Beyond the Double Bind
Women of Color in Science, Technology, Engineering, and Mathematics*

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[Race and gender] are not separate. Because they aren’t separate in me. I am always black and female. I can’t say. “Well, that was just a sexist remark” without wondering would he have made the same remark to a white woman. So, does that make it a racist, sexist remark? You know, I don’t know. And that takes a lot of energy to be constantly trying to figure out which one it is. I don’t do that anymore, I just take it as, you know, somebody has some issues about me and who I am in the world. Me being black, female, and wanting to do science and be taken seriously.3

Dr. Evelyn Hammonds  
Dean of Harvard College  
Harvard University

But Some of Us Are Brave

Context by the Numbers


- White Women: 32.47%
- Asian American/Pacific Islander Women: 1.77%
- Native American Women: 0.54%
- African American Women: 6.54%
- Hispanic Women: 7.03%

% STEM Bachelor's Degrees Awarded (2006)

- White Women: 31.55%
- Asian American/Pacific Islander Women: 4.62%
- Native American Women: 0.40%
- African American Women: 5.31%
- Hispanic Women: 4.33%
But Some of Us Are Brave

Context by the Numbers


- White Women: 33.24%
- Asian American/Pacific Islander Women: 2.48%
- Native American Women: 0.43%
- African American Women: 6.01%
- Hispanic Women: 6.86%

% STEM Doctoral Degrees Awarded (2006)

- White Women: 32.81%
- Asian American/Pacific Islander Women: 4.95%
- Native American Women: 0.14%
- African American Women: 2.61%
- Hispanic Women: 2.53%
We Know What Doesn’t Work

- Research across many STEM disciplines “has exposed numerous examples of practices that fail women and minorities, much less has addressed the question of how women of color have survived and succeeded.”
- Existing empirical research studies on women of color collected for our previous project\(^4\) included 39 qualitative studies, 32 of which were ethnographic and/or interview studies like BDB.
- Programmatic failure to promote women of color in STEM can be grouped into 3 different themes
  - Role of undergraduate research experience
  - Issues related to community
  - Micro-aggressions

Against the Current

We Know What Doesn’t Work

Role of Undergraduate Research Experience
- No research component
- Negative experiences
- “Only one” in research lab or group

Issues Related to Community
- Lack of safe space to interact with community of scholars like themselves; in such communities, women of color are able to:
  - Reject negative stereotypes
  - Validate identities
  - Learn how to address micro-aggressions
  - Grow sub-communities by serving as role models, mentors, and teachers
- Lack of personal and social support
- Lack of cohesive peer community
Micro-Aggressions

- Low expectations
- Undermine confidence of worthiness and capability
- Difficulty forming/joining study groups
- Lack of/limited peer support within class/cohorts/department
Smiling Underneath: Questions, Methods and Analytical Approach

Research Questions

**Primary Research Question:** What strategies work to enable women of color to achieve higher levels of advancement in STEM academia and professions?

**Narrative Sub-Questions (Track I):**
1. What overarching themes appear regularly and consistently in the narratives by and about women of color in STEM?
2. Are there themes that are unique to particular geographic regions, STEM disciplines, races, or stages of life?
3. Are there specific factors in higher education recruitment and retention programs that influence women of color to pursue STEM degrees and careers?

**Program Sub-Questions (Track II):**
1. Are there programmatic elements that program leaders, students, and other participants identify as factors that effectively promote women of color to advance in STEM?
2. How do women of color report using and experiencing the various programmatic elements?
3. Are there factors that can be identified across programs as being effective in promoting women of color in STEM?
4. How do the ethnographic and interview data from site visits compare and contrast to the findings about women of color’s individual experiences with programs as described in the narratives?
Methodology

Narratives
• Extant Texts: 500 articles, covering 83 women
• Interviews: 10 in-hand, 12 new completed, 4 follow-ups planned of previous participants

Programs
• Findings from Inside the Double Bind: Empirical research on women of color in STEM
• Results from narratives: Factors identified in narratives analyzed in Track I
• Expertise of program consultants, external evaluator and advisory board members
• Case Studies
  – Ethnographic case studies of programs
  – Interviews with program leaders
  – Interviews with students and faculty
• Research literature

Analytical Approach

**Narrative analysis**
- Treating extant texts as data
- Identifying codes, grounded in conceptual groupings
- Iterative process of codebook development

**Bias and authenticity**
- Consider perspective, interests, and mode of questioning by investigators and subjects
- Consider our potential influence on case study programs as both researchers and role models
- Note and report ambiguities and outlying responses
Codebook Structure

- Attributes
- Artifact compilation
- Six major categories
  - Climate-Culture
  - Connections
  - Personal
  - Power Dynamics
  - School
  - Work
- Code suffixes: -p, -h or -n
- Additional Codes
  - Advice
  - Golden quote
  - Parking lot
Disciplines of Focus

- STEM disciplines where women of color are most under-represented
  - Physics
  - Astronomy and astrophysics
  - Computer science and information technology
  - Engineering
Call It Beauty: People Places and Preliminary Results

Project Team

Maria (Mia) Ong, PI, and Apriel K Hodari, Co-PI
• Carol Wright, TERC Senior Researcher
• Irene Liefshitz, Harvard GSE Student
• Lily Ko, TERC Research Assistant
• Consultants
  – Fanny Cheung
  – Lorelle Espinosa
  – Patricia Gandora
  – Wendy Luttrell
• John Matsui, External Evaluator
• Advisory Board Members
  – Angela Johnson
  – Abigail Levy
  – Theda Daniels-Race
  – Roli Varma
  – Barbara Whitten
Call It Beauty: People Places and Preliminary Results

Case Study Programs

Program One
- Mid-size, public university
- More selective
- Close suburban, primarily residential
- Engineering undergraduates

Program Two
- Small, private, liberal arts college
- Selective
- Urban, highly residential
- Computer science undergraduates

Program Three
- Large, public university
- More Selective
- Suburban, highly residential
- Physics graduates
What We Know Does Work

- **Supportive Networks**
  - Families, professional & student organizations, teachers/professors & advisors, peers

- **Structural Factors**
  - Policies, programs, recruitment, retention & advancement

- **Rich Lives Outside of Science**
  - Hobbies, exercise, travel, faith/religion, non-STEM activities

- **Flexible Schedules**
  - Working from home, part-time, flex-time

- **Passion for Science**

- **Responsibility to Community and Opportunities for Activism**
  - Trailblazer, role model/mentor, bridging the gap between what she does and who she is, professionalizing advocacy
I had the opportunity to... sit down and talk with people about physics and then cross over to talking about [something] somebody had said to me about Black people... It was a safe space where I can actually be a person of color and be a physicist at the same time and not have anyone question my commitment to either identity.

Chloe
So I traveled a lot. I learned how to do Indonesian dancing…African dance…belly dance…I got certified [in] massage and acupuncture holistic health education they were things that made being under these conditions tolerable…the same week I got my PhD, I got my massage certification.

Jasmine
It’s like that line in Contact, where she says, ‘It makes us realize how insignificant and precious we are.’ That we are simultaneously this incredible product of a natural scientific process, that we have evolved to this stage to even being able to have these conversations… And that at the same time, we’re like complete and total specks in comparison to what the universe is. And cosmology is really all about that… it’s my job to worry about what the universe was doing when it was only like a few seconds old. And you know, there’s something kind of cool about that.

Chanel
Ongoing Challenges

- Conflicts between Individuals and Environments
- Location and Responsibilities to Family
- Ethical Issues
- Need to Prove Themselves
- Self-Presentation Issues
I think I have a certain amount of social side to myself, so I like socializing. Like, being around people. I like working with people. I like helping people. So I have that strong part of my personality. I think that also was definitely times in sciences where I felt it to be a very unfriendly environment. And so, that kind of probably pushed me away as well. So I would say there was a combination of push and pull.

Maddie
I remember from my lab, this one time that I had forgotten for some reason, that was the night of my lab, and I was wearing a mini-skirt… I literally went and bought pants because I thought there was no way I’m walking into a thirteen people class, all male, who have said to me things that they’ve said before… I get the same old thing, “okay, you cannot be attractive and think.”

Elana
Doing Better Science

- Diversity Trumps Ability⁶
- Examples of Better Science from Feminist Approaches
  - Haraway,⁷ Altman⁸ and Hardy⁹ separate work in primatology and sociobiology have changed the field, made it more objective and increased our understandings of mothering
  - King’s identification of an allele of the BRCA1 gene¹⁰
  - Colwell’s discovery that eight layers of sari cloth reduces the incidence of cholera in Bangladesh by half¹¹

⁸. See http://www.princeton.edu/~altlab/.
More Than Breadcrumbs

Making the Way for Those Who Come Next

How different would our science be if our scientists were more diverse?

- Will the evolution of domestic robotics change if more women of color work in this field?¹²
- Will cancer treatments change if women of color in health physics make contributions to the field?¹³

You’re gonna love this world
If it’s the last thing I do¹⁴

Questions?