Gender Differences in Academic Medicine: Retention, Rank, and Leadership Comparisons From the National Faculty Survey

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Abstract

Purpose
Prior studies have found that women in academic medicine do not advance or remain in their careers in parity with men. The authors examined a cohort of faculty from the 1995 National Faculty Survey to identify predictors of advancement, retention, and leadership for women faculty.

Method
The authors followed 1,273 faculty at 24 medical schools in the continental United States for 17 years to identify predictors of advancement, retention, and leadership for women faculty. Schools were balanced for public or private status and the four Association of American Medical Colleges geographic regions. The authors used regression models to adjust for covariates: seniority, department, academic setting, and race/ethnicity.

Results
After adjusting for significant covariates, women were less likely than men to achieve the rank of professor (OR = 0.57; 95% CI, 0.43–0.78) or to remain in academic careers (OR = 0.68; 95% CI, 0.49–0.94). When number of refereed publications was added to the model, differences by gender in retention and attainment of senior rank were no longer significant. Male faculty were more likely to hold senior leadership positions after adjusting for publications (OR = 0.49; 95% CI, 0.35–0.69).

Conclusions
Gender disparities in rank, retention, and leadership remain across the career trajectories of the faculty cohort in this study. Women were less likely to attain senior-level positions than men, even after adjusting for publication-related productivity. Institutions must examine the climate for women to ensure their academic capital is fully utilized and equal opportunity exists for leadership.

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Research since the Kaplan study of a sample of academic pediatricians in the United States in 1996[1] has consistently revealed a lack of parity in advancement for women in academic medicine. In the following 20 years, there have been a number of studies confirming this result.[1–5] Most of these studies have been cross-sectional, retrospective, or limited to one institution. Prior work has not been able to assess long-term trajectories, and these reports do not allow for differing time frames for achieving advancement. Cross-sectional surveys also exclude those women and men who have left academia for other career options. In this National Institutes of Health (NIH)-funded study, we analyzed advancement in rank and senior leadership positions as well as retention of faculty in academic medicine in a national cohort of faculty followed long-term from 1995 to 2012–2013 to examine differences in career outcomes by gender.

Method

Sample

In 1995, we conducted the National Faculty Survey, in which we mailed a questionnaire to a representative sample of academic medical faculty in the continental United States.[6,7] We randomly selected 24 medical schools from medical schools at that time that had at least 200 faculty, of which 50 were women and 10 were minority faculty, so that we had adequate numbers of total faculty, women, and minority faculty for the study. The schools were balanced for public and private status and the four geographic areas of the Association of American Medical Colleges (AAMC) (Northeast, South, Midwest, and West). Within each school, 6 faculty were randomly sampled within each of 24 cells: three graduation cohorts (before 1970, 1970–1980, and after 1980), gender, and four areas of medical specialization (primary care, medical specialties, surgical specialties, and basic science). To have adequate numbers of senior women and underrepresented minority faculty (because many schools did not have sufficient women or minority faculty for all cells), we sampled all women faculty who graduated before 1970 and all underrepresented minority faculty. The response rate was 60%, with 1,801 faculty returning the survey. All faculty were asked if they were willing to be contacted for future studies; 74% consented to participate in follow-up studies. Those consenting for follow-up surveys were similar in proportions to the original sample on key variables, including gender as well as race, specialty, and number of publications stratified by gender (Supplemental Digital Appendix 1, available at http://links.lww.com/ACADMED/A526).[6]

We conducted a follow-up survey during the 2012–2013 academic years. Using the name, prior institution, and academic interests from the 1995 survey, we conducted a web-based search to obtain the current location and contact information for the study subjects. Of the 1,335 faculty who agreed to be contacted,

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60 had died, leaving 1,275 faculty. Two of the respondents did not provide their gender, leaving a sample of 1,273 faculty (Figure 1). Demographic characteristics of the sample are provided in Table 1. An e-mail invitation was used to contact faculty where valid e-mail addresses were identified. When no e-mail address was available, we attempted to contact faculty by phone or mailing address. Subjects were invited to participate by completing a follow-up survey, either online or in a mailed version. To ensure matches between the original and follow-up surveys, faculty were again asked for gender, year of birth, and race/ethnicity. A comparison of the original 1995 cohort with the 2012–2013 subset who agreed to be contacted revealed no major differences in response by gender (see Supplemental Digital Appendix 1, at http://links.lww.com/ACADMED/A526). A modest remuneration was provided to faculty who completed the survey. For those subjects who did not answer the survey, we reviewed publicly available websites to obtain information about their career, including the academic institution or other location where they were employed, their academic rank, and what leadership positions they currently held. For example, we conducted a web engine search (Google) of their name and reviewed the websites of all medical schools, other academic schools, and academic health centers identified in their affiliations listed on their publications. We searched the NIH Research Portfolio Online Reporting tools for federal funding in the prior two years.[8] The follow-up survey was conducted in the 2012–2013 academic year. Institutional review board approval for the study was received from Boston University, Tufts Medical Center, and for Massachusetts General Hospital through a reliance agreement with Tufts Medical Center.

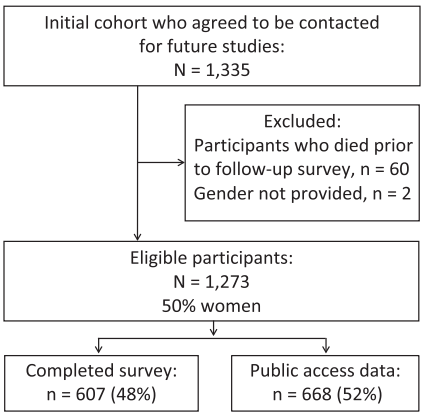

Figure 1 Follow-up faculty study cohort: National Faculty Survey longitudinal follow-up study of the effects of gender on retention, rank, and leadership positions in academic medicine, 2012–2013.

Table 1

Demographic Characteristics of Men and Women Faculty: National Faculty Survey Longitudinal Follow-Up Study of the Effects of Gender on Retention, Rank, and Leadership Positions in Academic Medicine, 2012–2013

Characteristics	Men (of 641 respondents)		Women (of 632 respondents)		*P* value
	Total no. who answered	Those who answered "yes"	Total no. who answered	Those who answered "yes"	
Race, no. (%)					
White	639	499 (78.1)	631	520 (82.4)	.0533
Department, no. (%)					
Basic sciences	613	147 (24.0)	605	134 (22.1)	.1396
Generalists	613	156 (25.4)	605	176 (29.1)	
Medical specialty	612	188 (30.7)	605	200 (33.1)	
Surgical specialty	613	122 (19.9)	605	95 (15.7)	
Number of years since initial academic appointment, mean (SD)	633	29.4 (9.2)	616	28.3 (8.6)	.0196
Currently in academic setting, no. (%)[a]	614	445 (72.5)	601	418 (69.6)	.2612
Marital status in 1995, no. (%)					
Married or partnered	635	557 (87.7)	626	460 (73.5)	< .0001
Parental status in 1995, no. (%)					
1 or more children	637	534 (83.8)	628	432 (68.8)	< .0001
% Effort distribution in 1995, mean (SD)					
Administrative	637	18.6 (18.0)	628	18.8 (17.6)	.8307
Research	637	30.4 (29.9)	629	28.7 (29.3)	.3290
Clinical	639	31.9 (28.9)	631	31.5 (28.7)	.7966
Teaching	638	19.1 (13.4)	630	21.0 (15.0)	.0166
Number of refereed articles in 1995, mean (SD)	602	33.5 (37.6)	604	22.2 (31.6)	< .0001

Abbreviation: SD indicates standard deviation.
[a]"Currently in an academic setting" includes government and foundation as well as medical school settings.

Data analysis

The outcomes of focus in this study were rank, retention, and senior leadership positions. These were determined from 2012–2013 data (either from the survey itself or the publicly available data). We dichotomized academic rank as full professor versus all others. Retention in academic careers was defined as working in an academic, foundation, or government setting, or being retired from one of those settings. We categorized faculty who moved to private practice, industry, or another setting as not being retained in academic medicine. Two investigators (P.L.C., K.M.F.) coded all leadership positions into senior leadership positions (e.g., dean, associate dean, provost, department chair) and other.

Gender was the independent variable of primary interest. Race from 1995 was dichotomized as white versus minority, and medical specialization in 1995 was separated into four categories (generalist, medical specialist, surgical specialist, and basic science faculty). We also adjusted for seniority in 2012–2013 (years since first appointment). Other covariates that we measured in 1995 that we included were percent effort distribution for administrative, research, clinical, and teaching activities. Marital status in 1995 was dichotomized as married/partnered

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versus all others. We dichotomized parental status in 1995 as having any children versus no children. Retention in an academic setting in 2012–2013 was used as a covariate in the rank and senior leadership models. We measured academic productivity by total number of refereed career publications in 1995. This was a covariate in the Model 2 analysis as well (described below, and see Table 2).

Descriptive statistics were calculated for subject characteristics. To assess gender differences, we calculated unadjusted differences and then developed logistic regression models to adjust for covariates. Race/ethnicity and gender were included in both models. Variables significant at $P < .10$ in bivariate analyses were retained if the association reached the $P < .05$ level in the backward selection process. For each outcome we developed two models. Model 1 allowed the backward selection process to choose from potential covariates (specialty, seniority, effort distribution, marital status, and parental status), excluding productivity in 1995. Model 2 included the Model 1 covariates and productivity. We used SAS statistical software, version 9.4, for all calculations (SAS Institute, Cary, North Carolina).

Role of the funding source

The study was funded by the National Institute of General Medicine Sciences and the Office of Research on Women's Health (NIH award number R01 GM088470). None of the funders were involved in the design of the study; the collection, analysis, or interpretation of the data; or the decision to approve publication of the finished manuscript.

Results

Of the 1,273 follow-up study participants, 607/1,273 (48%) responded to the survey (311/632 [49%] of females and 296/641 [46%] of males); 668 subjects (321/632 [51%] females and 345/641 [54%] males) had follow-up information obtained from publicly available websites. Two participants did not provide their gender and were dropped from the analyses.

Rank

In unadjusted analysis, 312/632 (60%) combined female respondents achieved the rank of professor compared with 399/641 (71%) combined men ($P < .0001$) (Table 3). Multivariable regression analysis indicated that women remained significantly less likely than men to have achieved the rank of full professor by 2013 (OR = 0.57; 95% CI, 0.43–0.78) after adjusting for race, years since first academic appointment, department, and setting (Table 2). However, when the adjusted model additionally included academic productivity as a covariate, the association between gender and receipt of full professor rank was no longer significant (OR = 0.77; 95%, CI 0.56–1.08).

Table 2

Unadjusted and Adjusted Models: National Faculty Survey Longitudinal Follow-Up Study of the Effects of Gender on Retention, Rank, and Leadership Positions in Academic Medicine, 2012–2013

Outcomes	No. of respondents	Unadjusted model: odds ratio (95% CI)	Model 1: odds ratio (95% CI)[a]	Model 2: odds ratio (95% CI)[b]
Rank	998	0.59 (0.46, 0.77)	0.57 (0.43, 0.78)	0.77 (0.56, 1.08)
Retention	1,138	0.72 (0.53, 0.97)	0.68 (0.49, 0.94)	0.86 (0.61, 1.19)
Senior leadership	1,201	0.42 (0.31, 0.58)	0.44 (0.32, 0.61)	0.49 (0.35, 0.69)

Abbreviation: CI indicates confidence interval.
[a]Model 1: All models included gender and were adjusted for race (white vs. minority). Additionally, candidate variables included in the backward selection process were specialty (generalists, medical specialists, surgical specialists, and basic scientist faculty), seniority (years since first faculty appointment), effort distribution, marital status, and parental status. The covariates retained were rank–race, specialty, and seniority; retention–race and specialty; senior leadership position–race.
[b]Model 2: The number of refereed publications in 1995 was added to Model 1.

Retention

In univariate analysis, women were less likely to remain in academic medicine compared with men, 485/632 (81%) versus 524/641 (85%) ($P = .03$). The OR for a woman to remain in academic medicine after adjusting for race and department was 0.68 (95% CI, 0.49–0.94) (Table 2). Adding productivity to the model changed the OR for the association between female gender and retention to 0.86 (95% CI, 0.61–1.19), such that it was no longer significant.

Senior leadership role

In univariate analysis, men were more likely to have a senior leadership role than women, 137/641 (21%) versus 65/632 (10%) ($P < .0001$). In the logistic model that did not include productivity, the OR of women achieving a senior leadership role compared with men was 0.44 (95% CI, 0.32–0.61) (Table 2). Adjusting for productivity, the OR for women to achieve a senior leadership role was 0.49 (95% CI, 0.35–0.69), indicating that women continued to be less likely to have senior leadership positions, even after accounting for academic productivity.

Discussion

Our findings indicate that differences in rank, retention, and senior leadership of faculty by gender at representative U.S. medical schools continue. After 17 years of longitudinal follow-up, women in our cohort were less likely to attain senior rank or to remain in academic fields than their male counterparts, with the productivity publication record an explanatory variable of this difference. Women were only half as likely to attain senior leadership roles in academic medicine as medical school deans, associate deans, provosts, and department chairs compared with men

Table 3

Univariate Outcomes of Men and Women Faculty: National Faculty Survey Longitudinal Follow-Up Study of the Effects of Gender on Retention, Rank, and Leadership Positions in Academic Medicine, 2012–2013

Univariate outcomes	Value	No. (%) of men (of 641 respondents)	No. (%) of women (of 632 respondents)	*P* value
Rank	Professor	398/557 (71.5)	312/522 (59.8)	< .0001
Senior leadership	Senior role	137/640 (21.4)	65/631 (10.3)	< .0001
Retention	Retained	524/614 (85.3)	485/601 (80.7)	.03

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over the course of our follow-up. The gender difference in senior leadership was not modified by inclusion of any of our covariates, including academic productivity.

The 2015 publication of Jena and colleagues[9] also found a difference in senior academic rank by gender, but this was not explained by academic productivity. Similarly, in a 2017 publication looking at rank of academic cardiologists, the OR of a woman being a full professor was 37% lower than that for a man.[10] One other single-institution study[11] addressed leadership attainment but included chairs of institutional committees and national organization leadership, resulting in most women (56%) and men (70%) holding some leadership role. Our definition was restricted to chair, dean, associate dean, and provost positions. Many fewer faculty hold these positions, and women were half as likely as men to achieve these leadership roles.

The differences we identified in rank and retention were not explained by race/ethnicity, department, years since first faculty appointment, effort distribution across research, administration, teaching and clinical care, or marital or parental status. However, upon adding academic productivity in 1995 to the models, the differences in rank and retention by gender were no longer significant. Some have suggested that publication record and productivity represent the causal pathway by which women do not advance in their careers. Women often begin their careers with less institutional support in the forms of both internal grant funding and administrative assistance.[12] They carry a greater burden of domestic responsibilities and need for caregiving leave such that, in general, they never catch up to their male colleagues.[13,14] Other studies[1–3] have suggested that the rank differences between men and women reflect differences in effort distribution or time use in their career, with women focusing more on teaching and clinical care rather than research in academic medicine. In our study, when we looked at models that accounted for this effort distribution, it did not reduce the gender gap, indicating that gender difference in time use alone does not account for the rank and retention differences. Earlier career publication record in 1995 was strongly associated with retention and rank and accounted for the gender difference in rank and retention when added to the model. Early academic productivity appears to predict those who remain and advance in academic careers. Retention is a measure of two components—those who choose to leave academic medicine and those who are not permitted to remain because of tenure track policies, a distinction not available in our dataset.

The prior explanation for the lack of women in leadership positions was the pipeline theory,[15,16] and that increasing numbers of women in academic medicine would lead to greater numbers of women in senior leadership positions. Our data indicate that this has not happened. We require a new paradigm to explain the lack of women in senior-level positions in academic medicine, one that recognizes that women may not be getting equal opportunity or support to attain these positions. These findings are not unique to academic medicine or the United States; gender inequities in leadership are seen across academic medicine internationally[17] and in business[18–20] and law.[21] The need to address the culture of advancement for women transcends academic medicine, suggesting that changes in the culture are needed to achieve the equitable career advancement of women across professional fields.

One theory for the persistent gender differences in professional advancement is that of perceptions of different leadership styles between men and women. Our prior work suggests that women are assumed to have a more collaborative and equalizing engagement style that would impede their capacity to serve as a leader within the more hierarchical structure of academic medicine.[22,23] Notably, more collaborative teams have been shown to be more productive, especially when they are more diverse,[24] but this has not translated into broadening the demographic profile of leadership in medicine. Addressing this difference would require a change in academic culture to appreciate different leadership styles and the benefits of a diverse leadership group. Studies of multilevel interventions to counteract pervasive stereotypes have shown gains in leadership self-efficacy for women participants, and these gains appear to have an enduring value in women's careers.[25,26] Tools to help women be successful are emerging, and institutions need to provide these opportunities to level the playing field and increase the number of women in senior-level positions.

Even when women achieve leadership positions, data suggest that women may be more vulnerable and less likely to achieve sustained leadership success.[27] A study looking at U.S. medical school deanships found that women deans were at less research-intensive medical schools and had shorter tenures than male deans.[27]

From our findings, it can be concluded that women will be more likely to be retained and to achieve senior rank if they are more academically productive, regardless of whether they pursue research, education, or clinical academic pursuits. Baseline publication was a predictor of subsequent retention and advancement. A number of strategies may address this gap. First, recent data suggest that women do not receive the same level of initial support for their academic careers, and that institutions must ensure equity of benefits including startup packages.[28] Mentorship is predictive of academic success, but was less commonly available to the women in our cohort in a publication of our 1995 data.[29] Changes in promotion criteria for educational and clinical scholarship may also help, with venues such as the AAMC's MedEdPORTAL for dissemination of educational scholarship and recognition of other academic products, including curricula.[30]

Our study has limitations: The response rate is not optimal, but we used a novel approach searching publicly available websites to garner career information including academic institution, rank, and leadership positions held. In addition, the self-reported data were consistent with the data we found online for the participants without gender differences. By using these online data, we were able to have data for 98% of eligible participants. These sources may underrepresent a woman's achievements if she changed her surname. Although we have a representative national sample of academic faculty, our data are not sourced from all institutions. Our faculty sample consisted of senior

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faculty who have been in academic medicine since 1995 or earlier; thus, our sample did not include a later cohort of junior faculty. Our study has important strengths: A longitudinal lens allows us to find predictors of retention and senior leadership, which can provide insight for how to better mentor women in academic medicine. Our study follows a nationally representative cohort of medical faculty, while much of the literature is limited to one institution or a single specialty. The follow-up time is 17 years, which is much longer than most longitudinal studies and captured the longer-term impact of gender on the outcomes of rank, retention, and leadership in academic medicine.

This longitudinal study contributes to efforts to address the gender disparity in academic rank, faculty retention, and attainment of senior leadership roles in academic medicine. Mentorship and academic support for women early in their careers are critical to ensure that they achieve the academic milestones toward advancement and retention. A new paradigm within academic medicine is necessary for women to attain senior leadership positions based on their leadership skills and academic achievements. A culture change in academic medicine that recognizes and acts on this knowledge is needed for a more diverse and inclusive leadership that maximizes women's potential.

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Ethical approval: This study was approved by the institutional review boards (IRBs) of Boston University School of Medicine (protocol #1.769575) on 04/24/2009 through 04/1/2015 and Tufts Health Sciences Campus (IRB #10372) on 05/15/2012 through 5/14/2015; Tufts IRB reviewed on behalf of Massachusetts General Hospital through the Master Common Reciprocal Agreement approved on 10/1/2013.

Previous presentations: NIH 25th Anniversary of the Office of Research on Women's Health, June 7, 2016, Bethesda, Maryland; and Medical Women's International Meeting, July 29, 2016, Vienna, Austria.

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Teaching and Learning Moments

Lorraine

Charlie was one of my first patients as a real, grown-up internal medicine attending. He had end-stage AIDS and was admitted with sepsis, as I recall. He was so skinny, probably 90 pounds soaking wet, and covered in all manner of rashes, like a walking dermatology textbook. He was always cold and wore a knit hat low on his brow. In a rare instance of clarity, he told me that he made his hats out of old sweater sleeves. Charlie was in and out of it. He was my first patient as an attending who I thought likely to die on my watch. I gathered his family—two brothers and a mother, also tiny. They stood shivering in their yellow isolation gowns, and we talked around the AIDS. They knew he was very sick, but I did not want to betray Charlie's confidence. Charlie kept hanging on and survived to be discharged to a nursing home, though he came back a month later and died in the intensive care unit. I saw his family again in the lobby; his mom was so small but so brave. I said a few nice things about Charlie, reiterated how sick he had been. They nodded.

Several months later, a familiar face showed up in my outpatient office. She was 91 years old and looked just like Charlie. I quickly recognized Lorraine as his mother despite meeting her only briefly. She was accompanied by her son, Charlie's brother. Her resemblance to my former patient was strong, and it struck me how often we see ghosts, sitting with parents who have lost children or brothers who have lost brothers, especially in our community where violence, AIDS, and drugs have been brutal and prolific serial killers.

Lorraine quickly became one of my favorite patients, always in high heels and red lipstick, smelling faintly of urine. She loved to give me feedback on my appearance and would let me know if she liked my shoes or noticed me getting thicker. Three years later, Lorraine fell and broke her hip. I visited her in the hospital. She was delirious after her surgery but happy to see me. I had no doubt that she would make it, despite the mountain of odds stacked against her. I never heard her voice, gently teasing me, ever again after that visit. Like Charlie, she was discharged to a nursing home and came back directly to the intensive care unit septic, profoundly dehydrated, and covered in ulcers. When I saw her, encased in a thicket of tubes and probes, tongue protruding, no lipstick on, tears came to my eyes. I knew she would have hated to appear this way. I pleaded with her living sons to allow her to pass. Each in turn said, "I would let her go, but there's no way my brother will agree."

I sat with Lorraine, listening to the mechanical sighs of her ventilator and remembering our three years together, each one peppered with loss, more loss than one human being should ever have to bear. After Charlie died, her daughter-in-law, a constant companion on her medical visits, also passed away unexpectedly after bariatric surgery. And I recalled her telling me that another one of her sons had died years before Charlie following a random assault.

Finally Lorraine's sons agreed to let her body rest, but on the day we planned to extubate her, they did not show up. I went home that evening and eventually they came to the hospital, her machines were disconnected, and she passed away in the early morning. I did not go to the funeral. I was nine months pregnant and had an ultrasound appointment that day. I saw my fetus in black and white while Lorraine's body was being buried deep in the ground. For the next few weeks, I thought of her often but then became busy with my own new life as a mother and started to forget about hers.

When I sat down to write this piece, it took me a few minutes just to remember her name, though I felt such a need to excavate these memories and put them down on paper. As I wrote, I remembered her smudged red lipstick and sharp-as-a-tack mind. I thought of our first interactions during Charlie's hospitalization, when I had no clue what a force she was. I traced in my mind our timeline of visits every other month, as I got to know Lorraine and the rest of her family. We celebrated many triumphs and mourned countless setbacks together, relating to her health and to her kids. I realized that Lorraine had taught me so much about the role family plays in healing and in health. To this day, I cannot think about Lorraine without thinking of her children, too many of whom had passed before she did. I miss seeing her and suffering through her jabs about my appearance, though I am so relieved that Lorraine will never feel loss again.

Author's Note: The names and identifying information in this essay have been changed to protect the identity of the individuals described.

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