Achieving Gender and Social Equality: More Than Gender Parity Is Needed

Anita Raj, PhD, MS, Tina Kumra, MD, MPH, Gary L. Darmstadt, MD, MS, and Karen M. Freund, MD, MPH

Abstract

In this Perspective, the authors review Association of American Medical Colleges data on gender parity and intersectionality, consider the literature on gender parity in academic medicine and the underlying gender norms that explain these statistics, and offer recommendations for moving past indicators of parity to achieve gender and social equality.

Improvements in gender parity among medical school graduates have not translated to gender parity among practicing physicians or medical school faculty, particularly for racial/ethnic minorities. Further, gender parity does not correspond to gender equality, such that gender-based disparities in salaries and advancement persist. In addition, social norms related to traditional gender role expectations reinforce existing biases and lead to sexual harassment and discrimination against women in the workplace.

Building on their analysis of existing data and the literature, the authors offer concrete recommendations to achieve gender equality in academic medicine that not only improve parity but also support policies and practices to address the norms that further bias and discrimination. These recommendations include the collection, monitoring, and open reporting of data on salaries as well as on sex and race/ethnicity; stronger policies related to family leave and sexual discrimination and harassment; and accountability structures to ensure that policies are enforced. While these efforts alone cannot eliminate gender inequalities, academic medicine should be at the forefront of creating a climate in medicine that is supportive of gender equality as part of their larger goal of promoting social equality.

Many have called for gender parity (i.e., numeric equality in representation by sex [assumed as biology]) in medical school faculty to promote justice and improve quality of care.[1,2] With the Association of American Medical Colleges (AAMC) now tracking sex-disaggregated data on students, faculty, and leaders in academic medicine, we can see improvements in gender parity among medical school matriculants. However, improvements in numbers alone do not equate to gender and social equality (i.e., a situation of justice where one's rights, responsibilities, and opportunities are not affected by gender [socially constructed beliefs, expectations, and status based on sex] or other social considerations).

In this Perspective, we review AAMC data on gender parity and intersectionality (i.e., considering multiple forms of social marginalization simultaneously, such as sex and race/ethnicity), and we consider the literature on gender parity in academic medicine and the underlying gender norms (i.e., the underlying social rules governing behavior that are based on gender) that explain these statistics. On the basis of this work, we offer concrete recommendations for improving gender parity and gender and social equality in academic medicine.

Please see the end of this article for information about the authors.

Correspondence should be addressed to Anita Raj, Department of Medicine, University of California, San Diego School of Medicine, 9500 Gilman Dr., La Jolla, CA 92093; telephone: (858) 822-0229; email: anitaraj@ucsd.edu; Twitter: @AnitaRajUCSD.

Acad Med. 2019;94:1658–1664.
First published online July 16, 2019
doi: 10.1097/ACM.0000000000002877

Gender Parity Does Not Equal Social Equality

Currently, only 35% of active physicians in the United States are women.[3] However, the sex distribution of medical students—a balance that has been consistent for the past 5 years—indicates that gender parity could be achieved in the physician workforce in the near future.[4–6] Despite gender parity in recent medical school graduates, the underrepresentation of racial/ethnic minorities persists regardless of sex.[4–8] Among medical school faculty, there is gender parity and even an overrepresentation of women at the instructor level. However, the share of female faculty declines at each subsequent rank such that the share of female professors is 56% lower than the share of female assistant professors.[7,9] This decline in female representation is even more pronounced among racial/ethnic minorities.[7,9]

Representation and advancement do show some variation by specialty. Pediatrics and obstetrics–gynecology have a high percentage of female faculty (63% and 57% female, respectively)[10] and a higher percentage of female chairs (37% and 28% female, respectively) than across all other departments at U.S. medical schools (18% female).[11] In the specialty with the lowest percentage of women—orthopedic surgery (5% female)—only 1 of the 120 chairs nationally is female, and representation of racial/ethnic minorities among chairs is 13%, less than their percentage among chairs across all other departments.[11] These findings suggest that improving gender diversity must be linked with improving racial/ethnic representation.

Gender Parity Does Not Equal Gender Equality

A clear demonstration of the inequality in medicine is the difference in women's versus men's salaries.[12–17] Among physicians generally and medical school

faculty specifically, the representation of women and racial/ethnic minorities is greater in lower-paying primary care specialties, with some specialities such as pediatrics and obstetrics–gynecology now having more women than men in practice; these specialties also have greater stagnation of salaries.[9,10,16–18] However, even in cases of equal work and position (same rank, training, and experience), unequal pay continues to disadvantage women[12,16] despite evidence that the quality of care women provide is equivalent and in some cases superior to that of their male colleagues.[19,20]

Lower salaries for women relative to men in academic medicine have been attributed to women's lesser productivity, defined by number of grants and authorship roles.[21–23] Yet, gender bias in peer review is well documented.[24–26] Despite this, the underrepresentation of women in authorship roles is declining,[23] and female representation on the editorial boards of premiere journals is increasing.[27] Further, the representation of authors from low- and middle-income countries is increasing, and greater gender parity in authorship roles is now seen in these countries compared with wealthier nations.[28]

Gender parity in authorship roles leads to more diversity in the type of work that is published. An analysis of more than 1.5 million scientific papers published from 2000 to 2015 found that women were more likely than men to publish sex-disaggregated data and a gender analysis of a given topic.[29] Unfortunately, while women and racial/ethnic minorities are more likely to publish research on gender and racial/ethnic biases, this work is also less likely to be funded or published in higher-impact journals, undervaluing both these researchers and their work.[30]

Despite decreases in publication bias, women continue to face gender discrimination in recognition and advancement.[31–37] Female faculty are less likely than male faculty to be invited to speak at grand rounds, less likely to be introduced with their title when they speak, and less likely to receive awards from their professional societies.[38–40] Decanal roles for women are also rare; only 15% of medical school deans are women.[41] Those in dean-level positions are often appointed to "nurturing" roles of service,[31,32] such as education or mentoring, rather than policy-setting roles in finance and governance.[9,41] Notably, when institutions have a female dean at the helm, they tend to have more women in decanal roles[41] and support more research on women's health.[42]

The Effects of Gender Norms and Inequalities

Gender inequalities in salaries and advancement contribute to the attrition of women in practice and faculty roles.[16,31,43] This attrition helps to explain why gender parity at medical school matriculation has not translated into sufficient improvements in the representation of women among medical school faculty, leadership, and the field more broadly. The costs of gender inequality are not just a lack of fairness but also a loss of the benefits to science and health that women bring.[19,20]

Traditional gender norms also affect women's entry and retention in medicine. These norms include expectations that physicians are men, that women must prioritize family responsibilities, and that sexual harassment in the workplace is expected. Below, we discuss these gender norms and their effects on women in medicine.

Physicians are men

Early in training and practice, women may receive subtle and not-so-subtle hints that medicine is inherently masculine and thus they may be less suited for it, particularly in the case of specialties with higher mortality risks for patients and longer duty hours, such as surgery.[44,45] Medical school textbooks continue to largely depict physicians as white men.[46] Female trainees report that their nonadherence to gender role expectations, such as displaying assertiveness even in a crisis situation, may result in backlash from both their peers and superiors.[47] Female faculty in male-dominated specialties receive lower evaluation scores than their male colleagues from both male and female trainees, suggesting gender bias in performance evaluations.[48] As a result, female faculty report less self-efficacy than male faculty with regard to performance and readiness for advancement.[49]

Women must prioritize family responsibilities

In medicine, women report being responsible for a greater share of domestic work than their male colleagues and are more likely to have a full-time working spouse, with their careers often viewed as secondary to the careers of their spouses.[50,51] Correspondingly, women are more likely to move for their spouse's job than their own, decreasing their opportunities early in their careers.[16,52,53] The context and climate of academic medicine reinforce these gender inequalities, with inadequate support for family leave policies[43,54] and breastfeeding and pumping at work.[55] These issues,

Box 1
About the Athena Scientific Women's Academic Network (SWAN) Program

The Athena SWAN program started in the United Kingdom in 2005 to advance women in science, technology, engineering, and math (STEM) institutions of higher education and research.[65] It was subsequently expanded to Ireland and Australia.[69] This initiative monitors and scores STEM institutions on (1) gender parity among students/trainees (from entry to exit) and professional and support staff (from entry to advancement and retention) and (2) policies toward fostering a gender-supportive working environment. Only institutions holding "silver awards" or higher are eligible for federal research funding. Improvements in the representation of women in STEM institutions in the United Kingdom have been attributed to the Athena SWAN program, which has also been viewed favorably by institutions.[69,75] A similar approach was implemented with university hospitals in Europe, reaching providers as well as faculty researchers.[76]

The Athena SWAN program shows great promise, but many question the long-term impact[65] of such a top-down approach and its ability to address entrenched power and pay imbalances and persistent inequalities in women's responsibilities in the home relative to men.[69] Critics also cite concerns that linking an institution's Athena SWAN program award level to federal funding access will discourage female faculty from disclosing discrimination because of the resulting funding loss and its impact on their peers.[67] Resentment and backlash also could form against female faculty by those who perceive that the program provides incentives for "positive discrimination."[69] Some qualitative evaluations of the Athena SWAN program have raised concerns that it puts the burden on women to implement it, which could negatively affect their productivity and other scholarship efforts.[66] While not specific to the Athena SWAN program, a meta-analysis of faculty mentoring programs documented that, while such programs do increase gender parity in faculty rank and retention, they also create additional work for women who have to participate in ways that men do not.[77]

combined with patients' expectations of more "care time" from female physicians, increase their risk of burnout[55–57] and may help explain the greater escalation in burnout among female physicians compared with male physicians.[58] Female physicians who reduce their duty hours to accommodate family care needs, even for a short period, pay a disproportionate penalty in compensation, which extends throughout their career,[14] as well as a reduction in future career advancement opportunities.

Sexual harassment in the workplace is expected

Existing gender norms about the roles women and men play in public generally and in the workplace specifically help explain the widespread sexual harassment women face.[59] Among medical school faculty early in their careers, 30% of women compared with 4% of men reported being harassed in the workplace; women who reported harassment also stated that it affected their confidence and/or hampered their careers.[54] Such harassment can start early in training. Recent data from graduating medical students indicate that 4% received unwanted sexual advances and 15% were subjected to sexist remarks during training.[60] This harassment contributes to the attrition of female physicians and is exacerbated among racial/ethnic minorities.[61] While the #MeToo movement and calls from the National Academies[62] have advocated for a climate of zero tolerance for these behaviors, efforts to tackle the underlying norms remain inadequate. Nonetheless, retaliation from those accused of harassment, and even fear of retaliation, can negatively affect the career opportunities and professional development of medical school faculty who have faced harassment.[63]

Recommendations to Support Gender Parity and Gender and Social Equality

Given that the current climate in medicine reflects restrictive gender norms that impede the advancement of women and racial/ethnic minorities, medical schools and other institutions need to develop specific programs and policies to overcome the biases underlying these inequalities.[64] Outside the United States, efforts are being made to improve gender equality with top-down approaches, such as the Athena Scientific Women's Academic Network (SWAN) program, which tracks and offers incentives to health institutions that demonstrate gender parity in their workforce (see Box 1).[65,66] However, such top-down efforts, attending primarily to establishing parity to eliminate discrimination, do not address the root causes of and norms sustaining gender inequalities and can lead to backlash or retaliation.[67–69]

Table 1
Recommendations for Approaches to Achieving Gender Equality in Academic Medicine

Recommendation	Approaches[a,b]	Additional considerations[a]
Improving gender parity		
Increase female representation in medicine broadly and in leadership roles specifically	• *Track those entering and leaving medicine by sex to identify gender disparities in entry and retention.*[65,69,75,76,78] • *Track time at rank, advancement to a leadership role, and type of leadership role (nurturing versus governance) by sex to identify gender disparities in advancement.*[65,69,75,78] • *Track those in government and institutional leadership roles at all levels by sex and training to identify gender disparities in advancement.*[78] • Make available mentoring programs for women to provide support, guidance, and role models for entry and retention.[76,77] • Ensure open announcements and hiring for leadership positions. • Address implicit biases in hiring. Reduce selection bias in hiring with structured behavioral interviewing and blinding of names on initial screens of applicants.[79]	• Tracking gender parity improvements must include monitoring other social equality indicators (e.g., race/ethnicity, religion, sexual orientation) or marginalized minority groups may be lost (i.e., consider issues of intersectionality). • Advancing women by increasing their positions in medicine and other specialties may inadvertently decrease the value of primary care and frontline providers. • Gender-focused mentoring programs, while promising, do add time and labor for women.[66,77] • Given variability in the mentoring preferences of women, organizations should encourage input from mentees regarding their mentorship preferences and diversity in mentorship.[80] • An emphasis on gender data can unintentionally stigmatize gender minorities and may impede the representation of transgender people as health care providers.
Establish equality in compensation for comparable work	• *Explicitly state that salary is negotiable. This improves women's negotiating position and salary equity.*[81,82] • Create written compensation plans to inform faculty how compensation is determined. • *Conduct audits of initial job offers and start-up packages and conduct intermittent audits to ensure equality. Track gender and other social equality indicators to gain institutional awareness regarding the impact of intersectionality on compensation.*	
Increase male representation in primary care	• *Track time trends in gender parity among physicians in contexts/nations where more women than men are entering or practicing medicine.* • Track health providers at each level (physician to outreach worker) and by sex and balance of primary care versus specialist providers.	• Gender parity may not affect gender biases and discrimination in the workplace for women or men. • Frontline health care may need to expand beyond maternal and child health and include men's health to effectively engage men as care providers at the community level.

(*Table continues*)

Table 1
(Continued)

Recommendation	Approaches[a,b]	Additional considerations[a]
Value primary care	• *Professionalize primary care by offering providers salaries that are commensurate with their training and experience.*	• Primary care physicians in faculty roles at medical schools can role model and encourage primary care as a viable career choice for students only if they feel valued and are not burned out.
Increase female representation in scientific contributions in public health and medicine	• Improve the representation of women as editors and on editorial boards, which is linked to better gender representation of published authors in journals.[23] • *Implement blinded reviews to prevent bias.*	• Some studies suggest that gender biases in submissions (i.e., fewer women submit manuscripts) is a concern.[83,84] Editors should encourage submissions from diverse groups. • Increased female authorship is more likely in female-dominated fields like pediatrics.[83] Monitoring authorship by specialty is needed.
Improve norms regarding gender parity and its value	• Monitor norms within and outside institutions, among and across types of providers. Similarly, monitor norms regarding the status, value, and professionalism across all cadres of providers.	
Improving gender equality beyond parity		
Establish institutional support for family responsibilities	• *Offer family leave for maternity/paternity care or elder care.*[85]	• Leave policies should offer pay and sufficient time to ensure their utility for young families. • Leaves should be structured to provide incentives for men to take them. For example, in Sweden, family leave can be extended for men to use. • Social norms supporting paternity leave and paternal care need to be improved. • In some fields, increased paternity leave resulted in men using this time for career advancement and widened gender inequalities.[86]
	• *Offer flexible schedules or part-time/shared schedules.*	• Part-time work can become full-time work with part-time pay. If women are more likely than men to use this option, gender gaps in pay and opportunities for advancement will be reinforced.
	• *Subsidize on-site child care.*[85]	• If on-site child care is cost-prohibitive, does not allow for flexible work schedules, or allows institutions to increase pressure for early return to work, it is not helpful.
	• Offer subsidized or free contraceptive services.[85]	• Confidential, person-centered, and respectful family planning support needs to be emphasized to ensure that this effort does not become a means of controlling physicians' reproductive timing or choices based on employer preferences.
	• *Implement policies that support breastfeeding.*[47]	• Policies must include provisions for adequate breaks and private spaces at work that allow for breastfeeding and pumping for nursing mothers as well as public breastfeeding.
Implement institutional protections against harassment and discrimination	• *Train all physicians to understand the scope of harassment, discrimination, and other unprofessional conduct, including bystander training, and processes and protections in reporting.*	• Training rather than just policies should be provided to staff and trainees at all levels in the context of ethics/human rights.
	• *Establish a clearly defined sexual harassment policy with accountability structures.*[85] • *Use climate surveys to monitor these concerns. Monitor claims of discrimination, harassment, and assault and their handling.*	
Offer institutional rewards for gender equality and advancement	• Evaluate supervisors on their respectful and nonpunitive treatment of their subordinates. • *Ensure safe working conditions across locations and opportunities for employment and advancement (e.g., rural settings, night shifts*). • Offer mechanisms for spousal hires and spousal supports to facilitate physicians' work participation.	

[a]Where possible, approaches and additional considerations are based on prior research, which is cited.
[b]Approaches in italics are those the authors recommend prioritizing, as systems are in place to undertake the work (e.g., annual Association of American Medical Colleges surveys), efforts are minimal (e.g., stating that salaries are negotiable), or political will is activated at the moment to help generate change (e.g., sexual harassment prevention).

Building on our analysis of the literature and lessons from the Athena SWAN program, we recommend approaches to achieving gender equality in academic medicine that not only improve parity but also support policies and practices to address the norms that further bias and discrimination (see Table 1). These approaches secure gender parity from matriculation through to senior leadership positions, such as dean, chief executive officer, and department chair, and they more broadly raise the visibility of women, from serving as leaders in organizations to giving grand rounds to being featured in the portraits on the walls. These approaches challenge the implicit biases in medicine's culture and include training in strategies to identify and overcome biases to improve attitudes and hiring practices.[70,71]

We recognize that some of the efforts outlined in Table 1 may be time- and resource-intensive; however, there are a few simple activities that institutions can implement quickly and in conjunction with required practices. These activities are indicated in italics in Table 1 and include the collection, monitoring, and open reporting of data on sex and race/ethnicity; the inclusion of sex-disaggregated data on those in faculty and leadership positions; the inclusion of questions about institutional climate in exit interviews; and the inclusion of self-assessments of diversity efforts in annual reviews and interviews for leadership positions. Additionally, institutional policies, procedures, and trainings on sexual harassment and assault as well as those related to bias and discrimination in the workplace must be revisited to ensure that they meet national standards. This approach may take time and, in some cases, be costly, but this time and cost will likely be less than that needed to address resultant lawsuits and institutional turmoil if gender inequalities are not addressed, as we have seen in recent cases across multiple institutions.[72–74]

Conclusion

Women now enter the medical profession in equal numbers to men, but gender parity at matriculation has not translated to social equality, with further underrepresentation of women of color, or gender equality, as women face discriminatory norms that limit their pay and opportunities, especially as they advance in the ranks of academic medicine. Thus, despite the increase in the number of women in the field, critical changes in the culture are needed to ensure gender and social equality.

In this Perspective, we offer recommendations for institutional policies and climate change efforts to build gender parity and equality for those working and training in academic medicine. While these approaches alone cannot overcome norms related to the value and treatment of women and their work, such approaches can support a larger climate and policy environment beyond our institutions that does not rely on these norms. Further, such efforts to achieve gender equality support the larger goals of achieving social equality in medicine. Policies that support women (e.g., transparency in salaries and paid family leave) and foster an environment of safety for women (i.e., free from harassment), when implemented with an intersectional lens, benefit everyone, providing security and protections for all trainees, faculty, and patients regardless of sex or gender.

Funding/Support: None reported.

Other disclosures: None reported.

Ethical approval: Reported as not applicable.

Data: The data reported in this article are from the Association of American Medical Colleges and are publicly available.

A. Raj is Tata Chancellor Professor of Society and Health, professor of education studies, and director, Center on Gender Equity and Health, University of California, San Diego School of Medicine, San Diego, California.

T. Kumra is assistant professor of pediatrics, codirector, Longitudinal Ambulatory Clerkship, and medical director, Remington Pediatrics, Johns Hopkins University School of Medicine, Baltimore, Maryland.

G.L. Darmstadt is associate dean for maternal and child health and professor of neonatal and developmental medicine, Department of Pediatrics, Stanford University School of Medicine, Stanford, California.

K.M. Freund is professor of medicine and vice chair for faculty affairs and quality improvement, Tufts University School of Medicine and Tufts Medical Center, Boston, Massachusetts.

References

1 Bates C, Gordon L, Travis E, et al. Striving for gender equity in academic medicine careers: A call to action. Acad Med. 2016;91:1050–1052.
2 Valantine H, Sandborg CI. Changing the culture of academic medicine to eliminate the gender leadership gap: 50/50 by 2020. Acad Med. 2013;88:1411–1413.
3 Association of American Medical Colleges. 2017 State Physician Workforce Data Book. Washington, DC: Association of American Medical Colleges; 2017.
4 Association of American Medical Colleges. Table A-8: Applicants to U.S. medical schools by selected combinations of race/ethnicity and sex, 2015–2016 through 2018–2019. https://www.aamc.org/download/321472/data/factstablea8.pdf. Published October 2018. Accessed July 2, 2019.
5 Association of American Medical Colleges. Table A-9: Matriculants to U.S. medical schools by selected combinations of race/ethnicity and sex, 2015–2016 through 2018–2019. https://www.aamc.org/download/321474/data/factstablea9.pdf. Published November 2018. Accessed July 2, 2019.
6 Association of American Medical Colleges. Table B-4: Total U.S. medical school graduates by race/ethnicity and sex, 2013–2014 through 2017–2018. https://www.aamc.org/download/321536/data/factstableb4.pdf. Published November 2018. Accessed July 2, 2019.
7 Association of American Medical Colleges. U.S. medical school faculty, 2017. https://www.aamc.org/data/facultyroster/reports/486050/usmsf17.html. Published 2017.
8 United States Census Bureau. QuickFacts—United States. V2018. https://www.census.gov/quickfacts/fact/table/US/PST045216. Accessed July 2, 2019.
9 Lautenberger DM, Dandar VM, Raezer CL, Sloane RA. The State of Women in Academic Medicine: The Pipeline and Pathways to Leadership, 2013–2014. Washington, DC: Association of American Medical Colleges; 2014.
10 Association of American Medical Colleges. Active physicians by sex and specialty, 2017. Table 1.3. Number and percentage of active physicians by sex and specialty. https://www.aamc.org/data/workforce/reports/492560/1-3-chart.html. Published 2017. Accessed July 2, 2019.
11 Association of American Medical Colleges. Table C. Department chairs by department, sex, and race/ethnicity, 2017. https://www.aamc.org/download/486590/data/supplementaltablec.pdf. Published December 2018. Accessed July 2, 2019.
12 Jena AB, Olenski AR, Blumenthal DM. Sex differences in physician salary in US public medical schools. JAMA Intern Med. 2016;176:1294–1304.
13 Freund KM, Raj A, Kaplan SE, et al. Inequities in academic compensation by gender: A follow-up to the National Faculty Survey Cohort Study. Acad Med. 2016;91:1068–1073.
14 Jagsi R, Griffith KA, Stewart A, Sambuco D, DeCastro R, Ubel PA. Gender differences in the salaries of physician researchers. JAMA. 2012;307:2410–2417.
15 Parks AL, Redberg RF. Women in medicine and patient outcomes: Equal rights for better work? JAMA Intern Med. 2017;177:161.
16 Butkus R, Serchen J, Moyer DV, Bornstein SS, Hingle ST; Health and Public Policy Committee of the American College of Physicians. Achieving gender equity in physician compensation and career

advancement: A position paper of the American College of Physicians. Ann Intern Med. 2018;168:721–723.
17 Grisham S. Medscape physician compensation report 2017. Medscape. https://www.medscape.com/slideshow/compensation-2017-overview-6008547. Published April 5, 2017. Accessed July 2, 2019.
18 Jagsi R, Griffith KA, DeCastro RA, Ubel P. Sex, role models, and specialty choices among graduates of US medical schools in 2006-2008. J Am Coll Surg. 2014;218:345–352.
19 Greenwood BN, Carnahan S, Huang L. Patient-physician gender concordance and increased mortality among female heart attack patients. Proc Natl Acad Sci U S A. 2018;115:8569–8574.
20 Wallis CJ, Ravi B, Coburn N, Nam RK, Detsky AS, Satkunasivam R. Comparison of postoperative outcomes among patients treated by male and female surgeons: A population based matched cohort study. BMJ. 2017;359:j4366.
21 Jagsi R, Motomura AR, Griffith KA, Rangarajan S, Ubel PA. Sex differences in attainment of independent funding by career development awardees. Ann Intern Med. 2009;151:804–811.
22 Raj A, Carr PL, Kaplan SE, Terrin N, Breeze JL, Freund KM. Longitudinal analysis of gender differences in academic productivity among medical faculty across 24 medical schools in the United States. Acad Med. 2016;91:1074–1079.
23 Filardo G, da Graca B, Sass DM, Pollock BD, Smith EB, Martinez MA. Trends and comparison of female first authorship in high impact medical journals: Observational study (1994-2014). BMJ. 2016;352:i847.
24 Gender imbalance in science journals is still pervasive. Nature. 2017;541:435–436.
25 Witteman HO, Hendricks M, Straus S, Tannenbaum C. Female grant applicants are equally successful when peer reviewers assess the science, but not when they assess the scientist. bioRxiv. December 12, 2017. doi:https://doi.org/10.1101/232868
26 Bendels MHK, Müller R, Brueggmann D, Groneberg DA. Gender disparities in high-quality research revealed by Nature Index journals. PLoS One. 2018;13:e0189136.
27 Jagsi R, Tarbell NJ, Henault LE, Chang Y, Hylek EM. The representation of women on the editorial boards of major medical journals: A 35-year perspective. Arch Intern Med. 2008;168:544–548.
28 Holman L, Stuart-Fox D, Hauser CE. The gender gap in science: How long until women are equally represented? PLoS Biol. 2018;16:e2004956.
29 Nielsen MW, Andersen JP, Schiebinger L, Schneider JW. One and a half million medical papers reveal a link between author gender and attention to gender and sex analysis. Nat Hum Behav. 2017;1:791–796.
30 Cislak A, Formanowicz M, Saguy T. Bias against research on gender bias. Scientometrics. 2018;115:189–200.
31 Carr PL, Raj A, Kaplan SE, Terrin N, Breeze JL, Freund KM. Gender differences in academic medicine: Retention, rank, and leadership comparisons from the National Faculty Survey. Acad Med. 2018;93:1694–1699.
32 Carr PL, Gunn CM, Kaplan SA, Raj A, Freund KM. Inadequate progress for women in academic medicine: Findings from the National Faculty Study. J Women's Health (Larchmt). 2015;24:190–199.
33 Wehner MR, Nead KT, Linos K, Linos E. Plenty of moustaches but not enough women: Cross sectional study of medical leaders. BMJ. 2015;351:h6311.
34 Reed DA, Enders F, Lindor R, McClees M, Lindor KD. Gender differences in academic productivity and leadership appointments of physicians throughout academic careers. Acad Med. 2011;86:43–47.
35 Blumenthal DM, Bergmark RW, Raol N, Bohnen JD, Eloy JA, Gray ST. Sex differences in faculty rank among academic surgeons in the United States in 2014. Ann Surg. 2018;268:193–200.
36 Isaac C, Griffin L, Carnes M. A qualitative study of faculty members' views of women chairs. J Women's Health (Larchmt). 2010;19:533–546.
37 Isaac C, Griffin L. Women chairs in academic medicine: Engendering strategic intuition. J Health Organ Manag. 2015;29:498–514.
38 Files JA, Mayer AP, Ko MG, et al. Speaker introductions at internal medicine grand rounds: Forms of address reveal gender bias. J Women's Health (Larchmt). 2017;26:413–419.
39 Boiko JR, Anderson AJM, Gordon RA. Representation of women among academic grand rounds speakers. JAMA Intern Med. 2017;177:722–724.
40 Silver JK, Bhatnagar S, Blauwet CA, et al. Female physicians are underrepresented in recognition awards from the American Academy of Physical Medicine and Rehabilitation. PM R. 2017;9:976–984.
41 Schor NF. The decanal divide: Women in decanal roles at U.S. medical schools. Acad Med. 2018;93:237–240.
42 Plank-Bazinet JL, Heggeness ML, Lund PK, Clayton JA. Women's careers in biomedical sciences: Implications for the economy, scientific discovery, and women's health. J Women's Health (Larchmt). 2017;26:525–529.
43 Carr PL, Gunn C, Raj A, Kaplan S, Freund KM. Recruitment, promotion, and retention of women in academic medicine: How institutions are addressing gender disparities. Women's Health Issues. 2017;27:374–381.
44 Burgess DJ, Joseph A, van Ryn M, Carnes M. Does stereotype threat affect women in academic medicine? Acad Med. 2012;87:506–512.
45 Fassiotto M, Hamel EO, Ku M, et al. Women in academic medicine: Measuring stereotype threat among junior faculty. J Women's Health (Larchmt). 2016;25:292–298.
46 Parker R, Larkin T, Cockburn J. A visual analysis of gender bias in contemporary anatomy textbooks. Soc Sci Med. 2017;180:106–113.
47 Kolehmainen C, Brennan M, Filut A, Isaac C, Carnes M. Afraid of being "witchy with a 'b'": A qualitative study of how gender influences residents' experiences leading cardiopulmonary resuscitation. Acad Med. 2014;89:1276–1281.
48 Fassiotto M, Li J, Maldonado Y, Kothary N. Female surgeons as counter stereotype: The impact of gender perceptions on trainee evaluations of physician faculty. J Surg Educ. 2018;75:1140–1148.
49 Pololi LH, Civian JT, Brennan RT, Dottolo AL, Krupat E. Experiencing the culture of academic medicine: Gender matters, a national study. J Gen Intern Med. 2013;28:201–207.
50 Jolly S, Griffith KA, DeCastro R, Stewart A, Ubel P, Jagsi R. Gender differences in time spent on parenting and domestic responsibilities by high-achieving young physician-researchers. Ann Intern Med. 2014;160:344–353.
51 Ly DP, Jena AB. Sex differences in time spent on household activities and care of children among US physicians, 2003-2016. Mayo Clin Proc. 2018;93:1484–1487.
52 Benson A. Rethinking the two-body problem: The segregation of women into geographically dispersed occupations. Demography. 2014;51:1619–1639.
53 Guille C, Frank E, Zhao Z, et al. Work-family conflict and the sex difference in depression among training physicians. JAMA Intern Med. 2017;177:1766–1772.
54 Jagsi R, Griffith KA, Jones R, Perumalswami CR, Ubel P, Stewart A. Sexual harassment and discrimination experiences of academic medical faculty. JAMA. 2016;315:2120–2121.
55 Adesoye T, Mangurian C, Choo EK, Girgis C, Sabry-Elnaggar H, Linos E; Physician Moms Group Study Group. Perceived discrimination experienced by physician mothers and desired workplace changes: A cross-sectional survey. JAMA Intern Med. 2017;177:1033–1036.
56 Salles A, Mueller CM, Cohen GL. Exploring the relationship between stereotype perception and residents' well-being. J Am Coll Surg. 2016;222:52–58.
57 Linzer M, Harwood E. Gendered expectations: Do they contribute to high burnout among female physicians? J Gen Intern Med. 2018;33:963–965.
58 Shanafelt TD, Hasan O, Dyrbye LN, et al. Changes in burnout and satisfaction with work-life balance in physicians and the general US working population between 2011 and 2014. Mayo Clin Proc. 2015;90:1600–1613.
59 Stop Street Harassment. The Facts Behind the #MeToo Movement: A National Study on Sexual Harassment and Assault. Reston, VA: Stop Street Harassment; 2018.
60 Antman K. Building on #MeToo to enhance the learning environment for US medical schools. JAMA. 2018;319:1759–1760.
61 Kaplan SE, Raj A, Carr PL, Terrin N, Breeze JL, Freund KM. Race/ethnicity and success in academic medicine: Findings from a longitudinal multi-institutional study. Acad Med. 2018;93:616–622.
62 National Academies of Sciences, Engineering, and Medicine. Sexual Harassment of Women: Climate, Culture, and Consequences in Academic Sciences, Engineering and Medicine. Washington, DC: National Academies Press; 2018.
63 Binder R, Garcia P, Johnson B, Fuentes-Afflick E. Sexual harassment in medical schools: The challenge of covert retaliation as a barrier to reporting. Acad Med. 2018;93:1770–1773.
64 Bohnet I. What Works: Gender Equality by Design. Cambridge, MA: Belknap Press; 2016.
65 Donald A, Harvey PH, McLean AR. Athena SWAN awards: Bridging the gender gap in UK science. Nature. 2011;478:36.

66 Caffrey L, Wyatt D, Fudge N, Mattingley H, Williamson C, McKevitt C. Gender equity programmes in academic medicine: A realist evaluation approach to Athena SWAN processes. BMJ Open. 2016;6:e012090.
67 Bothwell E. Athena SWAN funding link under scrutiny in discrimination row. Times High Educ. https://www.timeshighereducation.com/news/athena-swan-funding-link-under-scrutiny-discrimination-row. Published October 12, 2017. Accessed July 2, 2019.
68 Bryant LD, Burkinshaw P, House AO, West RM, Ward V. Good practice or positive action? Using Q methodology to identify competing views on improving gender equality in academic medicine. BMJ Open. 2017;7:e015973.
69 Ovseiko PV, Chapple A, Edmunds LD, Ziebland S. Advancing gender equality through the Athena SWAN Charter for Women in Science: An exploratory study of women's and men's perceptions. Health Res Policy Syst. 2017;15:12.
70 Carnes M, Devine PG, Baier Manwell L, et al. The effect of an intervention to break the gender bias habit for faculty at one institution: A cluster randomized, controlled trial. Acad Med. 2015;90:221–230.
71 Devine PG, Forscher PS, Cox WTL, Kaatz A, Sheridan J, Carnes M. A gender bias habit-breaking intervention led to increased hiring of female faculty in STEMM departments. J Exp Soc Psychol. 2017;73:211–215.
72 Hamilton M. USC gynecologist accused of abusing patients faces loss of medical license. Los Angeles Times. https://www.latimes.com/local/lanow/la-me-usc-doctor-license-20181023-story.html. Published October 23, 2018. Accessed July 2, 2019.
73 Stern J, Yaffe-Bellany D. The stubborn culture of harassment in America's medical schools. The Atlantic. https://www.theatlantic.com/education/archive/2019/01/michael-simons-and-lasting-power-men-medicine/580210. Published January 15, 2019. Accessed July 2, 2019.
74 Lavigne P, Murphy D. Federal report cites Michigan State with systemic 'serious violations' of campus-safety law. ESPN website. http://www.espn.com/espn/story/_/id/25885611/us-department-education-cites-michigan-state-university-clery-act-violations-espn-lines. Published January 30, 2019. Accessed July 2, 2019.

References cited in the exhibits only

75 Munir F, Mason C, McDermott H, Morris J, Bagilhole B, Nevill M. Advancing Women's Careers in Science, Technology, Engineering, Mathematics and Medicine: Evaluating the Effectiveness and Impact of the Athena SWAN Charter. London, UK: AdvanceHE; 2014.
76 Hasebrook J, Hahnenkamp K, Buhre WFFA, et al. Medicine goes female: Protocol for improving career options of females and working conditions for researching physicians in clinical medical research by organizational transformation and participatory design. JMIR Res Protoc. 2017;6:e152.
77 Laver KE, Prichard IJ, Cations M, Osenk I, Govin K, Coveney JD. A systematic review of interventions to support the careers of women in academic medicine and other disciplines. BMJ Open. 2018;8:e020380.
78 Global Health 50/50. Global Health 50/50 report (2018). https://globalhealth5050.org/report. Accessed July 2, 2019.
79 Reskin B, McBrief D. Why not ascription? Organizations' employment of male and female managers. Am Sociol Rev. 2000;65:210–233.
80 Carapinha R, Ortiz-Walters R, McCracken CM, Hill EV, Reede JY. Variability in women faculty's preferences regarding mentor similarity: A multi-institution study in academic medicine. Acad Med. 2016;91:1108–1118.
81 Bowles HR, Babcock L, McGinn KL. Constraints and triggers: Situational mechanics of gender in negotiation. J Pers Soc Psychol. 2005;89:951–965.
82 Leibbrandt A, List J. Do women avoid salary negotiations? Evidence from a large-scale natural field experiment. Manag Sci. 2015;61:2013–2280.
83 Heckenberg A, Druml C. Gender aspects in medical publication—The Wiener klinische Wochenschrift. Wien Klin Wochenschr. 2010;122:141–145.
84 Gilbert JR, Williams ES, Lundberg GD. Is there gender bias in JAMA's peer review process? JAMA. 1994;272:139–142.
85 Newman C, Ng C, Pacqué-Margolis S, Frymus D. Integration of gender-transformative interventions into health professional education reform for the 21st century: Implications of an expert review. Hum Resour Health. 2016;14:14.
86 Antecol H, Bedard K, Stearns J. Equal but Inequitable: Who Benefits From Gender Neutral Tenure Clock Stopping Policies? Bonn, Germany: Institute for the Study of Labor; 2016.