Eliciting Challenge-Oriented Attitudes and Behaviors toward Women Science, Technology, Engineering, and Mathematics (STEM) Faculty

Andrea L. Jarosz
Thesis Advisor: Tamera R. Schneider, PhD
Wright State University
Women in STEM

• Earn 43% of all STEM PhDs
  (National Academy of Science, 2003)

• Make up 20% of science & technical workforce
  (National Academy of Science, 2003)

• Barriers to tenure-track progression
  (American Chemical Society, 2001)
Why Fewer Women than Men in STEM?

• Covert bias -
  – Less favorable evaluations
  – Overlooked for leadership positions
  (National Academy of Sciences, 2003)

• Overt bias -
  – Explicit biases such as slights, ridicule, and hostility
  – Women perceive the STEM climate as “uninviting, unappealing, and unaccommodating”
  – Report isolation as reason for leaving tenure-track jobs
  (National Academy of Sciences, 2003)
Promoting a Welcoming STEM Environment

- Change attitudes
- Get motivational messages out there!
- Challenging vs. threatening messages
Challenging messages

• Positive descriptors and phrases
• Low-worry
• High-efficacy
• Recipients *more* likely to engage in recommended behavior

Threatening messages

• Negative descriptors and phrases
• High-worry
• Low-efficacy
• *less* likely to engage in recommended behavior

(Schneider, Lyons, & Rivers, 2009)
Challenge

THE STEM WORKPLACE: BUILDING STRENGTH

Threat

PROBLEMS IN THE STEM WORKPLACE: AIMING TOWARD SOLUTIONS
Message Effectiveness

• Challenging messages elicit more approach-oriented attitude and behavior change than threatening messages.
  
  (Schneider, Rivers, & Lyons, 2009)

• Shown in research on promoting testing for a fictitious illness and colorectal cancer.
  
  (Schneider, Rivers, & Lyons, 2009; Feufel, Schneider, & Berkel, 2010)
Hypotheses

• The challenge message will induce more favorable attitudes and behaviors, compared to the standard message that people get about scientists who are women in STEM.

• The challenge message will induce more favorable attitudes and behaviors, compared to the threat message.
# 3 Experimental Group

<table>
<thead>
<tr>
<th>Worry</th>
<th>Standard*</th>
<th>Threat</th>
<th>Challenge</th>
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<tbody>
<tr>
<td></td>
<td>“Women make up only 1/5 of the nation’s scientific and technical workforce.”</td>
<td>“… make up a scant 1/5 of the nation’s scientific workers.”</td>
<td>“make up 1/5 of the nation’s scientific workers.”</td>
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<td>“Academic leaders should confront biases and support local senior faculty, male and female, who advocate for fair treatment.”</td>
<td>“…must confront faculty and others who are abusive to students, staff, and faculty.”</td>
<td>“Men and women scientists deserve the same amount of respect, opportunity, and departmental collegiality.”</td>
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*adapted from National Academy of Sciences, 2003
Procedure

• **Baseline survey**
  – General anxiety and state anxiety measure to ensure randomization was equal across groups (Borkovec et al., 1983; Spielberger et al., 1983)
  – Attitudes about women in STEM (“Compared to the typical person, I think highly of women in STEM”)
  – Demographics: age, gender, major (recruited STEM majors)
• **1st exposure to message** – worry component
• **Middle survey**
  – Worry and efficacy manipulation checks
• **2nd exposure to message** - worry with efficacy
• **Post-exposure survey**
  – Worry and efficacy manipulation checks
  – Attitudes repeated
• **Behaviors**
  – Donation of money or time, taking a brochure
Results: Manipulation ✔s:

Worry: Sex × Group

- Middle
  - Women > in challenge and standard
  - Men > in threat
    » $F(2,41) = 4.76, p = .01$

- Final
  - Women > in challenge and standard
  - Men > in threat
    » $F(2,41) = 5.21, p = .01$

Efficacy: Group

- Middle,
  - $F(2,41) = 1.13, p = .33$

- Final
  - Challenge > than standard, but not threat
    - $F(2,41) = 5.95, p = .01$
• In support of our hypothesis
  – Women’s attitudes significantly more positive attitudes in the standard and challenge group

• In contrast
  – Men’s attitudes significantly more positive in threat condition
• Significant time by group interaction
  – Standard and challenge improved attitudes
Behaviors

• No significant differences, small N
  – Taking a brochure: Marginal effect for sex ($p < .10$)
    • Women appeared to (not significant) take brochures more than men
  – Volunteering: (not significant nor marginal, but practical - TIME)
    • Challenge appeared to elicit more volunteerism (1.7 hours on average; $p = .16$)
Limitations & Implications

• Low power - few data collected so far

• Use findings to improve STEM climate by developing persuasive messages for distribution among STEM faculty and staff

• In terms of changing attitudes to foster a warmer STEM climate, challenge and standard works best for women, threat works best for men – different messages!
  – Invited speakers, leadership meetings, print media (e.g., posters, flyers, post-it notes, etc.)
Thank You!

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