Arteriosclerosis, Thrombosis, and Vascular Biology

REVIEW

Institutional Support for the Career Advancement of Women Faculty in Science and Academic Medicine: Successes, Challenges, and Future Directions

Zhen Bouman Chen, Elena Aikawa, Mabruka Alfaidi, Kamilah Ali, Cassandra L. Clift, Ebru Erbay, Gabrielle Fredman, Delphine Gomez, Ngan F. Huang, Hong S. Lu, Patricia K. Nguyen, Suellen Darc Oliveira, Paula Rodriguez-Miguelez, Gopika SenthilKumar, Hanrui Zhang; by the ATVB WLC

ABSTRACT: Institutional support is crucial for the successful career advancement of all faculty but in particular those who are women. Evolving from the past, in which gender disparities were prevalent in many institutions, recent decades have witnessed significant progress in supporting the career advancement of women faculty in science and academic medicine. However, continued advancement is necessary as previously unrecognized needs and new opportunities for improvement emerge. To identify the needs, opportunities, and potential challenges encountered by women faculty, the Women's Leadership Committee of the Arteriosclerosis, Thrombosis, and Vascular Biology Council developed an initiative termed GROWTH (Generating Resources and Opportunities for Women in Technology and Health). The committee designed a survey questionnaire and interviewed 19 leaders with roles and responsibilities in faculty development from a total of 12 institutions across various regions of the United States. The results were compiled, analyzed, and discussed. Based on our interviews and analyses, we present the current status of these representative institutions in supporting faculty development, highlighting efforts specific to women faculty. Through the experiences, insights, and vision of these leaders, we identified success stories, challenges, and future priorities. Our article provides a primer and a snapshot of institutional efforts to support the advancement of women faculty. Importantly, this article can serve as a reference and resource for academic entities seeking ideas to gauge their commitment level to women faculty and to implement new initiatives. Additionally, this article can provide guidance and strategies for women faculty as they seek support and resources from their current or prospective institutions when pursuing new career opportunities.

Key Words: arteriosclerosis ■ biology ■ surveys and questionnaires ■ technology ■ thrombosis

Historically, women faculty in academia have faced significant gender disparities, including underrepresentation in leadership roles, gender bias, and limited access to resources and support networks. Over the past 20 years, increased recognition has led to the implementation of diversity and inclusion initiatives, mentorship programs, and family-friendly policies to support and advance women in academia. Since 1999, Arteriosclerosis, Thrombosis, and Vascular Biology Women's Leadership Committee (WLC) has been actively engaged in initiatives to advocate and support women in science and medicine.[1] The committee continually engages in discussions regarding institutional support for women faculty, both internally and within the broader Arteriosclerosis, Thrombosis, and Vascular Biology community. These discussions are integral to our role in leading career development and networking events at both Vascular Discovery Scientific Sessions and the American

Correspondence to: Zhen Bouman Chen, MB, PhD, Department of Diabetes Complications and Metabolism, 1500 E Duarte Rd, Duarte, CA 91010, Email zhenchen@coh.org; or Hanrui Zhang, MB, PhD, Cardiometabolic Genomics Program, Division of Cardiology, Department of Medicine, Columbia University Irving Medical Center, 630 W 168th St, P&S10-401, New York, NY 10032, Email hz2418@cumc.columbia.edu
Supplemental Material is available at https://www.ahajournals.org/doi/suppl/10.1161/ATVBAHA.124.320910.
For Sources of Funding and Disclosures, see page XXX.

Arterioscler Thromb Vasc Biol is available at www.ahajournals.org/journal/atvb

Nonstandard Abbreviations and Acronyms

CARES	Caregiving Affected Early-Career Research Scientists
CTST	Clinical and Translational Science Training
DRIVEN	Driving Research: an Interdisciplinary, Vibrant, Engaged, Network
ELAM	Executive Leadership in Academic Medicine
ELH	Executive Leadership in Health
GROWTH	Generating Resources and Opportunities for Women in Technology and Health
SAIL	Sharing Authentically to Inspire and Lead
WLC	Women's Leadership Committee

Highlights

- The members of the ATVB Women's Leadership Committee conducted interviews with 19 institutional leaders from a total of 12 institutions across the United States, aiming to gather their diverse experiences, insights, and visions regarding institutional support for the career advancement of women faculty in science and academic medicine.
- We present a summary of various initiatives identified through these interviews, including community fostering, workshops and training, work-life integration, and culture and transparency building, providing a comprehensive overview of current and ongoing efforts aimed at supporting the career advancement of women faculty.
- We highlight both success stories and key challenges encountered by these institutions. These insights can serve as invaluable resources and checklists for others seeking to enhance their support of women faculty.
- We discuss future directions and opportunities, which include expanding coaching and leadership training programs with an emphasis on individualized approaches, implementing data-informed strategic planning, continuing to enforce cultural changes, and fostering collaborations within and across institutions.

Heart Association Scientific Sessions. Through these exchanges, we have noted a recurring concern: while some women faculty feel they receive comparable support to their male counterparts, many others perceive a disparity in access to resources and support, such as startup funds, compensation, leadership training, and promotion opportunities. This observed imbalance can be attributed, in part, to a lack of readily accessible information regarding institutional support for many, if not all, faculty members.

Recognizing this gap, the Arteriosclerosis, Thrombosis, and Vascular Biology WLC set forth an initiative, which we named GROWTH (Generating Resources and Opportunities for Women in Technology and Health), to assess institutional support for women faculty and identify unmet needs and opportunities, underscoring the crucial role of institutions in facilitating the career advancement of women faculty. Toward this goal, we interviewed leaders of faculty development initiatives at 12 academic institutions in the United States. Leveraging these interviews, we aimed to reveal the current state of support for women faculty in academia and to share ideas that other institutions could potentially draw from, either to expand their current approaches or implement effective new strategies.

Through discussions with our interviewees, we identified unique challenges and potential disparities women faculty encounter. We hope this article will provide a powerful advocacy tool to encourage institutions to assess and address these challenges and disparities. Furthermore, we hope these efforts will serve as a catalyst for positive policy changes at national and international institutions, including the development and implementation of more robust support systems and policies, for example, equal pay, family-friendly policies, and initiatives to address unconscious biases in hiring and promotion processes. Additionally, we believe that proactively discussing this topic fosters a sense of community among women faculty, creating a platform for sharing experiences, strategies, and support mechanisms, ultimately strengthening our collective voice. Finally, by emphasizing the importance of diversity and inclusion, we hope to contribute to a more welcoming and accommodating academic environment, benefiting not only women faculty but also the entire academic community.

OVERVIEW OF SURVEY DESIGN AND INTERVIEWS

Members of the WLC designed a questionnaire (Supplemental Material) that was used to survey the interviewees regarding their roles, experiences, and perspectives in faculty development. The questionnaire also included a table to assess the status of various activities and programs designed to provide support to women faculty in the interviewees' home institutions. Using the questionnaire as a guide, the WLC conducted virtual or in-person interviews engaging a total of 19 leaders representing 12 institutions in the United States, including 2 interviewees from 2 institutions in the North, 4 interviewees from 3 institutions in the Midwest, 4 interviewees from 3 institutions in the West, and 9 interviewees from 4 institutions in the South (Figure 1A through 1C). Among the 19 interviewees, 84% (16 individuals) were women and 16% (3 individuals) were men (Figure 1D). The training

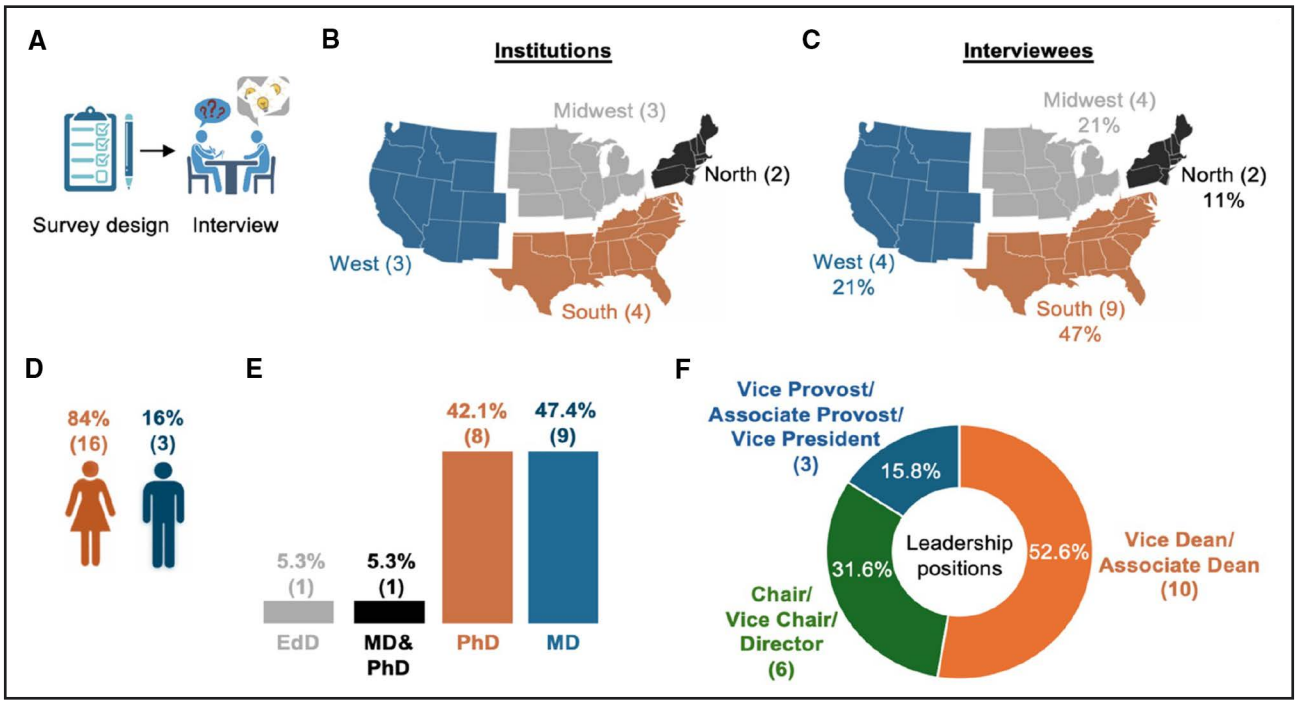

Figure 1. Summary of study design and participating interviewees and their affiliated institutions.
A, The survey was designed by the ATVB Women's Leadership Committee, and interviews were conducted from August 2023 to January 2024. **B** and **C**, Geographic distribution of the institutions (**B**; n) and interviewees (**C**; n and %) within the United States (gray, Midwest; black, North; dark orange, South; dark blue, West). **D**, Gender distribution of the interviewees (% and n; dark orange, women; dark blue, men). **E**, Training background of the interviewees (% and n; gray, Doctor of Education [EdD]; black, Doctor of Medicine [MD] and Doctor of Philosophy [PhD]; dark orange, PhD; dark blue, MD). **F**, Leadership positions of the interviewees (% and n; dark blue, Vice Provost/Associate Provost/President; orange, Vice Dean/Associate Dean; green, Chair/Vice Chair/Director).

backgrounds of the interviewees were as follows: 1 with an EdD (Doctor of Education), 1 with MD (Doctor of Medicine) and PhD (Doctor of Philosophy), 8 with PhDs, and 9 with MDs (Figure 1E). The leadership roles of our interviewees included Vice or Associate Provost, Vice President, Vice or Associate Dean, Department Chair or Vice Chair, or Center Director (Figure 1F). Upon completion of the interviews (held from August 2023 to January 2024), we compiled the data to summarize the status of initiatives, support, and resources available in these institutions. We additionally highlight success stories, pinpoint potential challenges, and provide recommendations for the future. Based on the collective results, we provide perspectives and outlooks as outlined in the following sections.

INSTITUTIONAL INITIATIVES

Support for women's success in the clinical and research space can come from many avenues within the academic setting, such as professional peer support and mentoring across career stages, or through a nonacademic environment, for example, family members, friends, and communities. However, the institutional environment likely plays a more prominent role.[2–4] Based on the nature and objectives of the initiatives described by the interviewees, we grouped the institutional support and resources into 4 following categories: (1) programs to foster community and sense of belonging (namely community fostering); (2) workshops, training, and coaching opportunities; (3) support/resources for work-life integration; and (4) institutional culture and transparency of data.

To provide a snapshot of the status of institutional efforts to support these initiatives, we summarized the categorical data we collected using the survey table. Of note, data from 10 of 12 institutions were completed and thus used in the analysis. The heatmap in Figure 2 depicts the status of various initiatives in 10 institutions. The results indicate that most institutions have implemented dedicated programs for broad topics such as networking and leadership training to foster community and provide training opportunities. Not all institutions have implemented more specific programs, such as support networks and gender equity workshops. Among these, research and funding opportunities specifically designed for women faculty were less common, despite being perceived as a promising strategy by most institutions. Of note, one may argue that in many institutions, research funding received by women faculty is no less than that of their male counterparts, and hence, there is no essential need for such initiative.

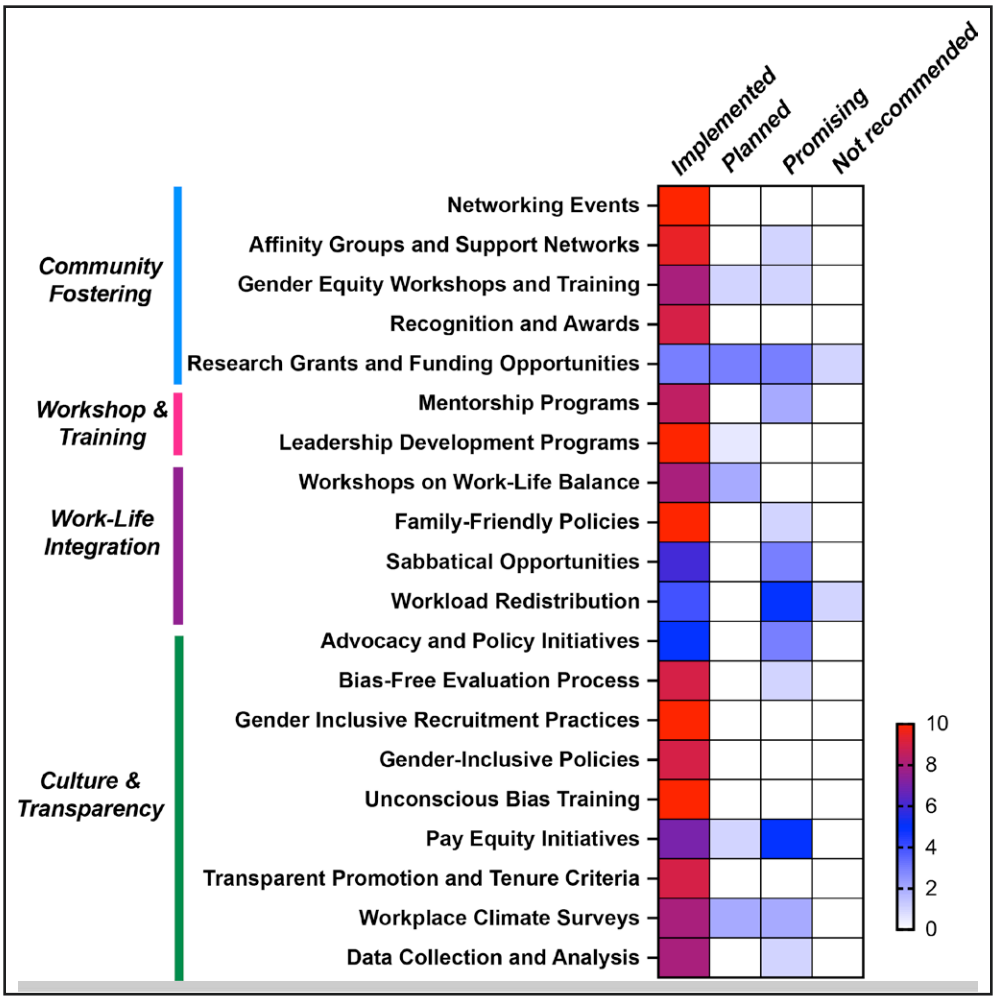

Figure 2. Current status of institutional initiatives to support the career advancement of women faculty at 10 representative institutions.

Data were summarized into 4 statuses (implemented: already doing; planned: plan to implement; promising: a good idea but takes effort and a good idea but impractical for now; not recommended: not a good idea). The indicated initiatives and programs are grouped into 4 categories based on their nature and purpose.

In terms of work-life integration, most institutions have family-friendly policies and offer workshops on this topic. Other initiatives promoting work-life integration, for example, sabbatical and workload redistribution, have yet to be implemented universally but have been perceived as promising strategies. Regarding institutional culture and transparency, gender-inclusive recruitment practices and policies are shared by all 10 institutions. The majority also apply transparent promotion and tenure criteria, conduct workplace climate surveys to assess workplace environment and culture, and collect gender-disaggregated data on faculty representation, promotion rates, and salary distributions to help identify potential disparities. Despite gender-inclusive policies and bias-free evaluation processes being commonly reported, pay equity initiatives are not as prevalent, speaking to an ongoing issue of persistent pay inequity, indicating that efforts are needed to address this area effectively.

Through our interviews, we gained additional insights into specific programs implemented at several institutions to provide the 4 categories of support, as highlighted below:

Community Fostering

Common to multiple institutions, women's networking events are regularly organized to build a community across the institution. Some institutions have also established tools, meetings, and interest/focus groups whereby women faculty can seek support from one another. Such programs include a web-based directory to facilitate networking among women professionals, monthly women-focused faculty meetings, cross-disciplinary annual conferences for women in medicine and science, a Council of Women's Advocacy, and a Committee for Internationally Trained Women Trainees and Faculty. While these are examples of

women faculty-centered programs, many institutions also provide funding and programs that, in general, promote a sense of community, collaboration, and collegiality, for example, through encouraging team science and clinical/research integration among all faculty regardless of gender. These include programs such as DRIVEN (Driving Research: an Interdisciplinary, Vibrant, Engaged, Network) and CTST (Clinical and Translational Science Training). Although not universal, some institutions offer specific grants to support clinical scientists with family care responsibilities, such as the CARES (Caregiving Affected Early-Career Research Scientists) program and the Fund to Retain Clinical Scientists.

Workshops and Training

Many institutions provide workshops, coaching and training opportunities, and leadership seminars for women faculty. Helpful topics included "How to get promoted," "Getting involved in societies, boards, and awards committees," "Negotiation," and "Grantsmanship." Workshops on more specific skills, for example, self-promotion and communicating your value, conflict management, overcoming imposter syndrome, leading diverse teams, engagement with sponsors, leveraging leadership style, financial management, and creating personal action plans, were also highly valued. Several leaders also mentioned the importance of providing diversity, equity, and inclusion training for search committees and mandating gender- and diversity-inclusive compositions of these committees. Almost all women interviewees mentioned participating in curated Women's Leadership Programs, highlighting their value. Furthermore, one interviewee leads a Women's Leadership Program, which includes six 2-hour sessions across 6 months, targeted specifically to early-career women faculty. One interviewee described a similar program called SAIL (Sharing Authentically to Inspire and Lead), which focuses on supporting junior women faculty and aims to improve retention.

Work-Life Integration Support

To accommodate work-life integration, many leaders mentioned offering flexible work hours, termed flex-hybrid mode, at some institutions, especially during and after the COVID-19 pandemic. Some institutions provide generous parental leave and on-site childcare facilities. Of note, several institutions encourage sabbatical or research leave to both promote work-life balance and provide women faculty with opportunities to learn new skills and acquire new expertise, thus enhancing research productivity and creativity. Additionally, although not women faculty specific, some institutions provide personnel support for administrative duties, teaching activities, and IT services to offset some of the faculty's workload.

Culture and Transparency

There is an increasing recognition of the importance of promoting cultural changes and transparency at all levels. Many interviewees described newly implemented bias and inclusion training and the respective evaluation processes. Initiatives such as requiring leadership positions to be publicly posted and requiring recruitment, award, and promotion committees to include gender representation are now becoming established policies and requirements in many institutions. Pay equity initiatives are increasingly being implemented. Many, if not all, leaders agreed that data collection and transparency are vital. Accordingly, several institutions have begun an annual analysis of gender equity, which captures metrics (eg, career advancement statistics, including recruitment and promotion) stratified by gender and ethnicity. One interviewee noted that it is critical to not only collect the data but also to make the data public and available. While this kind of data is being actively collected at the department level at several institutions, curating university-wide metrics across departments, deemed considerably challenging, remains an ongoing effort. To address this issue, some institutions are changing institutional software to make these data easier to curate, allowing hiring cohorts and pay equity to be assessed and addressed more effectively.

Many interviewees also highlighted their institutional websites as comprehensive sources for ongoing initiatives and commented on the importance of enabling current and prospective faculty to delve into and leverage them. Collectively, the initiatives that have been implemented or planned are substantial, focusing on the professional development of women in both clinical and basic research spaces while also supporting a systemic culture that uplifts women and underrepresented minority groups.

Although we highlighted specific initiatives in separate categories above, it is important to note that many programs are integrated and may provide support and resources to address >1 purpose. By functioning harmoniously as a whole, these integrated systems can inspire qualified individuals who will, in turn, continue to foster a positive environment for women faculty.

SUCCESS STORIES

Each interviewee shared encouraging and inspiring success stories, including initiatives they have implemented or participated in. They have also shared the significant impact and benefits these initiatives have had on women

faculty. Below, we highlight examples to emphasize where changes were/are needed and how changes have been initiated and sustained.

Promoting Representation of Women Faculty at All Levels

Dr Horne, vice provost and deputy director at the Beckman Research Institute of City of Hope, highlighted that half of the department chairs at City of Hope are women. The increased representation of women at the senior leadership level undoubtedly represents a driving force for positive changes in the institution to support women faculty. Similarly, Dr Woo, Chair of Cardiothoracic Surgery at Stanford University, made notable efforts to advance the national recognition of women faculty in the department. In his department, 23% (n=11) of faculty are women, a notable difference compared with the national average of 8.3%, according to the 2021 Association of American Medical Colleges Physician Specialty Data Report of 4448 listed active cardiothoracic surgeons.[5] He attributes this achievement to initiatives in recruitment and retention, which include an emphasis on gender representation.

Seeking External Funding

Dr Taylor, vice dean of Academic Affairs at Columbia University, highlighted the efforts by the Office of Academic Affairs to seek external funding to support the career advancement of women faculty. This includes an award from the Doris Duke Foundation for retention of clinical scientists and the NIH Prize for Enhancing Faculty Gender Diversity in Biomedical and Behavioral Science that supports childcare for faculty attending meetings, which was recognized by the NIH Office of Research on Women's Health. Similarly, Virginia Commonwealth University holds an ADVANCE initiative funded by the National Science Foundation to promote the advancement of women faculty in STEM careers. For the past 4 years, the program has had a significant impact on the institutional recruitment, retention, and advancement of women faculty, particularly through the initiation of structural and cultural changes.

Pay Equity Initiatives

Dr Wang, senior executive clinical vice chair at the University of California, Los Angeles, Department of Medicine, helped to rewrite their compensation bylaws to achieve better pay equity across the entire Department of Medicine. She attributes its success to having visionary leaders who support the endeavor from the top down and allocate resources, applying the strategy of standardizing salary requests through a set framework, and having a capable administrative team. She also highlighted the importance of cultivating an environment that values shared successes and prioritizes long-term retention of faculty.

Strategic Planning

Dr Ellinas, founding director of the Center for the Advancement of Women in Science and Medicine at the Medical College of Wisconsin, emphasized the importance of implementing data-informed strategic projects in collaboration with the institution's strategic goals. To this end, the Center provides training programs, networking events, awards, and a Council for Women's Advocacy, allowing for intergenerational and interdepartmental collaborations across the institution. At the University of Illinois Chicago, data-informed strategic planning, led by the Faculty Development Subcommittee, is integrated into the strategic planning initiative of the College of Medicine. Efforts by the subcommittee include identifying priorities through faculty surveys, emphasizing transparent metrics, and setting specific deadlines for goal achievement.

Other successful programs and initiatives introduced include the following: (1) sponsoring women faculty for leadership programs at the ELAM (Executive Leadership in Academic Medicine) and ELH (Executive Leadership in Health) programs and Association of American Medical Colleges; (2) implementing peer coaching and group coaching programs, in addition to a sponsored coaching program, to mitigate costs; (3) offering drop-in childcare during the pandemic; and (4) offering internal grants to support PIs in generating preliminary data for a second NIH R-level grant or comparable external funding.

CHALLENGES AT INDIVIDUAL AND INSTITUTIONAL LEVELS

Interviewees highlighted challenges and barriers faced by women faculty, ongoing efforts to address these challenges, and systemic challenges at the institutional levels.

At individual levels, persistent challenges for women faculty include cultural expectations regarding caregiving responsibilities, implicit gender bias, and the resulting leaky pipeline (ie, the underrepresentation of women in more senior positions) that impedes women's career advancement.

Caregiving Responsibilities and Expectations

During the COVID-19 pandemic, caregiving responsibilities exacerbated work-life imbalances, especially for women.[6] For example, in 2019 (pre-pandemic), there was no significant difference in the average number of grants submitted by women compared with men faculty. In contrast, women faculty submitted significantly fewer grants in 2020 (during the pandemic) than men.[7] Women faculty experience higher rates of burnout compared with men.[8] The cultural expectation that women

are primary caregivers persists across various societies, but implementing effective institutional policies can contribute to alleviating these challenges. For example, many institutions now offer increased flexibility in working hours, hybrid and remote work options, extended parental leave, and tenure clock extensions for childbirth. Some also provide on-site childcare, dedicated lactation breaks for clinicians, and coaching programs for promoting work-life integration and preventing burnout.

Gender Bias

Gender bias remains a pervasive systemic issue in academia, evident in gender-based harassment, microaggressions, and perceptions of how women can succeed in academic environments. This bias manifests in pay disparities and implicit biases in recruitment, evaluation, and promotion processes. To address this, it is crucial to raise awareness through educational initiatives such as bias training, especially among leadership. Indeed, tackling gender bias requires a cultural shift within organizations, emphasizing continuous efforts over mere policy implementation or isolated training sessions to proactively foster sustainable changes toward gender equality.

Leaky Pipeline and the Lack of Women in Leadership Roles

The underrepresentation of women in leadership roles persists despite their significant presence at the postdoctoral and junior faculty levels.[9] Among the institutions our interviewees are affiliated with, the proportion of women in leadership positions is not always clear, highlighting the need for transparency in statistical data to reflect the institutional state of inclusiveness and equity. The underrepresentation of women may stem from several factors, including the disproportionate burden of caregiving on women, the disparity in mentorship and sponsorship, and the workplace climate.[9–11] Achieving an equal representation of men and women faculty in all committees and decision-making processes remains a work in progress. While many institutions have implemented policies to ensure women faculty comprise ≈50% of all recruitment and award committees, women, especially those from underrepresented groups, often bear a disproportionate burden. Sustained progress necessitates conscious efforts in building engagement at individual and leadership levels, including clearly communicating promotion criteria and encouraging women to take proactive approaches to promotion and leadership positions.

At the institutional level, significant challenges often arise from a lack of strategic planning, assessment of status and results, a streamlined process to engage leadership support, and a reliable source of committed funding for initiatives. Some institutions have integrated career development for women faculty into their strategic planning, but not all institutions prioritize these goals equally. It is crucial to improve the approaches used to assess the impact and effectiveness of such initiatives and programs to enable further optimization. Assessing the status of women faculty, for example, burnout, implementing a tracking system and gathering specific data within institutions and at national levels may help enforce policies, yet this approach is not widespread. Interviewees noted that engaging supportive leaders is crucial, but the absence of a robust structure and streamlined process remains an issue. Sourcing dedicated funding is challenging. While providing robust support for onsite childcare is undoubtedly an effective strategy, its practicality may be limited for many institutions.

FUTURE DIRECTIONS AND RECOMMENDATIONS

Through these informative interviews, we believe that progress is underway to recognize, assess, and address challenges, and the landscape will continue to positively evolve. Future directions and recommendations also emerged during our discussions with the interviewees:

1. Coaching programs and leadership training programs: increase the availability of coaching and leadership training programs. Emphasize leadership training and establish a leadership academy exclusively for women.
2. Individualized program and training: recognize distinct challenges that basic and clinical research faculty face and design tailored programs. Address unique challenges at varying career stages, with particular attention to mid-career faculty, physician experiences, and improving retention. Ensure that programs and training are targeted and well timed. Recognize the evolving health care landscape, emphasizing the importance of programs such as clinical leadership, which integrate business acumen, including proficiency in financial matters and funds management.
3. Data-informed strategic planning: implement strategic plans with transparent metrics and specific deadlines for achieving goals. Collect and assess data on gender equity progress at both departmental and institutional levels, including hiring practices, retention rates, academic promotion, tenure, leadership positions, and more. Make reports on these metrics transparently available and assess the impact of policies and strategies to guide future planning.
4. Cultural changes: address cultural bias and microaggressions by taking proactive measures. This may involve mandatory training for division leaders, department chairs, and committees, who influence the hiring, retention, promotion, and career trajectories of women scientists and clinicians. To drive

positive cultural changes at the institutional level, one initiative gaining traction is bystander training, that is, training faculty of all genders to identify microaggressions or silencing tactics and speak up in the moment. It would be important for such training to be implemented from the leadership level, and it can be particularly useful to provide specific examples of discriminatory tactics to help male (and female) faculty members be aware of such tactics.

5. Collaboration within and across institutions: facilitate resource sharing, including seminars and workshops, coaching and mentoring opportunities, and other initiatives within and across institutions. This ensures that the community has access to a wealth of information and references to inspire and implement changes.

DISCUSSION

Unquestionably, the latest efforts to improve equity in science and medicine have brought awareness and propelled significant progress in addressing the challenges women faculty encounter in their daily lives and professional environments. However, many challenges unique to women faculty remain unsolved and may be aggravated particularly during trying times such as a pandemic or at certain career stages. We must continue our efforts to address equity issues and embrace inclusive leadership, recognizing that a diverse workforce contributes to innovation and societal progress not only for women but for the entire community. Of note, there is no one-size-fits-all approach. We must also recognize that individuals of varying races and ethnicities, geographic locations, career stages, social obligations, and physical states face distinct disparities and challenges, and we must prompt institutions to design effective initiatives to improve overall workforce satisfaction and efficiency. It is also becoming increasingly important that institutions openly share initiatives and programs with the broader academic and scientific communities, which can serve as roadmaps for others, especially those still building infrastructure with growing resources. The development of a toolkit to be shared at a national and international level should not be a burden that falls on the shoulders of women alone; rather, it will be essential to disseminate both the burdens and the benefits to fully unify ongoing efforts across groups and institutions—a challenge and opportunity the Arteriosclerosis, Thrombosis, and Vascular Biology WLC and the authors of this article have started embracing.

ARTICLE INFORMATION

Affiliations

Department of Diabetes Complications and Metabolism, Arthur Riggs Diabetes Metabolism Research Institute, Beckman Research Institute, City of Hope, CA (Z.B.C.). Division of Cardiovascular Medicine, Department of Medicine, Center for Interdisciplinary Cardiovascular Sciences (E.A., C.L.C.) and Division of Cardiovascular Medicine, Department of Medicine, Center for Excellence in Vascular Biology (E.A.), Brigham and Women's Hospital, Harvard Medical School, Boston, MA. Department of Internal Medicine, Division of Cardiology, LSU Health Sciences Center, LA (M.A.). Department of Basic Sciences, Touro College of Osteopathic Medicine, Touro University, NY (K.A.). Smidt Heart Institute, Cedars-Sinai Medical Center, Los Angeles, CA (E.E.). Department of Molecular Metabolism, Harvard T.H. Chan School of Public Health, Boston, MA (E.E.). Department of Molecular and Cellular Physiology, Albany Medical College, NY (G.F.). Department of Medicine, Division of Cardiology, University of Pittsburgh, PA (D.G.). Department of Cardiothoracic Surgery (N.F.H.) and Division of Cardiovascular Medicine, Stanford Cardiovascular Institute (P.K.N.), Stanford University, CA. Center for Tissue Regeneration, Repair and Restoration, Veterans Affairs Palo Alto Health Care System, CA (N.F.H.). Saha Cardiovascular Research Center, Saha Aortic Center (H.S.L.) and Department of Physiology (H.S.L.), University of Kentucky, Lexington. Cardiology Section, Department of Veteran Affairs, Palo Alto, CA (P.K.N.). College of Medicine, Department of Anesthesiology, Department of Physiology and Biophysics, University of Illinois Chicago (S.D.O.). Department of Kinesiology and Health Science, Division of Pulmonary and Critical Care, Virginia Commonwealth University (P.R.-M.). Medical Scientist Training Program, Medical College of Wisconsin, Milwaukee (G.S.). Cardiometabolic Genomics Program, Division of Cardiology, Department of Medicine, Columbia University Irving Medical Center, New York, NY (H.Z.).

Acknowledgments

The authors thank all the interviewees for their support in making this project possible, including the following institutional leaders who have agreed to be formally acknowledged: Drs. David Horne and Debbie Thurmond (Beckman Research Institute of City of Hope), Dr Kathryn M. Rexrode (Brigham and Women's Hospital, Harvard Medical School), Dr Anne L. Taylor (Columbia University Irving Medical Center), Dr Ann J. Brown (Duke University School of Medicine), Dr Elizabeth H. Ellinas (Medical College of Wisconsin), Drs. Scott W. Ballinger, Jennifer A. Croker, Alecia Gross, and Jean Ann Larson (University of Alabama at Birmingham), Dr Tisha S. Wang (University of California, Los Angeles), Dr Shikha Jain (Founder of the Women in Medicine), Dr Pauline M. Maki (University of Illinois at Chicago), Dr Isabella Grumbach (University of Iowa), Dr Lisa R. Tannock (University of Kentucky), Dr Joseph Woo (Stanford University School of Medicine), and Drs Amy J. Armstrong, Sally S. Hunnicutt, and Elizabeth Ripley (Virginia Commonwealth University). They also thank Clara Lapiner (Columbia University Irving Medical Center), Dr Yabing Chen (University of Alabama at Birmingham), and Dr Judith Currier (University of California, Los Angeles) for their assistance in connecting the authors to potential interviewees. They thank Graphic Designer Pedro C.H. Simões for his help with the graphic abstract. They also appreciate the expert language editing support by Dr Sarah Wilkinson at City of Hope. E. Aikawa, M. Alfaidi, K. Ali, Z.B. Chen, C.L. Clift, E. Erbay, N.F. Huang, H.S. Lu, P.K. Nguyen, S. Darc Oliveira, P. Rodriguez-Miguelez, G. SenthilKumar, and H. Zhang conducted interviews; E. Aikawa, M. Alfaidi, K. Ali, Z.B. Chen, C.L. Clift, E. Erbay, N.F. Huang, P.K. Nguyen, S. Darc Oliveira, G. SenthilKumar, and H. Zhang prepared the transcripts and drafted the first version of the manuscript; G. Fredman and D. Gomez edited the initial draft; Z.B. Chen, H.S. Lu, P.K. Nguyen, and P. Rodriguez-Miguelez prepared the figures. S. Darc Oliveira and P.K. Nguyen conceived the graphic abstract. All the members of the WLC conceived the ideas and reviewed the final version. Coauthors were listed by alphabetic order of last names. Z.B. Chen and H. Zhang organized the project and finalized the manuscript.

Sources of Funding

No specific funding was available for this project. Z.B. Chen received funding from the National Institutes of Health (NIH; R01HL145170) and a City of Hope-Historically Black Colleges and Universities Collaboration Pilot Award from City of Hope. E. Aikawa laboratory is supported by NIH grants R01HL136431, R01HL147095, and R01HL141917. M. Alfaidi is funded by the NIH/NHLBI (R01HL172846), NIH/NIGMS-COBRE/PRL (P20GM121307), and the American Heart Association Career Development Award (21CDA853487). C.L. Clift received funding from the American Heart Association Postdoctoral Fellowship (24POST1196620). N.F. Huang was supported, in part, by the NIH (R01 HL142718, R41 HL170875, and R21 HL172096-01), the National Science Foundation (1829534 and 2227614), the Tobacco Related Disease Research Program (T33IP6580), and the Department of Veterans Affairs (1I01BX004259 and IK6BX006309). The research work on aortic aneurysm by H.S. Lu is supported by the NIH/NHLBI (R35HL155649) and the National Center for Advancing Translational Sciences of NIH (UL1TR001998; Kentucky Center for Clinical and Translational Science). S. Darc Oliveira received funding from the NIH (K01HL159037) and the UIC Health Equity Pilot Program Award on Women-Prevalent Disease Research (Pulmonary Arterial Hypertension). H.

Zhang received funding from the NIH (R01HL151611 and R01HL168174) and the M. Iréne Ferrer Scholar Award by the Foundation for Gender-Specific Medicine.

Disclosures

None.

Supplemental Material

Expanded Materials

REFERENCES

1. Zhang H, Chen ZB, Fredman G, Gomez D, Grumbach IM, Huang NF, Nguyen PKP, Ouimet M, Sutton NR, Aikawa E. What makes a great mentor: interviews with recipients of the ATVB mentor of women award. *Arterioscler Thromb Vasc Biol.* 2021;41:2641–2647. doi: 10.1161/ATVBAHA.121.316558
2. Chang S, Guindani M, Morahan P, Magrane D, Newbill S, Helitzer D. Increasing promotion of women faculty in academic medicine: impact of national career development programs. *J Womens Health (Larchmt).* 2020;29:837–846. doi: 10.1089/jwh.2019.8044
3. Chang S, Morahan PS, Magrane D, Helitzer D, Lee HY, Newbill S, Peng HL, Guindani M, Cardinali G. Retaining faculty in academic medicine: the impact of career development programs for women. *J Womens Health (Larchmt).* 2016;25:687–696. doi: 10.1089/jwh.2015.5608
4. Chaudron LH, Anson E, Bryson Tolbert JM, Inoue S, Cerulli C. Meeting the needs of mid-career women in academic medicine: one model career development program. *J Womens Health (Larchmt).* 2021;30:45–51. doi: 10.1089/jwh.2019.8062
5. American Medical Association. Active physicians by sex and specialty. AMA physician masterfile (Dec 31, 2021). 2021. https://www.aamc.org/data-reports/workforce/data/active-physicians-sex-specialty-2021
6. Kotini-Shah P, Man B, Pobee R, Hirshfield LE, Risman BJ, Buhimschi IA, Weinreich HM. Work-life balance and productivity among academic faculty during the COVID-19 pandemic: a latent class analysis. *J Womens Health (Larchmt).* 2022;31:321–330. doi: 10.1089/jwh.2021.0277
7. Roubinov D, Haack LM, Folk JB, Rotenstein L, Accurso EC, Dahiya P, Ponce AN, Nava V, Maldonado Y, Linos E, et al. Gender differences in National Institutes of Health grant submissions before and during the COVID-19 pandemic. *J Womens Health (Larchmt).* 2022;31:1241–1245. doi: 10.1089/jwh.2022.0182
8. Laraja K, Mansfield L, de Ferranti S, Elia E, Gudanowski B, Gurvitz M, Gauthier N. Disproportionate negative career impact of the COVID-19 pandemic on female pediatric cardiologists in the northeast United States. *Pediatr Cardiol.* 2022;43:1913–1921. doi: 10.1007/s00246-022-02934-9
9. Spoon K, LaBerge N, Wapman KH, Zhang S, Morgan AC, Galesic M, Fosdick BK, Larremore DB, Clauset A. Gender and retention patterns among U.S. faculty. *Sci Adv.* 2023;9:eadi2205. doi: 10.1126/sciadv.adi2205
10. Carr PL, Gunn CM, Kaplan SA, Raj A, Freund KM. Inadequate progress for women in academic medicine: findings from the National Faculty Study. *J Womens Health (Larchmt).* 2015;24:190–199. doi: 10.1089/jwh.2014.4848
11. Patton EW, Griffith KA, Jones RD, Stewart A, Ubel PA, Jagsi R. Differences in mentor-mentee sponsorship in male vs female recipients of national institutes of health grants. *JAMA Intern Med.* 2017;177:580–582. doi: 10.1001/jamainternmed.2016.9391