

Advancement of Women in the Biomedical Workforce: Insights for Success

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Abstract

Women continue to face unique barriers in the biomedical workforce that affect their advancement and retention in this field. The National Institutes of Health (NIH) formed the Working Group on Women in Biomedical Careers to address these issues. Through the efforts of the working group, the NIH funded 14 research grants to identify barriers

or to develop and/or test interventions to support women in the biomedical workforce. The grantees that were funded through this endeavor later established the grassroots Research Partnership on Women in Biomedical Careers, and they continue to conduct research and disseminate information on the state of women in academic

medicine. This Commentary explores the themes introduced in a collection of articles organized by the research partnership and published in this issue of *Academic Medicine*. The authors highlight the role that government plays in the advancement of women in academic medicine and highlight the findings put forward in this collection.

In 2005, the National Academies convened the Committee on Maximizing the Potential of Women in Academic Science and Engineering. Among other responsibilities, this committee was charged with analyzing data and providing recommendations to university faculty, deans, department chairs, and other leaders; scientific and professional societies; funding organizations; and government agencies to maximize the potential of women in science and engineering careers.¹ The committee published “Beyond Bias and Barriers: Fulfilling the Potential of Women in Academic Science and Engineering,”¹ a report that provides recommendations for individuals and organizations at all levels of the academic career trajectory from department chairs to the federal government. Specifically, it was recommended that federal funding agencies and foundations support the full

participation of women and not reinforce a culture that is biased against women.¹ Furthermore, the federal government should take the lead and leverage its resources to increase the science and engineering talent developed in the United States.

To address the issues that arose from the report,¹ the National Institutes of Health (NIH) formed the Working Group on Women in Biomedical Careers, a trans-NIH effort to consider barriers for women in science and to develop innovative strategies to promote entry, recruitment, retention, and sustained advancement of women in biomedical and research careers.² The working group is co-chaired by NIH Director Dr. Francis Collins and NIH Associate Director for Research on Women’s Health and Office of Research on Women’s Health Director Dr. Janine Austin Clayton. Members of the working group include institute and center directors and other leaders from the NIH intramural and extramural research programs.³

In an attempt to identify barriers that prevent women from advancing within the academic medicine pipeline and to develop interventions that support the careers of women, the NIH published a funding opportunity announcement to support research on these topics.⁴

A total of 14 grants, totaling \$16.5 million, were funded. In November 2012, the grantees convened at an NIH workshop to present their findings.⁵ At the end of the workshop, the grantees decided to continue collaborating

amongst themselves and formed the grassroots Research Partnership on Women in Biomedical Careers. This partnership has been highly successful, and the investigators involved have published numerous studies and given many presentations on women in the biomedical workforce.³ Most germane, the research partnership developed a collection of articles in this issue of *Academic Medicine* to publish their research results alongside each other and to amplify the impact of their scholarly work through collective publication of their findings. In this Commentary, we highlight some of the common themes and advances that emerged from these publications.

Inequalities in Compensation

Despite the growing number of women in academic medicine over the last two decades, there continues to be a significant pay gap between men and women faculty members. Freund et al⁶ compared the income of faculty at 24 medical schools longitudinally over 17 years (1995–2012) and found that women earned approximately \$20,000 less per year than their male colleagues. This deficit remained significant even when accounting for differences in academic rank, specialty, and percent contribution.

The authors suggest that one explanation for this disparity is institutional and departmental leaders unintentionally contributing to the compensation gap by undervaluing women’s contributions.⁶ To complicate the issue, this type of behavior

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often occurs as a result of implicit or “hidden” biases toward women that may not be noticeable to the person propagating it. Therefore, interventions to educate faculty about implicit bias and strategies to reduce it may prove beneficial.⁷

Another factor leading to women receiving lower salaries than men is the starting salary.⁶ Once a salary level is determined, future increases may be capped, rendering it impossible for women to receive the same salary as men if they start with a lower salary. The authors hypothesize that women may not negotiate as assertively as men upon hiring, leading to increased salary disparities in the future.⁶

Although implicit bias from institutional leaders and decreased assertiveness from women faculty may play a significant role in salary disparities, the inequalities in academic rank and promotion rates also contribute. Raj et al⁸ evaluated the results of a 17-year longitudinal study at 24 medical schools to analyze academic rank and productivity of faculty. They found that women were significantly less likely than men to reach full professor status and attain senior leadership positions. Women also had fewer publications and a lower h-index than the men in the study. However, despite the differences in productivity, women still achieved the same levels of federal grant funding as men. The authors recommend that institutional leaders develop strategies for mentoring and supporting women to publish more frequently, especially early in their careers, to increase their overall academic productivity and likelihood of promotion.⁸

Research Funding

One of the most important achievements in the careers of many biomedical and human health researchers is the attainment of an NIH R01 grant. In an effort to create a more thorough evaluation template for reviewers, the NIH enhanced its R01 scoring system in 2009 by adding separate “criterion sections” for innovation, approach, significance, and investigator scores. Kaatz et al⁹ compared the scores/critiques of men and women R01 applicants between the years of 2010 and 2014. In agreement with previous data,¹⁰ they

found that women received significantly lower scores than men in R01 renewals.⁹ Surprisingly, in many of these cases, the reviewers were more likely to use positive standout adjectives like “outstanding” and “excellent” when critiquing female applicants compared with men; however, this did not translate to better scores in these areas.⁹ The authors suggest that although this study was conducted only at one institution, it may be indicative of a national problem that results in reduced advancement of women in the academic medicine pipeline.

Previous work has indicated that individuals from underrepresented groups are significantly less likely to receive R01 grants than their white counterparts.¹¹ Considering these findings, it is important to determine whether gender and race/ethnicity have compounding effects on R01 success rates. Ginther and colleagues¹² sought to determine whether women of color face greater, or “cumulative,” barriers in the review process for R01 grants. The data presented in this study and previous work from this group suggest that race/ethnicity, rather than gender, accounts for the R01 funding gap for women of color.^{11,12} The authors also demonstrate that women are less likely to resubmit an R01 application after a single failed attempt, which further perpetuates the inequality and may lead to preconceptions about women’s ability to cope with highly competitive environments.¹²

Work–Life Integration and Gender Consciousness

Historically, women have carried a heavy burden of the household and child care responsibilities, and many have made sacrifices at the expense of their professional careers to meet these demands. DeCastro et al¹³ examined the professional aspirations of physician–scientists holding NIH K08 and K23 career development awards and found that both men and women start their careers with very similar goals—to produce high-quality publications and have a lasting impact in their relative fields of research, medicine, and academia. However, as women progress and gain more life experience, many modify their goals and aspirations to better manage their professional and

family obligations.¹³ Having to make the difficult decision of balancing a family and a career may ultimately affect a woman’s interest in academia and may prevent her from pursuing faculty positions.

Research suggests that female graduate students begin to identify and describe gender issues very early in their training, which may affect their long-term career goals. The phrase “gender-conscious experiences” is used to define instances where women feel that their gender affects the attitudes, behaviors, and perceptions of others or themselves.¹⁴ To examine the effects of this, Remich and colleagues¹⁴ interviewed female doctoral students intending to pursue an academic career about gender experiences during their graduate training. Of the 22 women interviewed, 19 described instances where they had recognized gender-related bias or inequality while in graduate school. The described biases included feeling excluded from male-dominated conversation and encountering stereotypes about intellectual ability, among others.

Access to Mentorship

Many of the aforementioned issues can be significantly ameliorated with the help of mentors guiding new faculty members through the system and orienting them to the academic culture. Indeed, insufficient mentoring is a significant barrier to advancement of women within the academic pipeline.^{15,16} There are many advantages derived from a productive mentoring relationship: Faculty members with mentors publish at a greater frequency, receive more promotions, and have heightened fulfillment over the course of their career.¹⁷

Although benefits of mentoring are known, many women still find it difficult to identify and maintain quality mentoring relationships throughout their career. Because the mentor–mentee relationship is one that is usually built on similar interest and comfort, the right fit may require a deeper understanding of mentee preferences. Therefore, Carapinha et al¹⁷ determined which characteristics were most important to women in academic medicine when choosing a mentor. Also, they examined whether or not interests varied by race,

academic rank, or demographic areas.¹⁷ A survey of women faculty members at 13 medical schools nationwide indicated that women reported the strongest preference for having a mentor within the same department or institution; however, this was less true for more senior faculty. Race/ethnicity was generally considered the least important factor for most women—unless they were members of racial/ethnic minority groups or had never had a mentor. Interestingly, black faculty and individuals without a current mentor placed significant weight on identifying someone of the same gender.¹⁷ The authors suggest that mentee preferences should be considered when matching a mentor–mentee pair.

Conclusion

We briefly reviewed efforts by the NIH to support women in the biomedical workforce; additional information about these efforts is discussed in the article by Plank-Bazinet et al³ in this issue. We also highlighted common themes that recur throughout the collection including compensation, research funding levels, work–life integration, and mentorship. The findings of the articles in this collection indicate that, although the representation of women has increased in the faculty ranks, there is still significant work to be done to support the sustained advancement of women in academic medicine.

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