Gender Issues in Academic Medicine, Science, and Engineering

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Topics Covered Today

• Frame issue
• Illustrate how implicit assumptions about gender can undermine explicit egalitarian goals
• Highlight some interventions that reduce the cognitive distortion that results from implicit assumptions
• Case discussion
Tremendous gains in medicine

- In 2007-08, women comprised:
  - 49% of medical students
  - 45% residents & fellows
  - AMCs
    - 34% faculty
    - 12% chairs
    - 10% deans
  - 25% NIH R01 applicants and recipients
Gender issues remain in medicine

- Research = pathway to leadership in academic medicine
  - Women are more likely to be clinicians and educators
    Tesch et al., JAMA, 1995; Wright et al., Acad Med, 2003
  - Women more likely to be assigned “institutional housekeeping”
    Bird & Wang, NSWA, 2004

- Gender-based and frank sexual harassment remain prevalent
  Shiffman et al., JAMWA, 1995; Frank et al., Arch Intern Med, 1998; Witte et al., Acad Med, 2006

- Women physicians earn less with comparable productivity
  Wright et al, Acad Med, 2003; Ash et al., Acad Med, 2002

- “Climate” less supportive of women’s careers
  Foster et al., Acad Med, 2000; Carr et al., JWH, 2003
Benefits of Reducing Gender Bias

- Aligns with personal views of self as good and just
- Employee satisfaction higher in gender mixed work groups (Fields and Blum, J Organ Behav, 1997)
- Women’s career advancement in academic health sciences linked with advancements in women’s health (Carnes et al., J Womens Health, 2008)
- Prevents waste of human capital
  - ≥ half clinical doctorates and PhDs in biomedical and behavioral sciences awarded to women (AAMC, 2008; NSF, 2007)
Why haven’t we solved this already?

• Title IX (the Education Amendment) in 1972
• Multiple calls for gender equity for > 20 years
• National Academies of Science concluded that major barriers were:
  – Not too few women enter most fields (pipeline argument)
  – Not that women scientists are less committed to their careers (women’s deficit argument)
  – Assumptions about gender – usually unconscious – lead to habitual responses that disadvantage women in academic career advancement
Consistent story in field and experimental studies over several decades –

• Women and the work performed by women receive lower evaluations than men and the work performed by men – even if the work is identical – multiple studies: e.g. Heilman, 2004; Wenneras and Wold, 1997; Steinpreis, 1999

• Sex of the evaluator makes no difference – i.e. both men and women give women lower evaluations – nearly universal

• Women are particularly disadvantaged at evaluation points advancing to high authority positions, especially elite leadership positions – multiple studies; e.g. Sczesny et al., 2006

• Women, but not men, who self-promote receive lower evaluations – Several studies; e.g. Rudman, 1998

• Those who think they have no biases provide the most biased evaluations – Uhlmann and Cohen, 2005

We all have gender biases (conscious or unconscious) that would be predicted to subtly but significantly impede advancement of women in academic STEMM
Gender is a Social Category

• Sex is biological (xx = female; xy = male);
  – Gender is socially constructed

• Social categorization
  – People assigned to groups based on common attribute
  – Stereotyping can emerge if most members share certain characteristics

• Biology irrelevant to most professional roles occupied by men and women
  – Men and women continue to have different social roles outside the workplace
  – These social roles can influence gendered reactions and interactions in the workplace
Prescriptive Gender Norms

DESCRIPTIVE: How men and women actually behave

PRESCRIPTIVE: Assumptions about the way men and women in the abstract “ought” to behave:

- **Women**: Nurturing, nice, supportive, helpful, sympathetic, dependent = *Communal*
- **Men**: Decisive, inventive, strong, forceful, independent, willing to take risks = *Agentic*

RELEVANT POINTS:

- **Leaders, scientists, professors**: Decisive, inventive, strong, independent
- **Social penalties** for violating prescriptive gender assumptions
- **Implicit gender biases** are easily and automatically activated and once activated readily applied
Implicit biases conspire to prevent academic STEMM from achieving its explicit egalitarian goals

- Expectancy biases based on prescriptive gender norms
- Role congruity for men and implied communality deficit for women
- Reconstructing merit
- Shifting standards of reference
- Stereotype threat
- Gender priming
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Evaluation of Leadership/Competence

• Students seated around a table – Who is the leader?

Porter & Geis 1981
MALE

SAME-SEX STIMULUS GROUPS

$X^2 = 21.25, p < 0.001$

$X^2 = 43.75, p < 0.001$
Expectancy Bias = Scientists are men so male scientists must be doing better science

- 114 applications for prestigious research postdocs to Swedish MRC (52 women)
- Reviewers’ scores vs standardized metric from publication record = impact points
- Women consistently reviewed lower, especially in “competence”
- Women had to be 2.5x as productive as men to get the same score
- To even the score, women needed equivalent of 3 extra papers in a prestigious journal like Science or Nature


The graph illustrates the competence score distribution among men and women across different total impact points categories. The scores are plotted on the Y-axis, ranging from 2.1 to 3.0, while the total impact points are categorized on the X-axis: 0-19, 20-39, 40-59, 60-99, and >99. The trend shows an increase in competence scores for both men and women as the total impact points increase, with men consistently having higher competence scores across all categories.
Expectancy Bias = Faculty are men

- Curriculum vitae sent to 238 academic psychologists (118 male, 120 female)
- Randomly assigned male or female name to cv
- Academic psychologists gave cv’s with male names attached higher evaluations for
  - Teaching
  - Research
  - Service Experience
- More comments on cvs with female name
- Evaluators were more likely to hire the male than the female applicant

Steinpreis et al., Sex Roles 41: 509 1999
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Penalties for success: Reactions to women who succeed at male gender-typed tasks

• 48 participants (20 men)
• Job description; Assist VP; products made suggested male (e.g. engine parts, fuel tanks). Male and female rated in two conditions:
  - Performance ambiguous
  - Performance clear
**Achievement-related Characteristics:**
- Unambitious - ambitious
- Passive - active
- Indecisive - decisive
- Weak - strong
- Gentle - tough
- Timid - bold
- Unassertive - assertive

**Interpersonal Hostility:**
- Abrasive - not abrasive
- Conniving - not conniving
- Manipulative - not manipulative
- Not trustworthy - trustworthy
- Selfish - not selfish
- Pushy - accommodating

**Competence Score:**
- Competent - incompetent
- Productive - unproductive
- Effective - ineffective

**Likeability:**
- Likeable - not likeable

How much do you think you would like to work with this person?
- Very much - not at all

**Comparative Judgment:**
Who is more likeable?
Who is more competent?
Results

Performance ambiguous
- Likeability and hostility comparable
- Men more competent
- Men more achievement-related characteristics

Performance clear
- Competence comparable
- Achievement-related characteristics comparable
- Women less liked
- Women more hostile

Congruity of roles for men and incongruity for women

Penalty for gender role violation
Why Are Women Penalized for Success at Male Tasks?:
The Implied Communality Deficit

• Similar design – evaluating VP’s in male-gendered position
• Memo from CEO introducing each VP; sentence varied in last paragraph:
  – Communal (“caring and sensitive” to employees; encourages “cooperation and helpful behavior”)
  – Positive non-communal (“worked hard to maximize employees’ contributions”)
Results

• No effect of participant sex

• Positive non-communal or no information:
  – Women vs men
    • Less likable
    • More hostile
    • Less desirable as boss

• Communal information
  – Men - no effect
  – Women vs men
    • More likable
    • Comparable hostility and boss desirability

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Mock hiring situation – 3 studies

Male and female applicants with identical credentials

Police Chief – criteria constructed to favor male applicant

Women’s Studies Professor – criteria constructed to favor female applicant

Self-perceived objectivity predicted gender bias

**Constructed Criteria:**
Redefining Merit to Justify Discrimination
Uhlmann and Cohen, Psychol Sci, 16: 474-480, 2005
Fig. 2. Results from Experiment 1: the interaction of applicant’s gender and self-perceived objectivity in predicting biased criteria. Low self-perceived objectivity is defined as one standard deviation below the mean; high self-perceived objectivity is defined as one standard deviation above the mean. Higher numbers indicate greater favoritism toward the applicant.
Study 3 -

• Half of the evaluators rated importance of criteria before seeing applications (commitment vs no-commitment)

• No-commitment: Criteria constructed to favor male applicant

• Commitment: Male and female applicants – similar hiring evaluations

Uhlmann and Cohen, Psychol Sci, 16: 474-480, 2005
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Shifting Standards of Reference:
Occurs when reliance on a group trait or stereotype leads to evaluation using a different referent standard (e.g., strong, for a woman; sensitive, for a man)
Shifting Standards of Reference cause cognitive distortions in judgment

- Height of men overestimated and women underestimated despite standard reference  

- Woman judged lower than men on actual wages but higher in financial success  

- Women applicants as likely to be shortlisted but less likely to be hired for male gender-typed job  
Figure 1. Schematic depiction of stereotyped representation of competence and minimum-standard levels for low- and high-status groups.
Implicit biases conspire to prevent academic STEMM from achieving its explicit egalitarian goals

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Clearing the Air: Identity Safety Moderates the Effects of Stereotype Threat on women’s Leadership Aspirations

Davies, Spencer & Steele, J Pers Soc Psych 88:276-287, 2005

• 61 Ss (30 M, 31 F)
• Gender Priming = viewed commercials that reinforced female gender stereotypes or neutral
• Stereotype Threat = women are less able to lead
• Asked to select role as “leader” or “problem-solver” in a subsequent group task
Results

• Men in all conditions and women after neutral commercials
  – No clear role preference

• Women after gender priming
  – Strong preference for problem-solver rather than leader

Davies, Spencer & Steele, J Pers Soc Psych 88:276-287, 2005
Affirmation of gender competence removed impact of stereotype threat

• Study repeated with:
  – Confirmation of gender priming
  – Randomized, controlled inclusion of statement affirming competence of men and women in both tasks

• Results:
  – Priming did activate stereotype
  – Affirming statement completely eliminated impact on role selection

Davies, Spencer & Steele, J Pers Soc Psych 88:276-287, 2005
Gender difference in NIH Award rates, 2003-07

Ley & Hamilton Science, 2008
NIH K23
- Mentored (usually by senior male)
- Lower status than reviewers
- Lower budget
- Less competitive

NIH R01
- High prestige
- Scientific leadership
- Keen competition for scarce resources with high status
  \textit{Agentic}

MALE
- Role congruity for men
- Implied communality deficit for clearly competent agentic women

FEMALE
- Status differential replicates societal gender roles

Study Section
Letters of Recommendation

- 312 letters of rec for medical faculty hired at large U.S. medical school
- Letters for women vs men:
  - Shorter
  - 15% vs 6% of *minimal assurance*
  - 10% vs 5% with *gender terms* (e.g. “intelligent young lady”; “insightful woman”)
  - 24% vs 12% *doubt raisers*
  - *Stereotypic adjectives*: “Compassionate”, “related well…” vs “successful”, “accomplished”
  - 34% vs 23% *grindstone adjectives*
  - Fewer *standout adjectives* ("outstanding" “excellent”)

Trix and Psenka, Discourse & Soc 14:191 2003
NIH Director’s Pioneer Awards

• All 9 went to men in the first round (2004)
• In subsequent rounds, women received:
  – 2005 = 43%
  – 2006 = 31%
  – 2007 = 33%
  – 2008 = 25%

Were women doing better science after 2004?
### Characteristics of target scientist and research

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<thead>
<tr>
<th>2004</th>
<th>≥ 2005</th>
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<td><strong>Risk-taking emphasized:</strong>&lt;br&gt;• “exceptional minds willing and able to explore ideas that were considered risky”&lt;br&gt;• “take…risks”&lt;br&gt;• “aggressive risk-taking”&lt;br&gt;• “high risk/high impact research”&lt;br&gt;• “take intellectual risks”&lt;br&gt;• URL includes “highrisk”</td>
<td><strong>Emphasis on risk removed:</strong>&lt;br&gt;• “pioneering approaches”&lt;br&gt;• “potential to produce an unusually high impact”&lt;br&gt;• “ideas that have the potential for high impact”&lt;br&gt;• “highly innovative”&lt;br&gt;• URL no longer includes “risk”</td>
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### Description of recommendations from outside consultants

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<thead>
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<th>2004</th>
<th>≥ 2005</th>
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<td><strong>Technological advances highlighted as desirable:</strong>&lt;br&gt;• “support the people and projects that will produce tomorrow’s conceptual and technological breakthroughs”</td>
<td><strong>Mention of technological breakthroughs removed; human health added:</strong>&lt;br&gt;• “encourage highly innovative biomedical research with great potential to lead to significant advances in human health.”</td>
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Semantic priming and tenure criteria?

- 25 top research academic medical centers
- Tenure criteria from websites
- Scanned for “Leader”
- Also scanned for other Bem Sex Role Inventory male, female, neutral words
- Slopes of regressions for annual % faculty tenured women x 7 years
- “Leader” = OR 6.0 (1.02, 35.37) for slope below median compared to those without

Marchant, Bhattacharya, Carnes. J Woman’s Health, 2007
Stereotypically male traits valued for tenure = role congruity for men?

<table>
<thead>
<tr>
<th>Male</th>
<th>Neutral</th>
<th>Female</th>
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<tbody>
<tr>
<td>Analytical</td>
<td>Friendly</td>
<td>Sensitive</td>
</tr>
<tr>
<td>Competitive</td>
<td>Helpful</td>
<td>Understanding</td>
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<td>Defends</td>
<td>Inefficient</td>
<td>Yielding</td>
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<tr>
<td>Independent</td>
<td>Truthful</td>
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<td>Individualistic</td>
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<td>Leadership</td>
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<tr>
<td>Risk</td>
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Median 5.5/school; 2-50

Total 183
Gender Differences in Self-Assessed Abilities to Perform Clinical Research = Stereotype Threat?

• Women (n=28) entering a program to train clinical investigators scored lower than men (n=29) on 22/35 competencies
  – significantly lower on “spend sufficient time developing and advancing one’s own area of scientific research.”

• Following 3 d workshop, gender difference increased; women lower on 34/35, sign. for 7

Bakken et al., Acad Med, 2003
Pre-training difference in mean ratings of men and women for each objective on the self-assessment (n=57).
Evidence-Based Strategies –
For women in male sex-typed roles

• Avoid triggering female stereotype of less competence and implied communality deficit = narrow range of behavior
  – Too stereotypically feminine = triggers assumptions of incompetence, dependence
  – Too stereotypically masculine = penalties for gender role violation
• Agentic but communal = powerful combination
• Individuate whenever possible = prevents filling in gaps with stereotyped assumptions
Evidence-Based Strategies – For institutions committed to gender equity

- Reaffirm that “research shows there is no gender difference in the performance of…”
- Structure evaluation processes to allow individuation
- Remove sources of information that lead to stereotype threat (e.g. picture gallery of white men)
- Examine wording of internal awards for gender priming favoring male applicants
- Establish value of credentials before reviewing applicants
In spite of our egalitarian goals, gender bias recurs

**2004**

**NIH Director’s Pioneer Award**

- Conditions that lead to application of gender bias:
  - Male semantic priming – “high risk research”, “technological breakthroughs”
  - Rapid, unfamiliar review
  - Ambiguous performance criteria

**Round 1**

- Conscious efforts to reduce application of implicit bias

- Round 1 = 9/9 men

**Round 2+ = ≥25% women**

**2006**

**CTSA Awards**

- Conditions that lead to application of gender bias:
  - High prestige
  - Leader of leaders
  - Big budget
  - Lots of institutional power
  - Ambiguous performance criteria

**Round 1**

- Conscious efforts to reduce application of implicit bias

- Round 1 = 35 male PIs

**Round 2+ = ≥16% women**

Carnes et al., 2005, 2006, 2007
Conclusion/Summary

• Women physicians & scientists have made tremendous advances but gender bias causes cognitive distortions at both the individual and institutional level that conspire to reduce women’s full participation in the academic STEMM enterprise.

• The subtlety of these distortions enables bias against women to enter decision-making processes without being overt (both of individual women and those rating women’s work).

• Academic medicine would be well served if we diagnose and treat gender bias with the same reverence for evidence-based decision-making that we demand in our clinical practice and teaching.
Case of Dr. Leroy