Women's Views and Experiences of Female Mentors and Models in Academic Science

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Introduction

Women are underrepresented in science and engineering (SE) higher education and careers. Atmospheric science (ATS) is a particularly challenging case with regard to diversity. Over the past four decades, the percentage of women earning ATS doctoral degrees has been among the lowest within SE disciplines, with between 19.5% and 37.9% of doctorates awarded to women between 2001 and 2009 (NSF, 2012). Furthermore, the percentage of women in ATS occupations lags behind the percentage of women completing degrees in the discipline, with women comprising 18.2% of the 2010 ATS workforce (Gonzales, 2010; Hartten & LeMone, 2010).

Positive role models and mentorship experiences are important to women's interest and success in SE education and careers (Downing, Crosby, & Blake-Beard, 2005). Female role models have been identified as critical to women's choice of, and persistence in SE (Buck et al., 2008; Stout et al., 2011). Professional SE women with female mentors report feeling more empowered and influential in their careers than those with male mentors (Settles, Cortina, Stewart, & Malley, 2007). To date, no research has examined the mentoring views and experiences of female graduate students in ATS, hence the focus and method of this study.

Study's Objective and Questions

This study was designed to examine female ATS graduate students' views of, and experiences with, female mentors and role models. In this study, 'mentors' were defined as individuals who, according to the participants, formally or informally provided them with professional support and/or advice, while 'role models' were defined as persons perceived by respondents as professional models. Specifically, this study focused on: (1) *how* women described their experiences with female mentors and role models, and (2) *whether* or not women perceived female mentors and role models to be important, and if they did, what specific types of support female mentors and role models provided.

Method

Participants: Twenty-five female ATS graduate (14 masters and 11 doctoral-level) students between the ages of 22 and 30 (M_{age} = 25.13) participated in this study. Seven were married, 12 were in a committed relationship, and 6 were not in a couple relationship. None had children.

Procedures: Participants were recruited via email invitation and via student and faculty referrals. In-depth, semi-structured interviews were used to explore views and experiences of female mentors and models. Each interview was audio-recorded, transcribed verbatim, and edited for accuracy.

Method (continued)

Data Analysis: The interviews were analyzed based on grounded theory. Coding was completed by a four-member female team and consisted of a multi-phase process whereby all team members, (1) identified textual segments of interest; (2) organized emergent themes into hierarchical categories; and (3) described categories based on properties and dimensions. Finally, narrative descriptions were created to further elaborate on key themes (Strauss & Corbin, 1998).

Data Trustworthiness: All interviews were independently coded by at least three researchers. Individual codes were discussed and revised in coding meetings, with final codes being achieved via a consensus process.

Findings

What are your experiences with female mentors and role models?

I have had no female mentors or models in ATS:

"I don't remember too many courses from females or too many atmospheric scientists that are women…I guess it would have been nice [to have had a female mentor]."

"Science I think in general is a male-dominated field…In undergrad I think I had one female teacher for meteorology. Like, they were all men."

It's exciting and validating to see women succeed in science and in academia:

"It's really exciting to see other women doing well in our field."

"She's this very powerful [research scientist] and [that] encouraged me 'cause she's made all these awesome discoveries and she's a woman too."

"If [my female ATS professor] can withstand all the politics and all the issues that come with being a professor and being the only one [woman], it's something that I can do as well."

"Just seeing *one* woman forecaster [made me realize], 'That's great. There are females that work in this field too.' So that was encouraging."

Findings (continued)

Observing female mentors and models in academia makes me not want to be a professor:

"I don't want [my female professor's] life…You know, 'It's great to see that you're succeeding, but you also had to sacrifice a lot that I'm not willing to sacrifice.'"

"I see a lot of women in our field, especially faculty…and it's like their personal life is not part of who they are as a scientist… [That's] a barrier for me in this field."

"When I look at [female professors], it's not necessarily what they've done in the science, but what they do personally as well as the science…It does make me not want to be a faculty member."

Is it important for you to have female mentors and role models?

No, because I have never had one:

"I'm in a very male-dominated field. And I never went into it with the expectations of finding a female role model."

"Having a female role model is more in the middle of super important and not important at all. I don't know, maybe because I've always had a close relationship with [male role models]."

Yes, because as women we are a minority in the field and need the experience of female mentors to learn how to cope with the field's gender politics:

"[It is] really important [to have a female mentor]…when you are outnumbered and [when] you can't push an idea through because you're a woman and [male peers] don't respect you as much."

"[My female mentor has been helpful with] just learning how to deal with the boy's club."

"[The only female professor in my department] did help kind of change the dynamic a little bit. Because, I mean, there *was*…that, you know, good old boy mentality."

"I think [having a female advisor has] been really good for me because she does have that perspective of…[knowing] what it was like to be kind of the minority in a field…I think she was helpful at… just encouraging the female students and making sure that they were getting their needs met."

Findings (continued)

Yes, especially when figuring out family and career:

"As I get older, trying to figure out, like, family and a career and everything…it's always nice to have women in the position to look up to because they've gone through the same thing."

"I'm getting closer to getting married and having babies. I need women role models in that sense. Like, 'How did you do this?'"

"I think down the road [having a female mentor] might be a little bit more important when…I'm having kids and getting married."

Summary and Discussion

The majority of the women in this sample (about 2/3) mentioned a female mentor or model. These women thought that female mentors and models provided distinct and critical forms of support. However, women who did not mention a female mentor or model believed that having a female mentor or model was irrelevant to their success.

Consistent with previous research (e.g., Lockwood & Kunda, 1997; Stout et al., 2011), many women in this study described female mentors and models as inspiring and motivating because seeing successful women in science made them optimistic about their own educational and career pursuits. They also said that female mentors provided emotional and practical support on issues relevant to women in science (e.g., ATS gender politics). For some women in this study however, interactions with female ATS professors reduced their interest in a science doctorate and in an academic career. In their view, academic-science women were so absorbed in their work that they did not have time for the family commitments they were envisioning for themselves. These findings align with previous research documenting that female mentors and models can be both motivating and discouraging of women's interest, persistence, and success in science (Holmes & O'Connell, 2003; Huntoon & Lane, 2007; Levine, González, & Martínez-Sussmann, 2009).

To conclude, this study supports and expands past findings on SE women's views of, and experiences with, female mentors and models. An important finding of this study was that respondents did not consistently perceive female mentors and models as a critical or positive influence. For some women, this was because they did not have female mentors or models. For others, observing female mentors and models, especially in academia, was demotivating with regard to a career in academic science because of the family sacrifices such a career appeared to require. These findings confirm that female SE students look at both the personal and professional lives of female mentors and models to make decisions about their own commitment to a SE education and career.

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