Big-10 URM peers
- Students with high GPAs, and who belong to student organizations, report highest satisfaction with academic experiences

Figure 5. How often is lab work divided equally among lab group?



* CoE significantly different from Big-10 peers (see text)

Findings: Academic Experiences

- Lab Work Divided Equally
  - In many studies, women report that they are not full participants in group work; this did not emerge in our study
  - Asian students, and students with high GPAs actually reported more often that work was NOT divided equally

Findings: Interpersonal Experiences

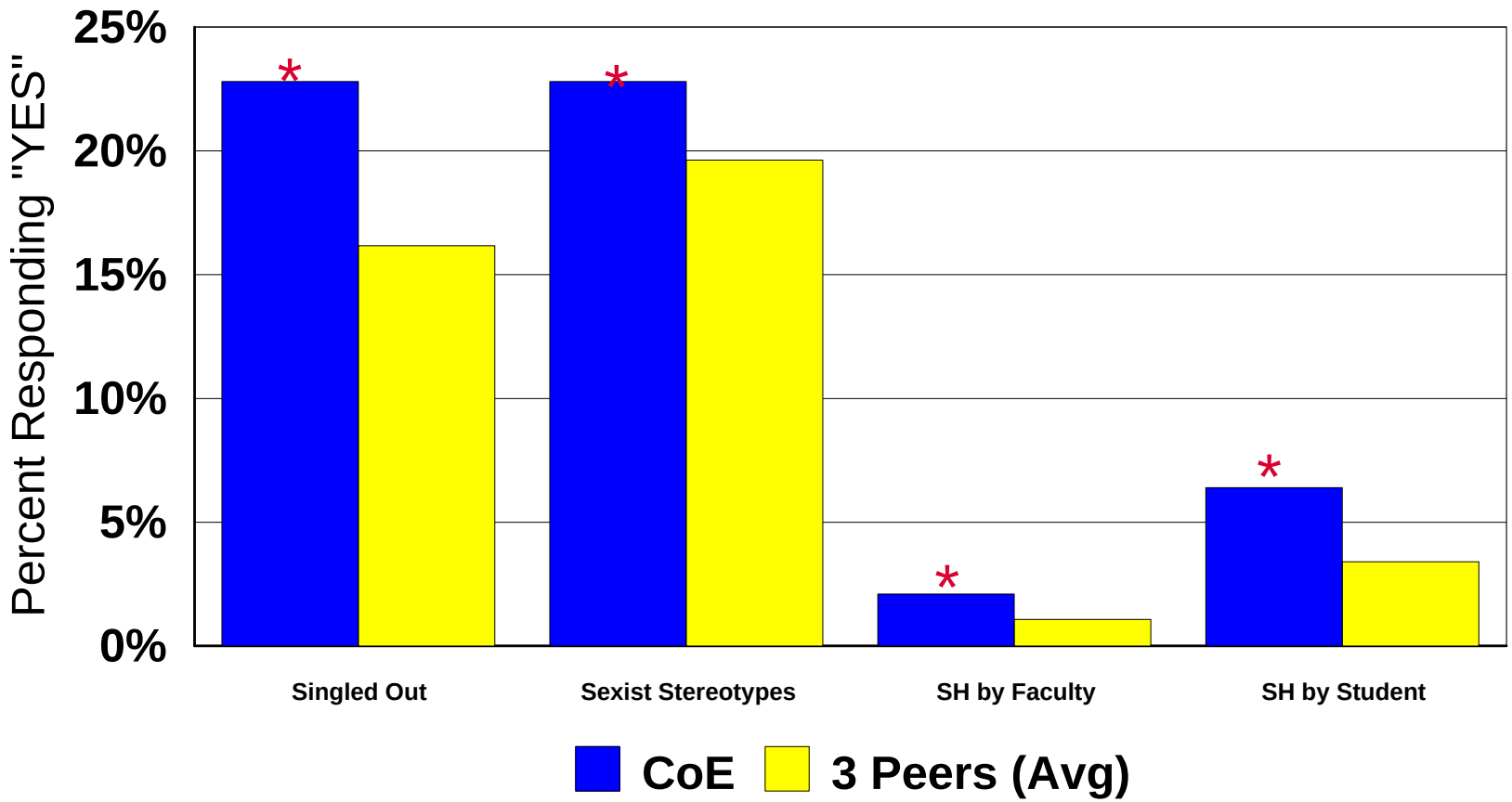
- Few differences overall between CoE and other Big-10 schools
  - Feeling like part of an Engineering community
  - Participating in study groups
  - Competition between students
  - Students take each other seriously

However…..

Findings: Interpersonal Experiences

- Women students report very high levels of experiencing differential treatment based on gender compared to women in Big-10 peer schools

Figure 6. Singled Out Due To Gender
Women respondents only



* CoE significantly different from Big-10 peers (see text)

NOTE: SH=sexually harassed

Findings: Interpersonal Experiences

- Even the men notice:

"I think it's very commonplace for Engineering students to joke about women, and how few of them there are in Engineering. The jokes seem harmless to us (men), but I'm sure their [sic] not to those few women actually in the field." (RID=243)

Findings: Interpersonal Experiences

- Further analysis shows that women who participate in student organizations, particularly the Engineering Projects and the Associations, are especially likely to report these instances.

Table 2. Women's Negative Experiences in the CoE, Logistic Regression Analysis

	In class, I have been singled out unfiarly because of my gender								In class, I have heard engineering faculty express stereotypes about men and women							
	Model 1				Model 2				Model 1				Model 2			
	Est.	S.E.	O.R.	*p*	Est.	S.E.	O.R.	*p*	Est.	S.E.	O.R.	*p*	Est.	S.E.	O.R.	*p*
Intercept	**-1.08 ***	**0.32**		**0.0007**	**-1.13 ***	**0.28**		**<.0001**	**-1.30 ***	**0.32**		**<.0001**	**-1.42 ***	**0.29**		**<.0001**
Freshman/Sophomore	**-1.37 ***	**0.36**	**0.25**	**0.0001**	**-1.35 ***	**0.37**	**0.26**	**0.0003**	**-1.19 ***	**0.35**	**0.30**	**0.0006**	**-1.20 ***	**0.37**	**0.30**	**0.0012**
Student Org	0.69	0.36	2.00	0.0535					**0.94 ***	**0.36**	**2.57**	**0.0091**				
Honor Society					0.31	0.66	1.37	0.6362					-0.61	0.85	0.54	0.475
Professional Society					0.74	0.68	2.10	0.2743					0.67	0.80	1.95	0.4062
Engineering Projects					**1.16 ***	**0.45**	**3.18**	**0.0094**					**0.96 ***	**0.45**	**2.60**	**0.0341**
Associations					0.24	0.38	1.27	0.5316					**0.84 ***	**0.37**	**2.32**	**0.0241**
SWE					-0.38	0.69	0.69	0.588					0.01	0.81	1.01	0.9916
N	227				227				228				228			
-2 Log L	227.559				219.58				228.951				214.323			
df	2				6				2				6			

* indicates significance at $p < .05$.

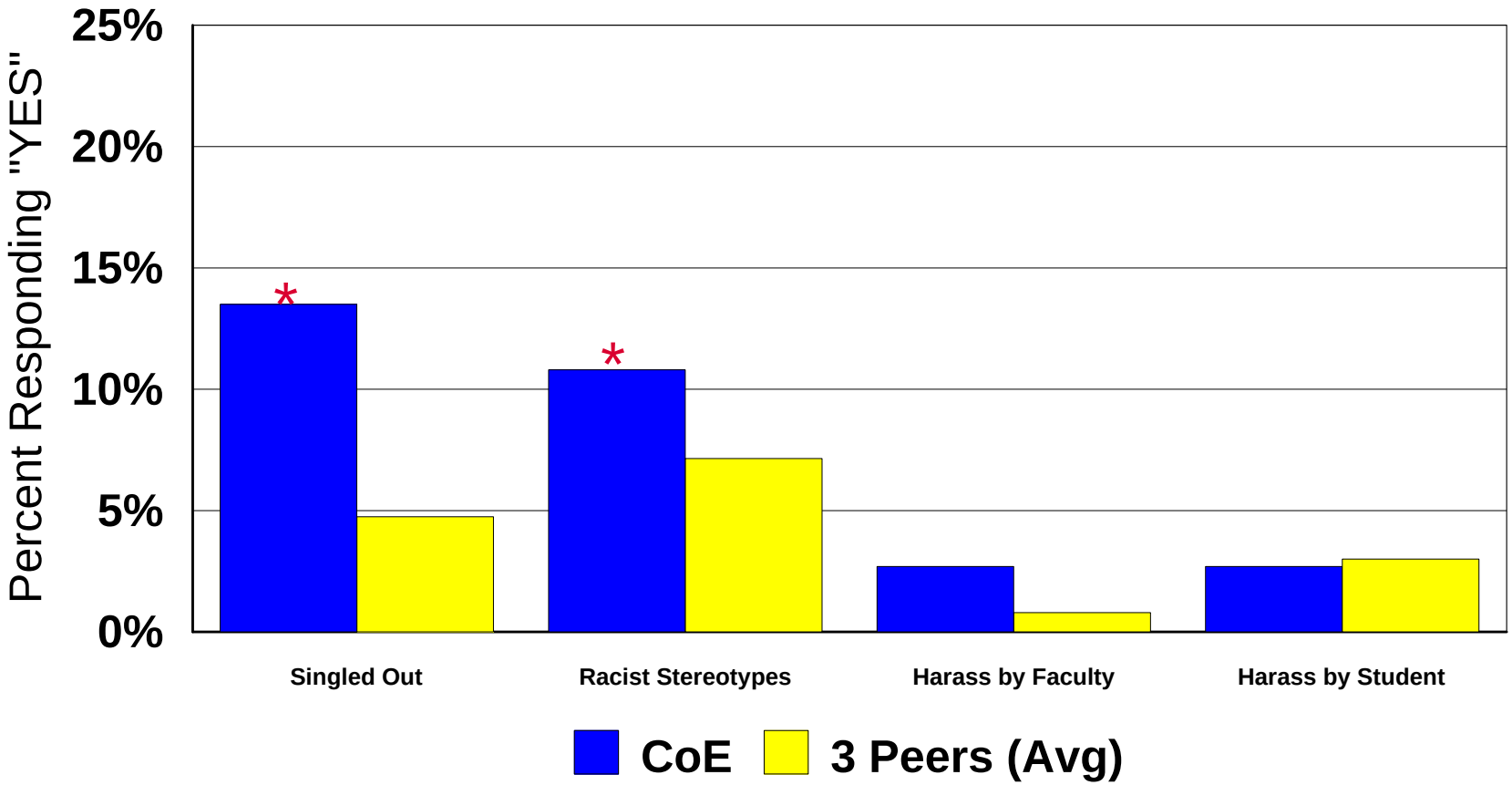
Findings: Interpersonal Experiences

- Singled out due to race
  - Targeted minority students not more likely to say yes

But…

  - Asian students (all ethnicities) more likely to say yes

Figure 7. Singled Out Due To Race/Ethnicity
Asian students only

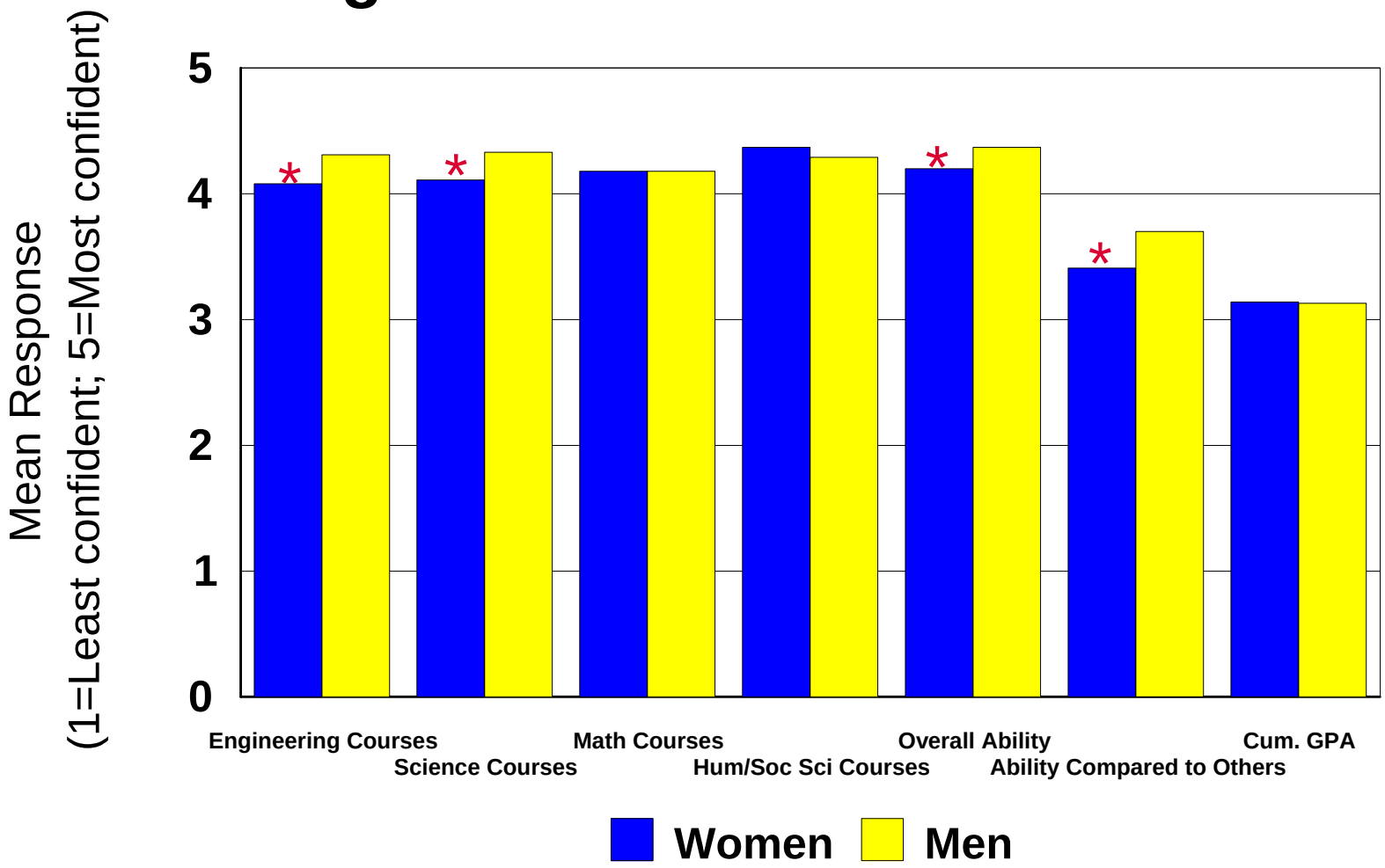


* CoE significantly different from Big-10 peers (see text)

Findings: Intrapersonal Experiences

- Women students have lower confidence in their abilities, but report the same GPAs as men students

Figure 8. Confidence in Abilities



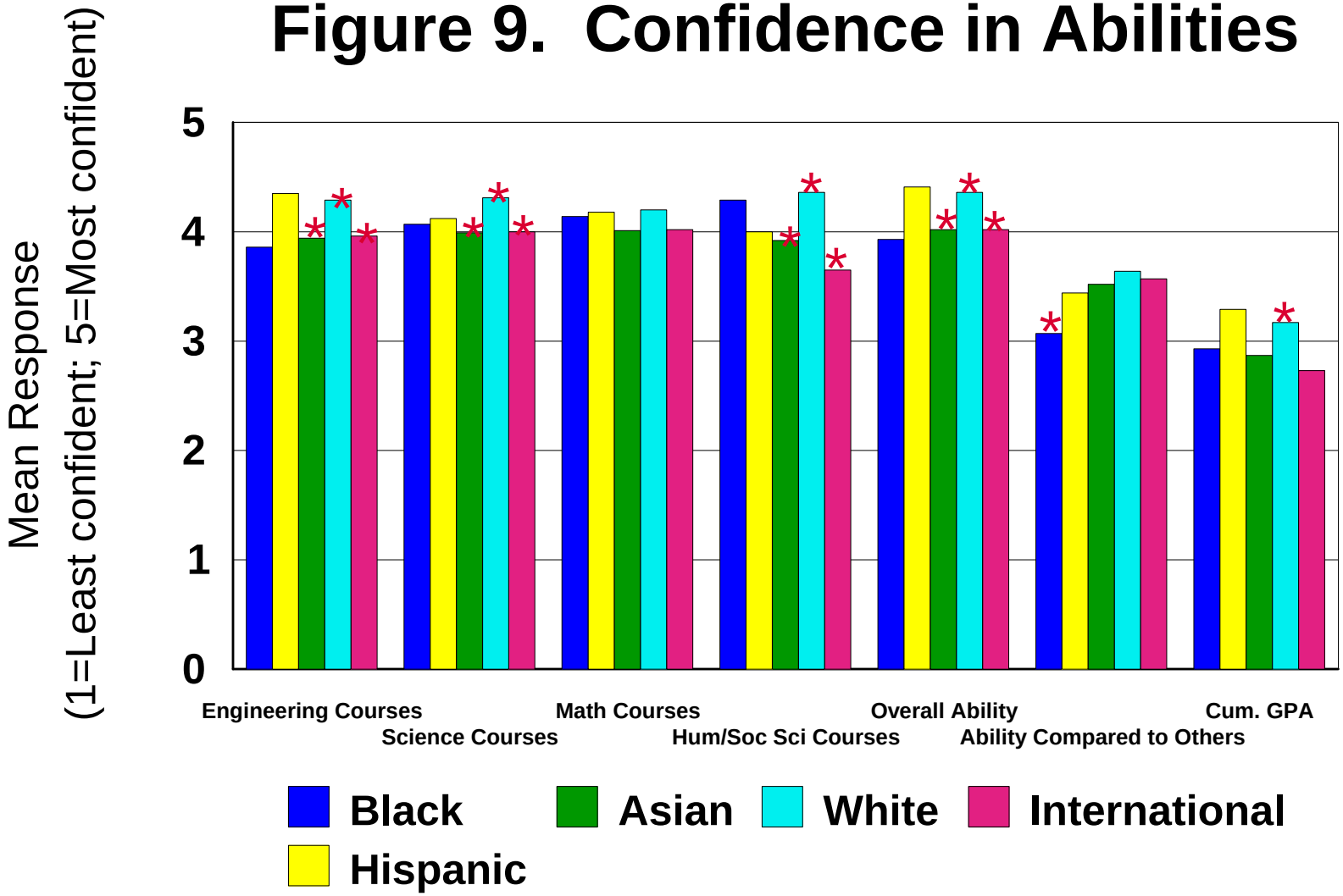
* CoE women significantly different from CoE men ($p<.05$)

NOTE: See Appendix 1 for actual question wording and response categories.

Findings: Intrapersonal Experiences

- Targeted minority students report lower confidence than their majority peers, but this difference appears to be driven by the lower confidence of African American students
- Asian students, and international students, also have low levels of confidence. Hispanic and white students report the highest confidence, and the highest GPAs

Figure 9. Confidence in Abilities



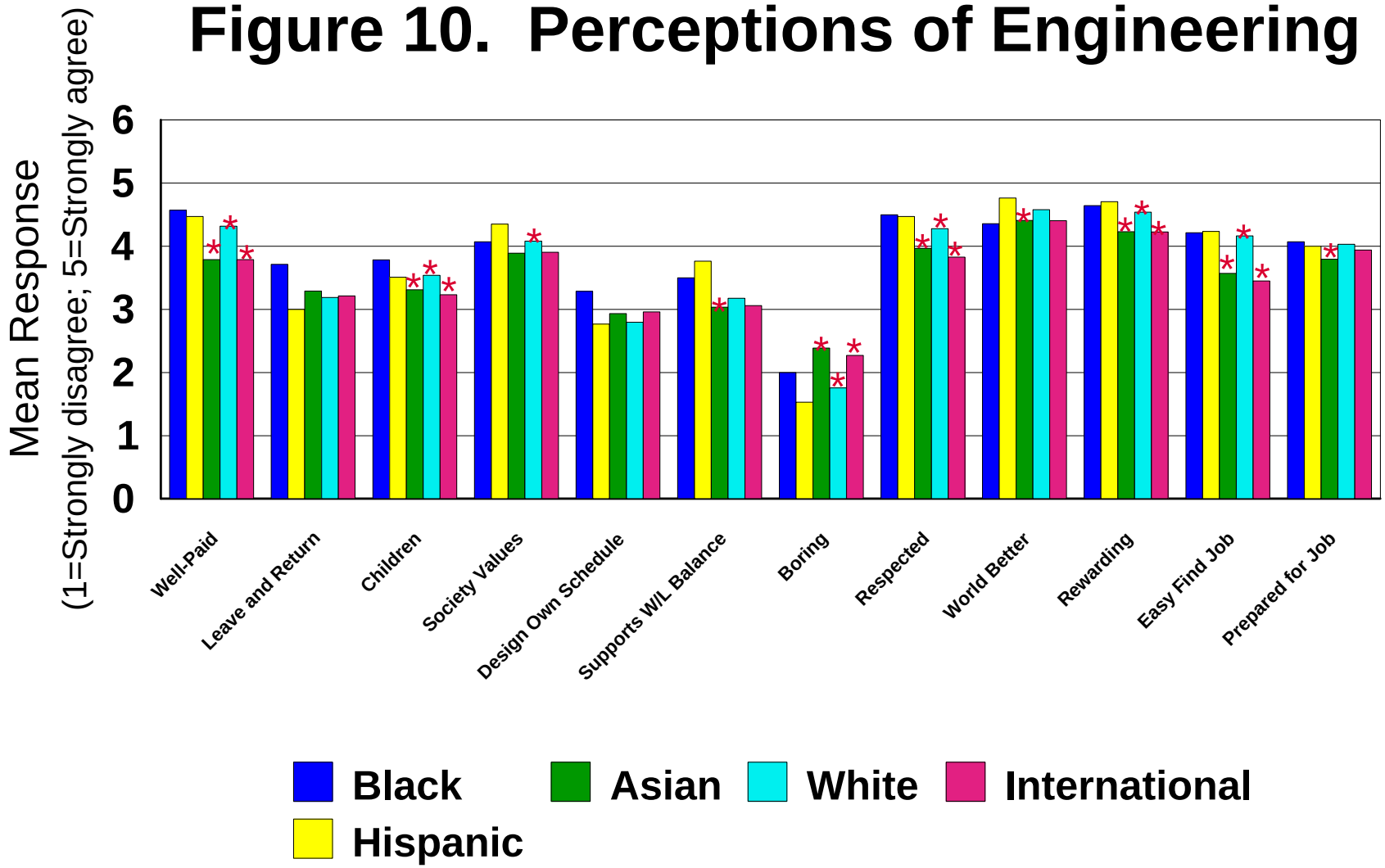
* Significant difference between selected group and all others (p<.05)

NOTE: See Appendix 1 for actual question wording and response categories.

Findings: Perceptions of Engineering

- UW-Madison Engineering students have a very positive view of Engineering as a discipline, compared to Big-10 peers
- Very few gender differences, but racial/ethnic differences are interesting

Figure 10. Perceptions of Engineering



* Significant difference between selected group and all others (p<.05)

Findings: Perceptions of Engineering

- Black, Hispanic, and white students have highest ratings of Engineering as a discipline on most measures
- Asian students and international students tend to respond the most negatively to the perception items

Summary

- Overall, CoE students rate well compared to Big-10 peers, especially on academic experiences measures, and perceptions of engineering measures
- A culture of not asking for help appears to exist among undergraduate CoE students
- The quality of TAs, and Engineering Career Services, rate very highly
- Students who belong to CoE student organizations and students with high GPAs are having the best experiences in the CoE

Summary (Cont'd)

- Yet, group differences were uncovered
  - Asian students (all ethnicities) provide lower ratings for most measures
  - Hispanic and white students provide higher ratings than other groups
  - Women, African American students have mixed responses

Summary

- Women students report very high incidence of differential treatment due to gender—higher than Big-10 peers
  - Women in particular types of student organizations appear to account for most of this
- Asian students report very high incidence of differential treatment due to race—higher than Big-10 peers or other non-white students

Summary

- Women students exhibit a “confidence gap”—underestimate their abilities relative to peers even while their GPAs are equal to peers. At the same time, women students report that their professors think they lack ability more often than do women in other Big-10 Engineering programs

Summary

- One non-finding of interest is that CoE women and targeted minorities report being treated as equals in group work, and enjoy group work; this is in contrast to some findings in this area
  - Asian students and high-GPA students, on the other hand, do not feel that group work is allocated equally

Next Steps

- Report given to deans
  - Present at CoE Diversity Forum next week
  - Present at CoE Academic Affairs staff meeting next week
- PACE project presenting overall findings at American Society of Engineering Education (ASEE) meetings in June

Next Steps

- Recommended actions
  - Some sort of harassment training for student leaders of Engineering student groups
  - More faculty oversight of activities within student orgs
  - Education of faculty regarding “confidence gap” for women students
  - Education of faculty, staff regarding singling out of Asian students (“model minority”?)
  - More inclusion of Asian students within the Engineering community—student groups, representation in Diversity Affairs Office, etc.?

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