Exploring the Relationships Among Performance on Engineering Tasks, Confidence, Gender, and First Year Persistence

Jennifer Light, LCSC – NAE UW Post Doc,
Russ Korte, UMN,
Deborah Kilgore, UW,
Ken Yasuhara, UW

The problem

- Flat or declining women and minority enrollment in engineering programs
- High attrition during the first two years in engineering
- Maintaining competitive edge and future technological advancement

Why do we have these problems?

- Social stigmas associated with engineering

- Heavy course load, inflexible curricula

- No connection between engineering and societal benefits

- Misalignment between expectation and experience

Combination: Cognitive Dissonance* and Expectancy Theory**

- Mechanism to regulate self-esteem
- Strive to achieve and maintain cognitive balance through attitude change.
- Less dissonance, less radical change

*Tesser, 2000; Hunt, 1993

** Wanous, 1992

Research Questions

Are there particular "types" of confidence aligned with gender?

What accounts for women's equal success in terms of performance and persistence in the first year of their engineering education in comparison to men, despite their self-reported lower confidence in their intellectual and technical abilities?

The Study

- Academic Pathways Study
  - Multi-method
    - Survey
    - Performance tasks
    - Structured interviews
    - Ethnographic interviews and observation
  - Multi-institutional (4 institutions scattered across US)
 - Longitudinal (same cohort through year four)
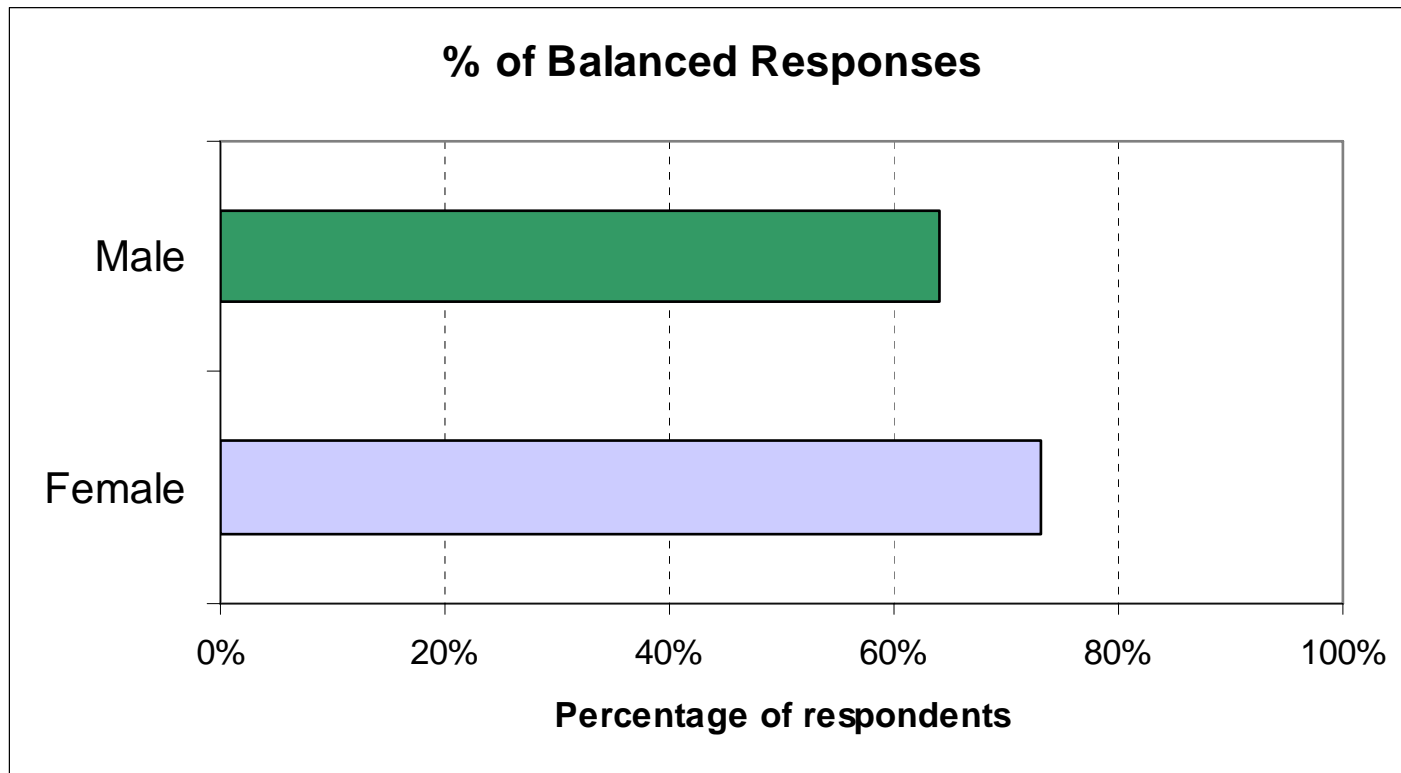
Methods

- Students rated self-confidence in Likert-style survey questions
- Performance task
  - Playground design: closed-ended question on survey about the information they would need to design a playground
- Persistence measured at beginning of following year

Results - Confidence

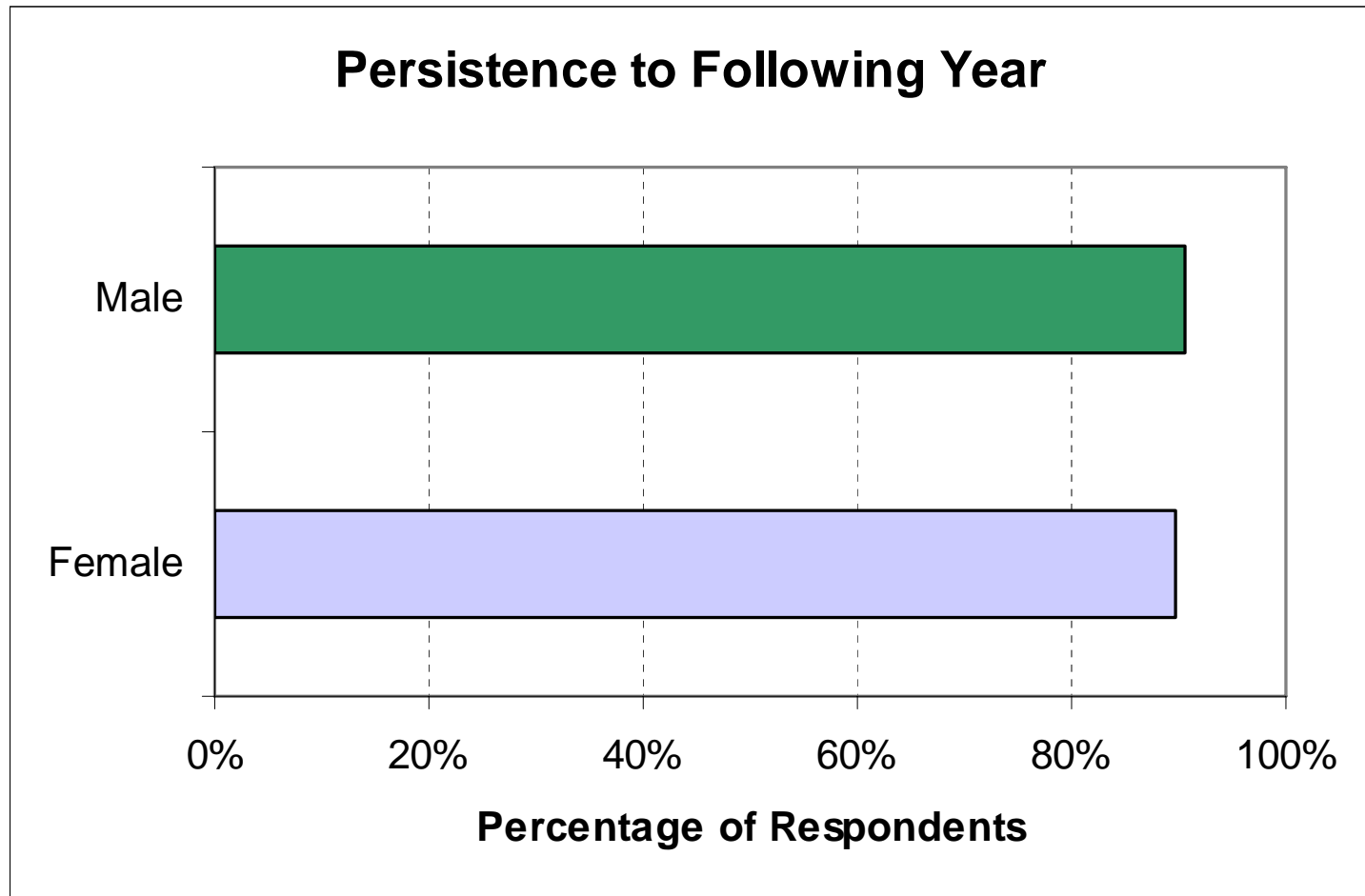

Significant differences in Confidence Ratings
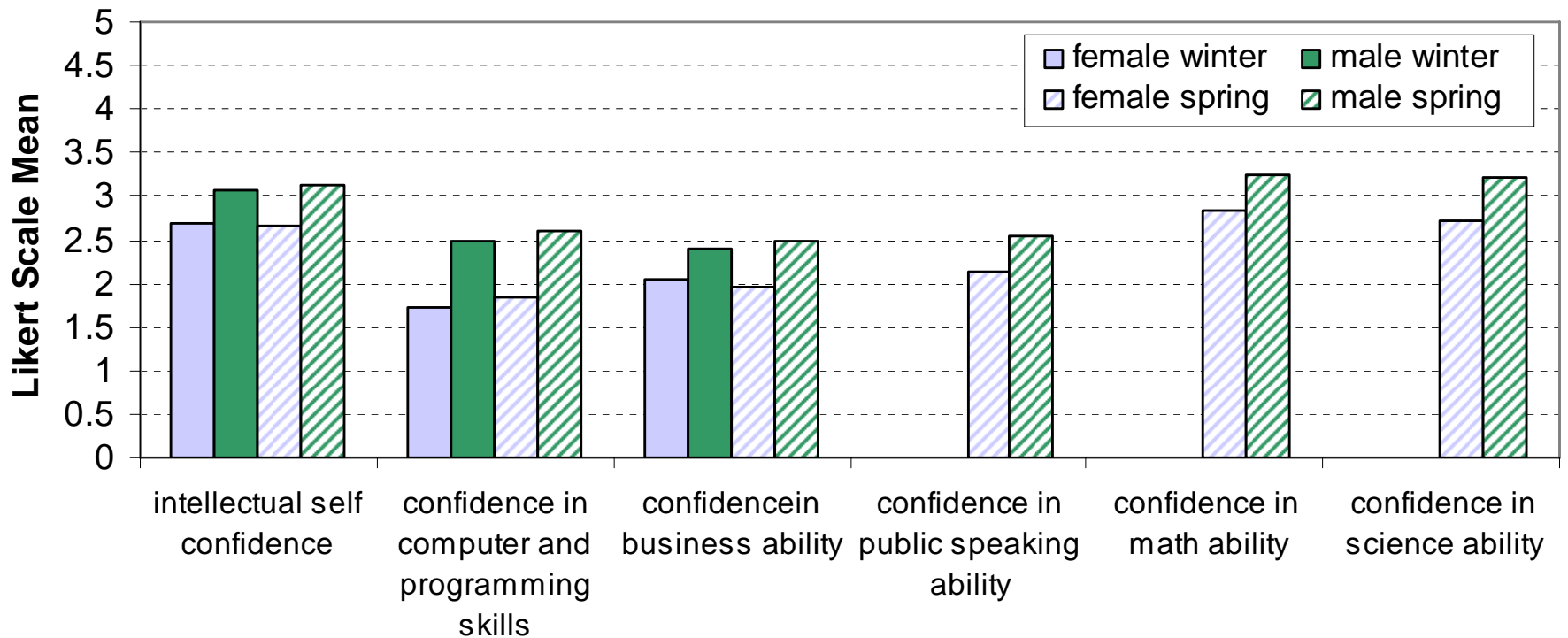
Results - Performance Task*

No difference when participants with balanced and unbalanced playground responses compare to mean confidence ratings

* See Kilgore et. al, 2007 for study details

Results - Persistence

Persistence to Following Year

Percentage of Respondents

Findings - Gender and Confidence

Are there particular "types" of confidence aligned with gender?

- Yes, women tend to rate their confidence lower than men in
  - general intellect
  - business abilities
  - computer abilities
- ...but similar or higher in
  - social self-confidence
  - leadership
  - public speaking
  - written communication

- In the first administration of the survey (winter 2004) women rated their math/science abilities similar to men but the following semester rated them significantly lower.

Cognitive Dissonance's Possible Role

What accounts for women's equal success in terms of performance and persistence in the first year of their engineering education in comparison to men, despite their self-reported lower confidence in their intellectual and technical abilities?

One reason may be a misalignment between expectations and reality (cognitive dissonance). This appears to be particularly identifiable in men where they had greater confidence in themselves going into engineering then suffered more disillusionment than women as they experienced academic challenges in the first year of study.

Bottom line…

The closer the expectations are aligned to students' experiences, the more successful the student experience will be.

In first year courses outlining expectations for:
- work load
- study skills
- time management

Building community through:
- experiences from prior students
- encouragement and reaffirmation after academic difficulties

Acknowledgements