Stemming the Tide: Why Women Leave Engineering

(and What Can Be Done About It)

Nadya A. Fouad, Ph.D
Romila Singh, Ph.D
University of Wisconsin-Milwaukee

Presentation to the CWSEM at
The National Academy of Sciences
April 24, 2013

Agenda

- Status of women engineers nationally
- "Stemming the tide" report and the Project on Women Engineers' Retention (POWER)
  - Rationale
  - Key findings
- Best practices from the study
- Summary and recommendations

Women in Engineering: National Investment

- Concern about underrepresentation for 3 decades
- Many efforts at Undergraduate, then K-12 levels to address STEM Education
- $ 3.4 billion in federal funds for STEM Education in FY 2010
- 31% for underrepresented minorities, 13 million for women explicitly

Women in Engineering: National Profile

- Women comprised more than 20% of engineering school graduates for past two decades (18% in 2012).
- 11% of practicing engineers are women
- Varies by discipline area
- EE and Electronics Engineering the lowest (9%),
- Chemical the highest (22%) (Biomed majors are highest-50%)

Women in Engineering: Current Status

- Engineering profession has the highest turnover compared to other skilled professions: accounting, law, medicine, and higher education.
- Return on Investment (ROI) on STEM careers is not optimally realized
- Loss of women engineers=loss to organizations, loss to society, loss to the U.S.'s competitive edge, loss to individual

Women = Dispensable Talent?

"The stock market would not allow the waste of capital in the way we tolerate the waste of female talent and ability."

- Lord Myners, in his keynote speech at the Report of the Gender & Productivity Summit, 11 Downing Street, October 2004

Project on Women Engineers' Retention (POWER): Study Site and Method

- 3-year, NSF-funded longitudinal study – results reported from 1st phase; Phase 2 in progress.
- Formally partnered with top 30 universities with the highest number of women engineering graduates (list from ASEE, 2008).
- Reached out to female engineering alumnae through email and postcards
- Women from an additional 200 colleges participated in the survey after hearing of this study through colleagues

Study Site and Method

- As of August 2012, over 5,700 women responded to the survey; (Response rate ~ 31%) (5303 useable responses)
- Engineering alumnae targeted across different life and career stages (graduates spanned over six decades: 1947-2010)
- Thousands of women added comments at the end of survey
- *Who's an engineer?* Women asked to self-identify whether they were currently working in engineering

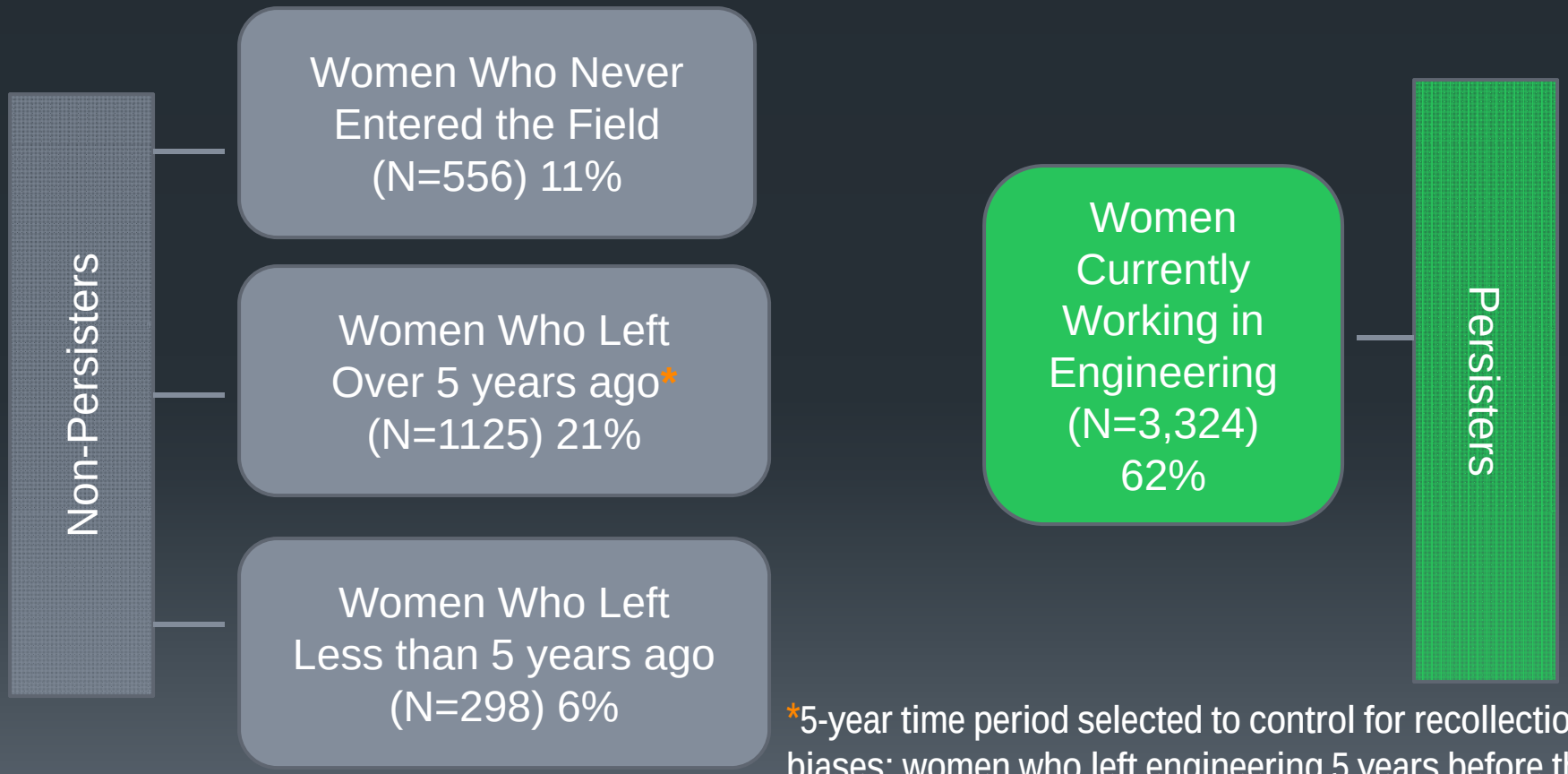
Partner Schools

California Polytechnic State University, SLO	Southern Illinois University
California State Polytechnic University, Pomona	Stanford University
California State University, Northridge	University of California, San Diego
Cornell University	University of Florida
Georgia Institute of Technology	University of Illinois
Iowa State University	University of Maryland
Marquette University	University of Michigan
Michigan State University	University of Missouri-Kansas City
Massachusetts Institute of Technology	University of New Mexico
North Carolina State University	University of Texas, El Paso
Ohio State University	University of Washington
Penn State University	University of Wisconsin-Madison
Purdue University	University of Wisconsin-Milwaukee
Rutgers University	University of Wisconsin-Platteville
San Jose State University	Virginia Tech

Profile of POWER Participants: Four Groups

,

Three most cited majors: Industrial Engineering, Chemical Engineering, and Mechanical Engineering



*5-year time period selected to control for recollection biases; women who left engineering 5 years before the study was launched received a shorter survey than women currently working in engineering.

Four Groups: Different Career Paths

- Women who never entered the engineering profession post baccalaureate degrees.
- Women who worked in engineering fields and then left—
  - More than five years ago, and
  - Less than five years ago
- Women who are still working in engineering.

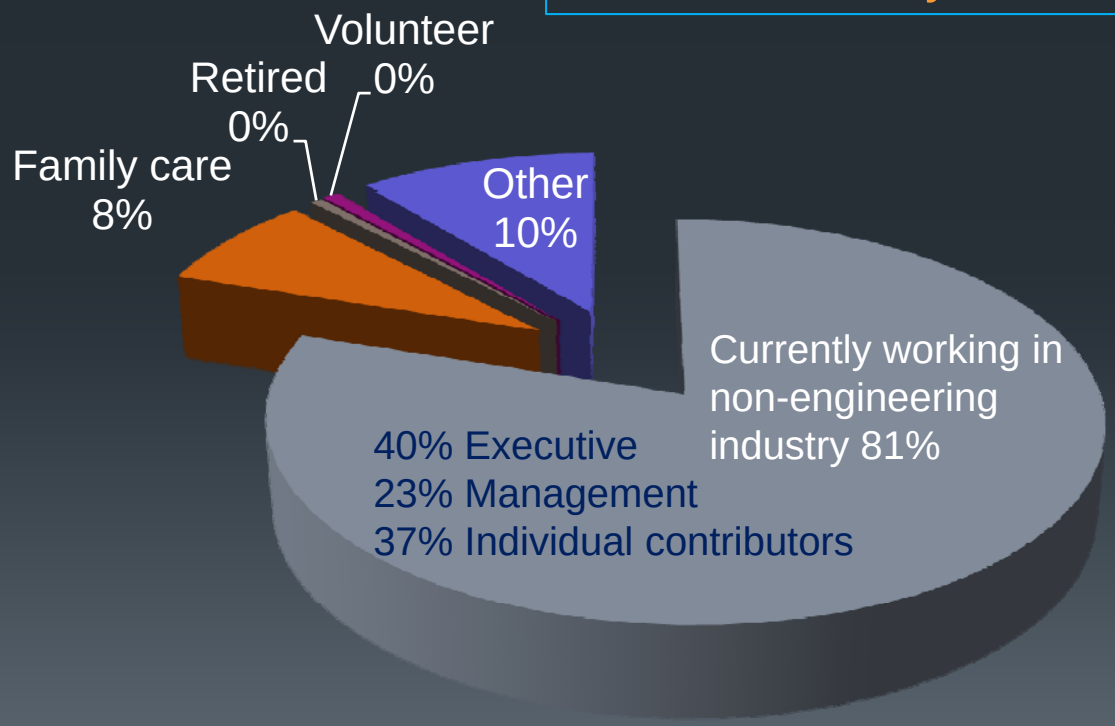
Four Groups: Different Career Paths

- Paths taken by women who never entered the engineering profession post baccalaureate degrees:

Why They Didn't Enter?

- Not interested in engineering (24%)
- Wanted to start their own business (18%)
- Didn't like the engineering culture (17%)
- Planned to go into another field (15%)
- Low salary (7%)

Where Are They Now?



In their own words…

- "At the time I graduated no one was hiring except for the computer consulting companies that also paid very well compared to engineering and valued our problem-solving skills. By the time I worked … for 5 years, I had surpassed my father's salary who had worked in engineering for over 40 years."

– Caucasian Aerospace Engineering Graduate

- "I interviewed with a company where there were no women, no minorities and one in the young adult age group"

– African American Chemical Engineering Graduate

- "My first-class engineering education allowed me to pursue extraordinary opportunities as a strategy consultant."

– Caucasian/Latina Chemical Engineering Graduate

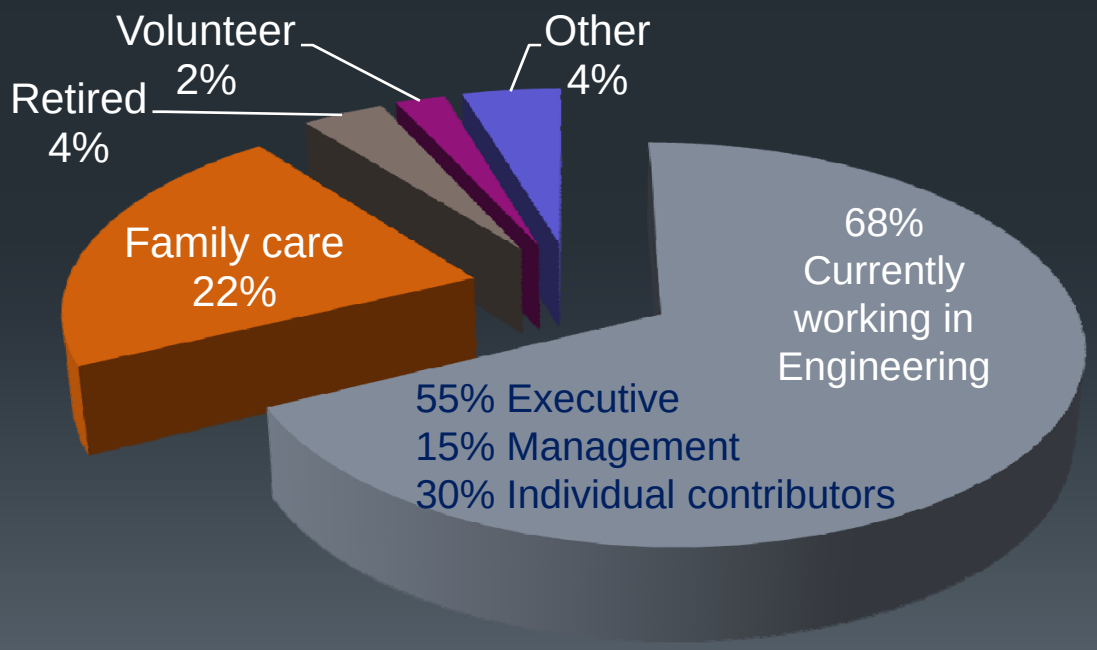
Four Groups: Different Career Paths

- Paths taken by women who worked in engineering fields and then left more than five years ago:

Why They Left?

- To fulfill care-giving responsibilities (17%).
- Not offered opportunities for advancement (12%).
- Lost interest in engineering (12%)

Where Are They Now?



In their own words…

- " To advance, it seems as though you must be willing and able to work 50+ hours/week and often be on-call 24/7."

– Caucasian Chemical Engineering Graduate

- "There isn't a strong network of females in engineering. You either need to learn to be "one of the guys" or blaze the trail yourself, which is very difficult. I deviated from engineering... but work now in construction, where I am the only female executive officer."

– Caucasian Agricultural Engineering Graduate

- "[There is] no opportunity for advancement in a male-dominated field—the culture of engineering is male-centric with high expectations for travel and little personal time."

– Caucasian Chemical Engineering Graduate

Four Groups: Different Career Paths

- Paths taken by women who worked in engineering fields and then left less than five years ago: smallest of 4 groups
- Two-thirds left pursue *better opportunities* in other fields and organizations
- A third left to stay home with the children *(because companies weren't flexible enough to accommodate work-life concerns)*
- Currently:
  - 54% in Executive roles
  - 22% in Project Management and/or Management roles
  - 24% in Individual Contributor roles
- Average compensation: $51,000-$100,000

In their own words…

- "Women leave engineering due to a lack of job satisfaction, lack of reliable female role models, inflexible work schedules, workplace discrimination, white mid-western men syndrome, and glass ceiling issues."

– Latina Civil Engineering Graduate

- "Most of management is a male-dominated culture (male conversation topics, long hours, demanding lifestyle, career-focused expectations)…. Women usually choose to leave without fighting the uphill battle to make improvements. It is a self-sustaining cycle!"

– Asian-American Operations Research and Engineering Graduate

- "…what ultimately led me to B-school and a non-engineering job was the lack of a viable career path (i.e. advancement) within the engineering organizations where I worked. In addition to that, most engineering organizations have promotion/leadership funnels that are very, very narrow."

– African-American Mechanical Engineering Graduate

Profile of Women Currently Working In Engineering

- On average worked 43.5 hrs/week, tenure at organization- 8 years, and reported earning salaries ranging from $76,000 to $125,000.
- About half of them were “individual contributors,” one-third were in project management positions, 15% were in executive roles.
- For those in management positions, a majority of engineers supervised between 1 to 5 individuals.
- Most worked in groups that were predominantly male with a smaller number (18%) reporting working in gender balanced groups.

Why Do Women Stay in Engineering?

- They are satisfied with their jobs and careers
- They have supportive bosses and co-workers
- Their organizations "get it"- how do they show it?
  - They recognize women's contributions and care about their well-being
  - They invest in their training & professional development
  - They provide clear, transparent paths for advancement
  - They have supportive work-life policies *and* a work culture that supports work-life balance for all

Are Current Women Engineers a Flight Risk?

- Yes, they are. And here's why:
- Women who thought about leaving their organizations experienced :
  - excessive workload without enough resources, conflicting work demands, and unclear expectations about work goals and standards
  - a career plateau with few advancement opportunities
  - low satisfaction with their jobs and careers
  - a variety of climate related barriers

Workplace Climate that Hinders Persistence: Undermining & Incivility at Work

- Undermining behaviors targeted at women by their managers and co-workers:
  - Being belittled, insulted, talked about behind their back
  - Being pulled back when trying to succeed at work
- Working in companies where women are treated in a condescending, patronizing manner by senior managers and co-workers

Workplace Climate that Hinders Persistence: No Support for Managing Multiple Life Roles

- Companies that did not offer flexible work-life policies
- Companies with poor work-life cultures stressed:
  - Face-time;
  - Taking work home on weekends and evenings;
  - Working more than 50+ hours/week to get ahead;
  - Regularly putting work before family
- Companies need *both* - supportive climate and work-life policies - to attract and retain employees

Comparison: Women Currently Working and Those Who Left Engineering Less Than 5 Years Ago

- No differences in women's:
  - self-confidence to perform engineering tasks,
  - manage multiple life roles, or
  - navigate organizational politics
- No differences in vocational interests

How do Persisters and Non-Persisters Differ?

- Experienced greater barriers at work, specifically, climate related barriers
- Non persisters experienced:
  - greater undermining behaviors by supervisors
  - lack of managerial support and sensitivity toward their family responsibilities

How do Persisters and Non-Persisters Differ?

- Experience of support from their organizations
- As compared to women who recently left engineering, women currently working in engineering experienced greater:
  - Opportunities for training and development
  - Stretch assignments
  - Supervisor and coworker support
  - Promotion opportunities

Does Race Play a Role?

- Yes, racial/ethnic minorities expressed greater incidence of supervisory undermining behaviors (e.g., insults, talking behind one's back)
- Yes, racial/ethnic minorities noted more frequent role conflicts stemming from incompatible requests and demands from multiple stakeholders.
- No differences in perceptions of different types of support among different groups (e.g., training & development, supervisor support, advancement opportunities).

Are There Differences by Industry?

- No reported differences by industry in terms of perceptions of supportive and non-supportive work environments.
- Key* (SIC) industries examined were:
  - Aerospace (N=340)
  - Transportation & utilities (N=253)
  - Construction (N=174)
  - Computer services/software (N=140)
  - Biotech (N=100)
  - Excluded: Education, Consulting, and Govt. (Fed, Local, State)

* Selected on the basis of sample size over 100.

Leaning In But Getting Pushed Back (and Out)

- What Pushes Women Engineers Back from Success?
  - role-related pressures
  - hostile climate
  - job dissatisfaction
  - inadequate training and development opportunities, and
  - lack of advancement opportunities.
- Women engineers are not being pushed out by lack of self-confidence. No differences in women engineers' self-confidence regardless of whether they stayed or left.
- Race matters: women of color reported *less* supportive work environments.

What Can Organizations Do to Retain Women Engineers?

Step 1: Recognize the problem

- Recognize that --
  - this is not a woman's issue
  - it is not about women wanting to spend time with their children or taking time for care-giving
  - the reasons why women stay are very similar to why they leave--
    - Advancement opportunities
    - Climate issues

How to Retain Women Engineers

Step 2: Change starts from the top,

but leaders all the way down to the front-line supervisor must model the change.

- Create a culture that --
  - has zero-tolerance for incivility and undermining
  - recognizes employees' contributions and cares about their well-being
  - respects employees' work-life obligations and responsibilities

How to Retain Women Engineers

Step 3: Implement system-wide changes;

reinforce the change with metrics and reporting systems that track performance and accountability

- Create systems and policies that --
  - Invest in skills-based training and overall professional development
  - Provide transparent paths with clear, fair criteria for mobility and advancement
  - Provide opportunities for formal and informal mentoring; other networking opportunities
  - Offer a variety of options to manage multiple life responsibilities, without any career penalties

How to Retain Women Engineers

Step 4: Implement role-level changes

- Communicate clear work goals and relevance of tasks to the corporate objectives
- Clarify what needs to be done, how, and when it needs to be done
- Eliminate, when possible, conflicting demands, expectations, and role disruptions
- Infuse new resources or reallocate existing ones to streamline work procedures

Professional Engineering Societies: Making a Difference

- Create leadership opportunities for women and URM at all levels; avoid tokenism
- Target high-achieving women and URM for nominating as fellows at different engineering societies
- Create fellowship programs for women and URM
- Create and offer opportunities for formal and informal mentoring within the academies (e.g., developmental workshops)

Summary and Final Thoughts

- All evidence points to one fact:

  Women's departure from engineering is not a "*woman's issue*" after all.

- Climate issues and lack of advancement opportunities lie at the heart of women opting out and/or not leaning in.
- Our results also show that women engineers who contemplate leaving their organizations also think about leaving the profession:

attrition from organization=attrition from profession

Next Steps...

- Currently 2nd phase of longitudinal Study for Women
- Funding from NSF for 2 studies:
  - Recruit Male Alumni from partner universities
  - Recruit working engineers (Male and Female) to study engagement: Why do engineers stay in their organizations and the field?
- We need your help and partnership with both!

To Continue This Discussion...

Please contact us with comments and suggestions:

Dr. Nadya Fouad (nadya@uwm.edu)
Dr. Romila Singh (romila@uwm.edu)

To learn more about the study:

http://www.studyofwork.com

Thank you!