

(TOO) FEW WOMEN IN STEM: TRACING THE PSYCHOSOCIAL PATHWAY

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Context for our work

- National concern about S & E workforce
- High rate of attrition among doc students (CGS, 2007)
- Doctoral attrition rates for women higher than for men; in physical sciences & engineering too (GAO, 2005; NSF, 2006)
- High social, personal, and economic costs of losing accomplished, capable women who aspired to STEM careers

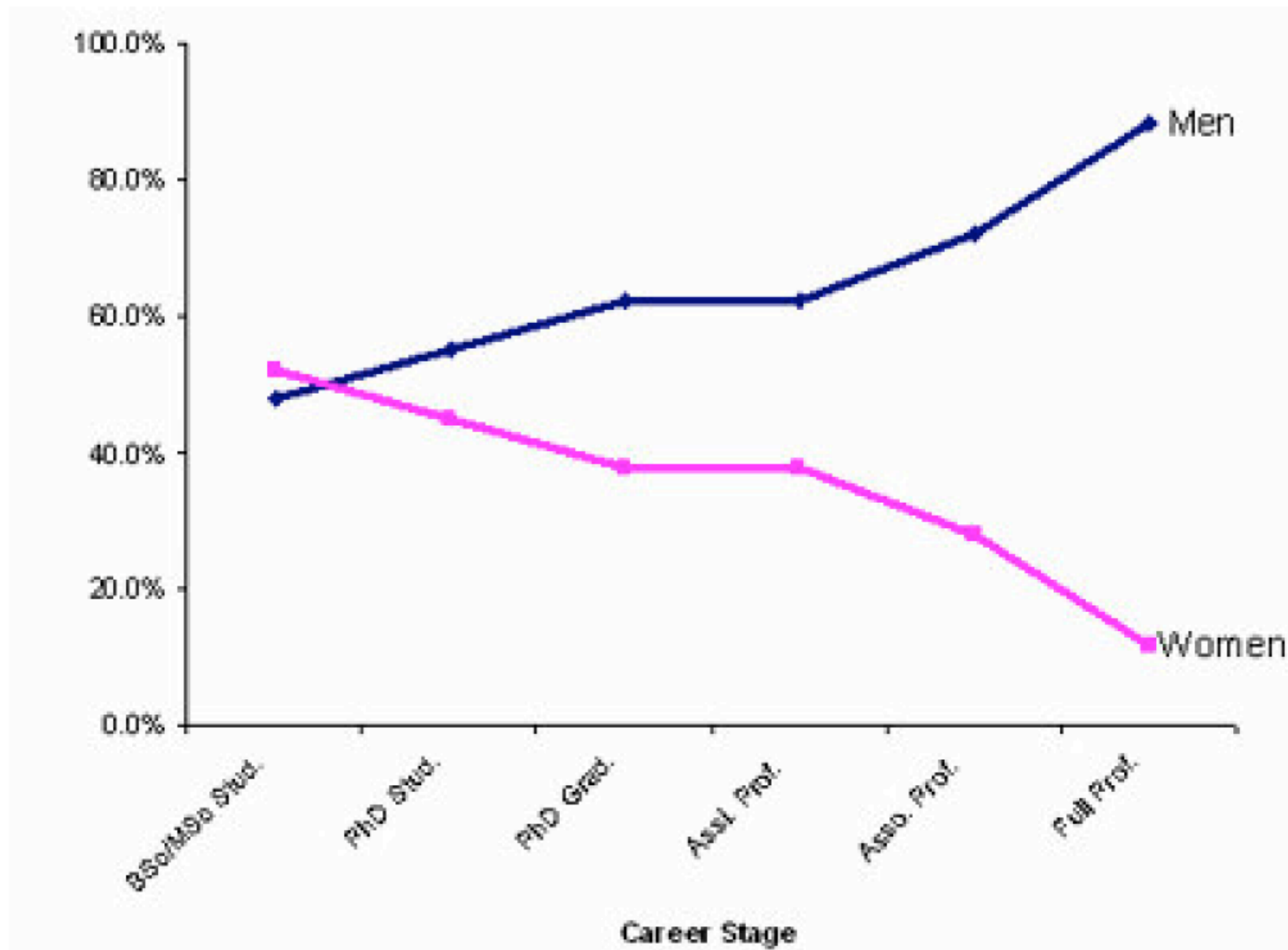
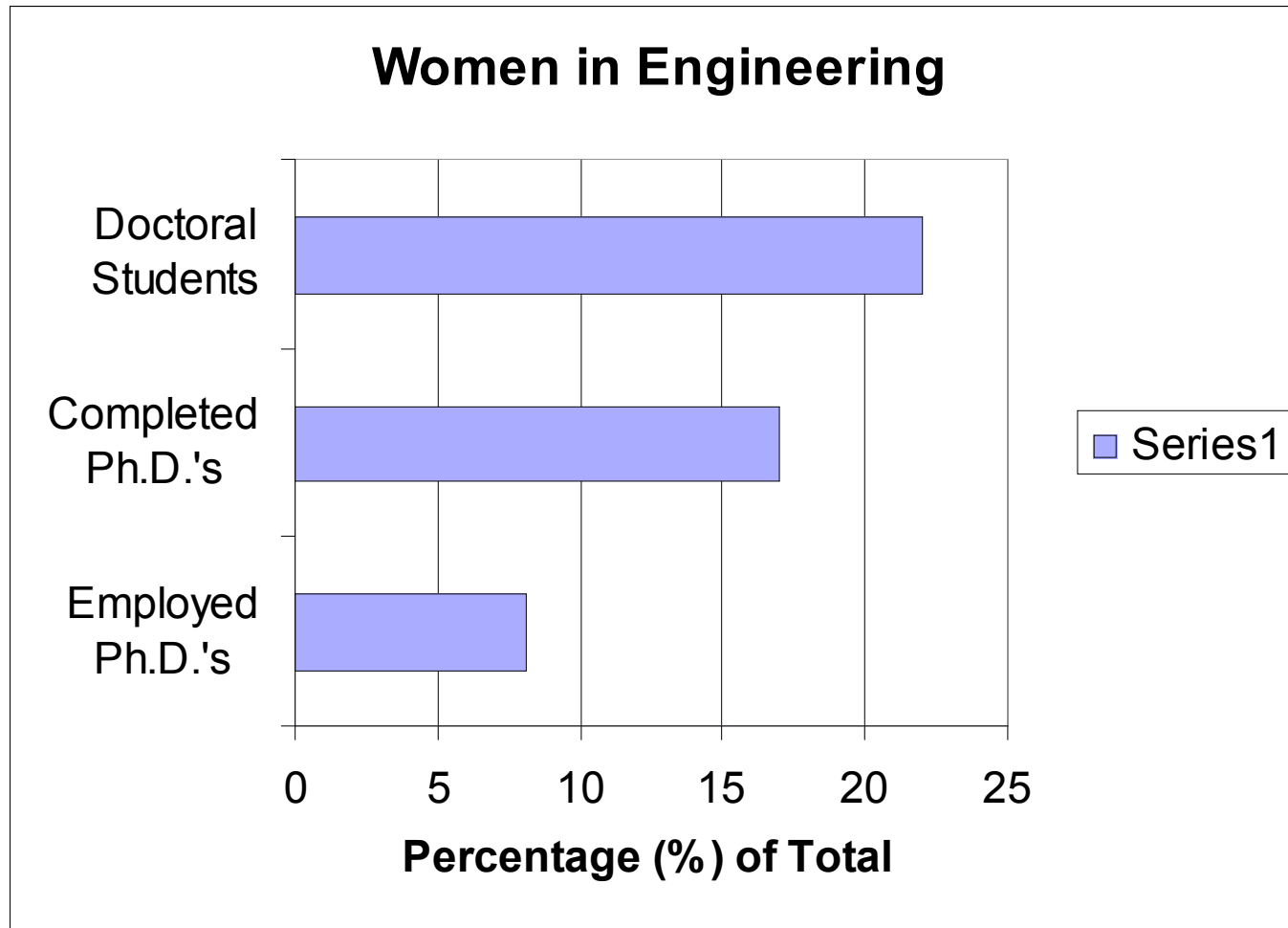


Figure 4: The Gender Scissors (source: Third European Report on Science and Technology 2003, http://www.dife.de/~mristow/2003EU_3rd_report.pdf)

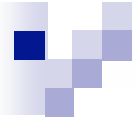
Graduate and Beyond: Leaks or Gushes?



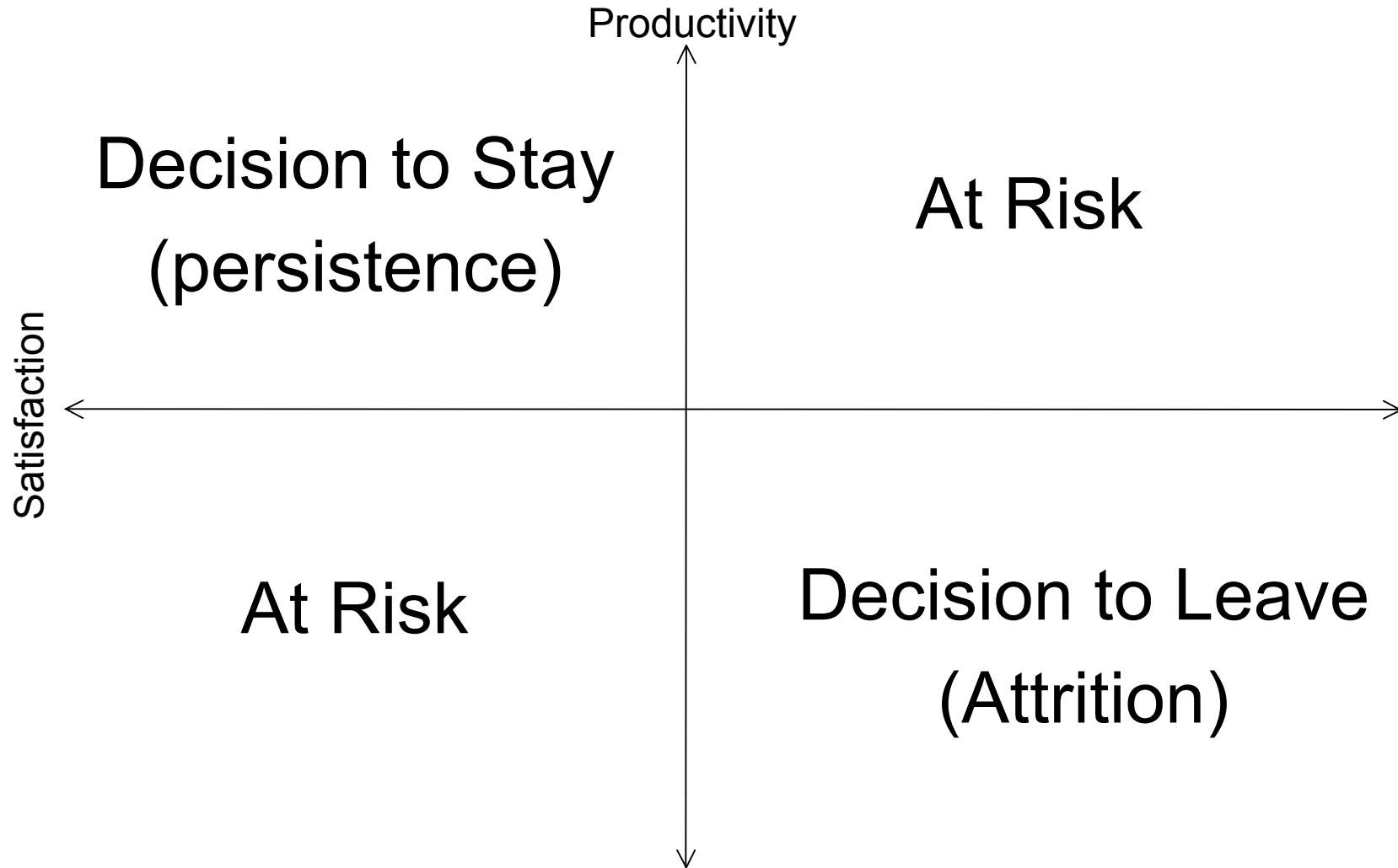


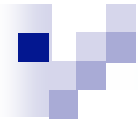
Purposes of Current Work

- Identify the primary environmental sources of discouragement and encouragement for women in STEM Ph.D. programs.
- Develop a personal resilience training program and test whether participation increases intent to persist and reduces attrition.
- Develop a psychosocial model of STEM career choice and persistence



Prediction Matrix





Implications for Interventions

Targets of Interventions	Productivity	Satisfaction
Organizational		
Individual	RT	RT



Results of Focus Groups with PhD Students

Level of discouragement is wide and deep

- “It’s a daily, weekly struggle to continue.”
- “I’m very disillusioned with how it all works.”
- “You just get broken down. Your will is broken down. Why am I putting myself through this?”



Discouragers Reported by S & E Women: A Taxonomy

- *Problems with advisor:*
 - Inadequate feedback/direction
 - Excessive criticism & demands
 - Incompatible styles or priorities

- *Insufficient productivity:*
 - No/bad results
 - Lack of timely progress
 - Structural conditions

- *Experiencing the chilly climate*
 - Experiences of isolation and/or marginalization
 - Experiences of discrimination
 - Competitive, harsh environment

- *Difficulty with work/life balance:*
 - Ticking biological clock
 - Juggling personal and academic roles
 - Lack of support from family



Encouragers Reported by S & E Women: A Taxonomy

- *Personal support* & encouragement from significant others:
 - Spouse/Partner
 - Advisor
 - Parents/Children
 - Other students
 - Friends

- *Collaborative* environment
 - Minimal hierarchy
 - Lab meetings
 - Informal group activities

- *Active guidance* and direction from advisor:
 - Troubleshoots, navigation guide
 - Encourages conference activity
 - Provides opportunities & introductions
 - Sets high expectations
 - Provides clear, specific feedback

- *Scholarly productivity*:
 - Promising results
 - Tangible products

- *Catalytic Agents*
 - Women role models
 - Effective mentors
 - Sponsors/advocates



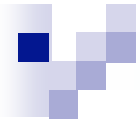
Voices: Chilly Climate for Women

I actually keep my conversational interaction with them [male co-workers] to a minimum to avoid things that make me angry. ...For over 4 years now, I've heard from a particular co-worker things like, 'Oh, women should work in the home, and women can't really do science.' ...So I would say my biggest discourager are the people that I work with on a daily basis, my lab mates.



Voices: Work/Life Balance Issues

*I've gotten to that point where I'm thinking 'Why in the heck am I doing this PhD?' I do think, wow...**maybe I should just start having children.** ...To have a piece of paper and say 'Okay, I picked the piece of paper before kids.' ...*



Productivity Issues

[What is most discouraging is] you study and work hard, but don't do well. You do research, but [get] no results. It kills you. You don't know what they want.



CareerBound Resilience Training

Problem Type & *C-Briefs*

Advisor Issues
Active Guidance
Compatibility of Workstyle & Interests
Advisors vs. mentors, sponsors, advocates

Productivity
Defs. of Product. in STEM
Science Norms
Disciplinary Norms
Competition & Collaboration

Chilly Climate
Gender Stereotyping—
Gender schemas, eval bias, stereotype threat, unconscious bias
Interpersonal—Collegiality, Civility, Bullying
Personal: belonging, isolation, solo, bandwidth
Discrimination: gender equity

Work/Life Balance
Multiple roles, role salience
Dual careers, Pregnancy, Childcare
Parental support

PsychBriefs for Self-Understanding

Goals
Setting Career Goals, Role Saliense, Satisfaction, Career Choice, Career Efficacy, Persistence & Attrition

Resilience
Hardiness, self-efficacy self-care

Stress
Daily hassles, microstressors, cumulative adversity
Coping

Thinking
problem-foc coping, problem-solving process
Coping efficacy

Feeling
Emot-foc coping, emot reg, rumination

Problem-Solving Steps & *PS Tutorials*

Assess Problem
Active listening—
Observing vs. evaluating
Perspective-taking

Specify Outcome
Setting objectives & outcomes
SMART model
Prioritization

Weigh strategies
Brainstorming, creativity
Decision-making

Execute & Evaluate

Info-Briefs

Women in Context
Sex Harassment
Univ resources
Family-Friendly Policies
Stakeholder Roles & Responsibilities

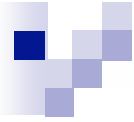
Skill Tutorials

Assertive Communication
Confronting Subtle Sexism, Conflict
Mgmt, Negotiation

Time Management
Perfectionism, Procrastination

Getting Support
Finding mentors
Assembling Support groups
Networking for advice & contacts

Mobilizing for Change
Organizing advocacy groups
Getting policies changed
Establishing new structures



Having trouble juggling roles between your family and academics?

(L2 Questions from Taxonomy)

Image Here (Rotating)

Q1

Q2

Q3

Q4

Q5

Are you a woman in a science or engineering field? If so, this website is designed specifically for you. In this site, you'll not only have the chance to explore ideas and solutions for handling commonly faced problems, but you'll also learn our problem solving model, which has four key steps to success. Click on the flower graphic for more about the problem solving model, and look for it throughout the site anytime you want to know more.

Click here to find out
more about problem
solving!



Chilly
Climate

Work/Life
Balance

Advisor
Issues

Insufficient
Productivity

Tutorials

Case

Herstorie

Wondering how to be a good mom and a scientist?

See how other women have managed. **HERSTORIES**

Read examples of possible solution strategies. **CASE STUDIES**

Learn knowledge and skills that will help you address the situation.

PSYCHBRIEFS, INFO-BRIEFS, TUTORIALS, PROBLEM-SOLVING

Worried about waiting to have kids until after you're done with your degree?

See how other women have managed.

Read examples of possible solution strategies.

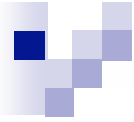
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Having trouble explaining to your family why your PhD is important?

See how other women have managed.

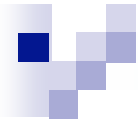
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Conclusions and Future Directions

- Considerable levels of discouragement are expressed by women in STEM doctoral programs
- Experiences as a PhD student make “possible selves” salient.
- Specific environmental barriers and personal responses can be identified around which resilience training can be designed
- Clear sources of support are described that imply need for more careful planning and selections of program, advisor, and life partner and and new patterns for programs and departments
- Many new questions are raised for continued work



CareerBound

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