

## CONTEMPORARY REVIEW

# Mind the Gap! Working Toward Gender Equity in Pediatric and Congenital Heart Disease: Present and Future

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**ABSTRACT:** Evidence from medicine and other fields has shown that gender diversity results in better decision making and outcomes. The incoming workforce of congenital heart specialists (especially in pediatric cardiology) appears to be more gender balanced, but past studies have shown many inequities. Gender-associated differences in leadership positions, opportunities presented for academic advancement, and recognition for academic contributions to the field persist. In addition, compensation packages remain disparate if evaluated based on gender with equivalent experience and expertise. This review explores these inequities and has suggested individual and institutional changes that could be made to recruit and retain women, monitor the climate of the institution, and identify and eliminate bias in areas like salary and promotions.

**Key Words:** equity ■ gender disparity ■ pediatric cardiology

It is well recognized that a diverse and representative workforce enriches thought and encourages innovation. Evidence from medicine and other fields has shown that gender diversity results in better decision making and outcomes.<sup>1–3</sup> Furthermore, gender equity has been shown to result in more effective health policy development and patient care.<sup>4,5</sup> Pediatric cardiology is a unique field, with origins in the brilliant insight and collaboration of Dr Maude Abbott, a pathologist and Dr Helen Taussig, a clinician and educator who started the first pediatric cardiology fellowship-training program.<sup>6</sup> Numerous other women, including Drs Jackie Noonan, Jane Somerville, Jane Newberger, Vicki Vetter, Jean Kan all rose to a level of reverence in the field of pediatrics and congenital cardiology.<sup>7</sup>

The landmark Title VII of the Civil Rights Act of 1964 prohibits employment discrimination based on race, color, religion, sex, and national origin.<sup>8</sup> Additional protections in this legislation cover acts of discrimination based on pregnancy, childbirth, or related medical conditions. Despite these laws, employment disparities related to gender continue in the world of medicine in many areas including workforce composition, leadership opportunities for career progress, promotions, research opportunities, speaking engagements, and compensation packages.

Gender equity means fairness of treatment of men and women according to their respective needs, and may include treatment that is equal or different but equivalent in terms of rights, benefits, and obligations.<sup>9</sup>

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## Nonstandard Abbreviations and Acronyms

**WIC** Women in Cardiology

The incoming workforce of congenital heart specialists (especially in pediatric cardiology) appears to be more gender balanced, but past studies have shown many inequities.<sup>10–12</sup> Gender-associated differences in leadership positions, opportunities presented for academic advancement, and recognition for academic contributions to the field persist. In addition, compensation packages remain disparate if evaluated based on gender with equivalent experience and expertise.<sup>11</sup> The authors hope to explore these horizontal inequities and provide potential opportunities for interventions.

## GENDER DISPARITIES IN THE ACADEMIC WORKFORCE AND LEADERSHIP

From 2005 to 2020, women accounted for between 72% and 74% of first-year categorical pediatric residents each year.<sup>13</sup> Over the same time, there was a concomitant increase in female representation among first-year pediatric cardiology fellows, from 40% in 2005 to 53% in 2020.<sup>13</sup> Though this trend is encouraging, there remains significant, concerning statistics. For example, in 2020, the representation of women among first-year pediatric cardiology fellows continued to lag behind in combined female representation among all other pediatric subspecialties (69%). Furthermore, this disparity was more evident compared with percentage of women in the overall pool of residents (third-year pediatric residents and fourth-year medicine–pediatric residents in 2019), from which those fellows were presumably drawn (70%). This phenomenon has been described elsewhere as the “residency to fellowship cliff.”<sup>13,14</sup>

Women comprise approximately 60% of faculty in pediatrics overall, and account for 55% of fellows and 45% of faculty in pediatric cardiology.<sup>12</sup> Representation of women in leadership roles was notably less, including 39% of clinical subspecialty directors, 25% of endowed chairs, and 16% of division directors.<sup>12</sup> Currently, 34% of practicing pediatric cardiologists are women, and this number will increase, because women now represent >50% of pediatric cardiology fellows.<sup>15</sup> A survey of diplomates of the American Board of Pediatrics documented gender differences among various pediatric cardiology subspecialties.<sup>16</sup> More men than women primarily identified as an interventional cardiologist (12% versus 2%) or electrophysiologist (10% versus 4%). By contrast, more women identified as a noninvasive imaging cardiologist (21%

versus 14%), cardiac intensive care specialist (13% versus 8%), or fetal cardiologist (6% versus 1%).

At US medical institutions, 41% of full-time faculty are women.<sup>17</sup> In 2018, only 25% of female faculty had acquired the rank of full professor and only 37% the rank of associate professor.<sup>17</sup> A survey of the American Association of Medical Colleges faculty roster showed that women cardiologists with a faculty appointment were younger than men (mean age, 48.3 years versus 53.5 years;  $P<0.001$ ), had fewer total publications (mean number, 16.5 publications versus 25.2 publications;  $P<0.001$ ), were similarly likely to have National Institutes of Health funding (proportion with at least 1 National Institutes of Health award, 10.8% versus 10.4%;  $P=0.77$ ), and were less likely to have a registered clinical trial (percentage with at least 1 clinical trial, 8.9% versus 11.1%;  $P=0.10$ ).<sup>18</sup> In adjusted analyses, women were less likely to be full professors than men (adjusted odds ratio [OR], 0.63 [95% CI, 0.43–0.94];  $P=0.02$ ).<sup>18</sup>

Given that nearly two-thirds of female cardiologists report some form of discrimination, a rate nearly 3 times that of male colleagues, concerns for an unwelcoming and exclusive atmosphere are not unfounded.<sup>19,20</sup> A 2015 work–life survey conducted by the Women in Cardiology (WIC) section of the American College of Cardiology found that female cardiologists were less likely to be married or have children than their male colleagues and were less likely to have a spouse at home either assisting with or providing childcare. In addition, 40% of respondents who had gone through pregnancy during their career reported experiencing a pregnancy-related complication.<sup>21</sup>

There is evidence that the COVID-19 pandemic has had a disproportionate impact on the careers of women in academic sciences, engineering, and medicine.<sup>22</sup> Scholarly productivity has been reduced, with fewer women in senior authorship roles during the COVID-19 pandemic.<sup>23</sup> In a survey of pediatric cardiologists with dependent-care responsibilities, female cardiologists disproportionately assumed more caregiver hours, were more likely to take leave from work, and more likely to sustain a reduction in salary during the pandemic.<sup>24</sup>

## GENDER DISPARITIES IN CONFERENCE PANELS, ARTICLE AUTHORSHIP, AND GRANT FUNDING

Equitable gender representation among speakers at academic cardiology conferences has appropriately garnered attention over the past several years, and women continue to be in less visible roles as speakers.<sup>25</sup> A systematic analysis of the gender balance of speakers at 6 large (>2500 attendees) cardiology conferences analyzed data on 80 680 speakers from 2015 to 2019, and found that although the proportion of talks

given by women at these meetings increased gradually over time and largely exceeded the proportion of women in cardiology and cardiology subspecialties, there continues to be a deficit of women in invasive subspecialties (electrophysiology and cardiac catheterization) and among faculty giving invasive subspecialty conference talks.<sup>26</sup> However, another study analyzing 752 scientific sessions in the Americas with 3786 participants found that the median participation of women was only 20% (interquartile range [IQR], 0%–37.5%).<sup>27</sup> Specifically, the statistics reflected a female participation of 25% (IQR, 0%–43.6%) in North America, 12.5% (IQR, 0%–43%) in Central America, and 10% (IQR, 0%–33.3%) in South America ( $P<0.0001$ ). The frequency of all-male panels was 36.8% (95% CI, 33.3%–40.1%), and it increased over time (2019: 30.9% versus 2020: 40.3%;  $P=0.012$ ).<sup>27</sup> Often, the named lectureships, like the Feigenbaum lecture at American Society of Echocardiography, have an upper age limit of 50 years. This often excludes women who take a longer time to fulfill the academic ambitions given they spend time during their early career balancing family and work.

Over the past 4 decades, female authors accounted for 33% of all authors in 3 high-impact cardiology journals.<sup>28</sup> At the time of The Research Project Grant (R01) grant submission, women had a lower number of publications and tended to have a lower faculty rank.<sup>28</sup> However, over the past decade, the percentage of women who were first authors of randomized clinical trials has slightly increased from 20% to 30%.<sup>29</sup> Although women are receiving more attention for their work, they still receive, on average, less than men. One study surveyed >6000 top cardiovascular journals and found that women as first and last authors had a lower Altmetric Attention Score across various media platforms, resulting in fewer citations. They further analyzed this disparity and saw that women still receive 20% fewer citations compared with men on articles that had a similar Altmetric Attention Score.<sup>30</sup>

The National Institutes of Health is mandated by law (Public Health Service Act sec. 492B, 42 U.S.C. sec. 289a-2) to include women and minority groups in their study groups, but it does not mandate the equality of women as investigators. Using the National Institutes of Health principal investigators database, a study analyzed gender-based success for first time principal investigators, and noted that 43.6% of awardees were women; however, the awards granted were all significantly lower amounts for women versus men.<sup>31</sup> Women make up 37.9% of the early career applicant pool, but only 27.2% of experienced applicants applying for R01 funding.<sup>32</sup> This trend of funding older and established researchers, therefore, creates an inherent bias for selection of nonfemale applicants. However, the study also noted that women still receive R01-level funding at a later age, and that the trends

are improving.<sup>32</sup> A study on surgeon scientists with R01 funding found that although women continue to be underrepresented in surgical specialties, they hold a greater than expected proportion of R01 grants.<sup>33</sup> Forscher et al also demonstrated little to no race or gender bias in initial R01 evaluations.<sup>34</sup> Thus, although negative reports exist, there are improvements in the overall trends.

## GENDER DISPARITY IN COMPENSATION

Numerous studies have clearly demonstrated gender-based disparities in compensation in medicine.<sup>35</sup> This income difference persists even after adjustment of factors such as age, race, marital status, specialty, work hours, faculty rank, leadership position, research productivity, and years of experience.<sup>11,36</sup> An Association of American Medical Colleges study found that women were paid between \$0.72 and \$0.96 per \$1 paid to men across different departments and specialties.<sup>37</sup> Female physicians in the United States in a 40-year career earn >\$2 million less than male physicians in the United States after adjustment for factors that may otherwise explain observed differences in income such as hours worked, clinical revenue, practice type, and specialty.<sup>38</sup> The birth of a child results in major career changes for the working mother, varying from entirely leaving the workforce to opting to work part-time or switching careers in another field or less busy subspecialty.<sup>39,40</sup>

The gender pay gap for physicians decreased, albeit slightly, from 28% in 2021 to 26% in 2022.<sup>41</sup> The pay gap in 2022 was still significant, with female physicians earning nearly \$110 000 less than male physicians, on average, even when salaries were controlled for specialty, location, and years of experience.<sup>41</sup> Fields dominated by female physicians, such as pediatrics, are less well compensated compared with those with higher proportion of male physicians.<sup>35,42</sup> Within pediatrics, early to midcareer female pediatricians earned less than their male counterparts.<sup>11,43</sup> When examining the physician gender pay gap by specialty, findings from a Doximity report show that in 2022 there were no medical specialties in which women earned the same or more than men. All specialties had gender pay gaps >10%, with the exceptions of pediatric cardiology, which had a pay gap of 9.2%, and nuclear medicine, which had a gap of 3%.<sup>41</sup> An estimated 10-year net present value, starting salary, year-10 salary, and mean annual salary growth rate over the first 10 years following training for female and male pediatric cardiologists is shown in Table 1, with projections based on cross-sectional mean compensation data by rank for academic physicians from the Association of American

**Table 1. Estimated 10-Year NPV, Starting Salary, Year-10 Salary, and Mean Annual Salary Growth Rate Over the First 10 Years of Posttraining Employment for Female and Male Pediatric Cardiologists<sup>43</sup>**

Subspecialty	10-y NPV (\$)		Starting salary (\$)		Salary at 10 y (\$)		Average annual salary growth rate (%/y)	
	Women	Men	Women	Men	Women	Men	Women	Men
Pediatric cardiology	1923437	2059627	234602	243530	286874	315065	2.2	2.8

Medical Colleges 2019 to 2020 Faculty Salary Report.<sup>44</sup> Although the net present value was only 7.1% lower for women, over the lifetime this is a significant loss of income, especially if this was invested or enables early payoff of student debt.

Cardiologists in procedural subspecialties like interventional cardiology and electrophysiology have much a higher pay compared with cardiologists in noninvasive imaging, outpatient clinic, or preventive cardiology. There are far more men than women in interventional cardiology, with more fellows entering this field.<sup>45</sup> Even within an interventional specialty, Shah et al documented a gender-based pay gap among pediatric electrophysiologists.<sup>46</sup> Based on survey results with 146 respondents (27% women, 78% US based), the researchers found that there is a significant difference in the median annual salaries for female versus male electrophysiologists (\$250 000–\$299 000 versus \$300 000–\$399 000,  $P=0.29$ ). Female electrophysiologists were less likely to be in the top 45% of earners compared with male electrophysiologists (27% versus 51%,  $P=0.015$ ), and this difference persisted after adjustment for academic rank and years in practice (OR, 0.26 [95% CI, 0.09–0.82]).<sup>46</sup> There are no comparable data for other pediatric cardiology subspecialties.

## PAY DISPARITY BETWEEN ADULT AND PEDIATRIC CARDIOLOGISTS

Although pediatric and adult cardiology share identical years of training and similar functional categories (electrophysiology, catheterization, imaging), income, institution affiliation, and gender distribution differ strikingly between the 2 groups. According to the 2020 Physician Specialty Data Report, only 15% of adult cardiologists are women, and cardiology is ranked 39th of 47 specialties in the percentage of women.<sup>47</sup> There are no recent published comparisons of adult and pediatric cardiology incomes, and existing reports from social media suffer from selection bias. Nevertheless, available analyses from surveys, publicly traded organizations, health systems, and social media groups indicate stark differences that are unlikely to be explained by methodology alone. In the Doximity 2021 Physician Compensation Report, based on self-reported data from >46 000 full-time physicians in the United States, adult cardiologists reported an annual average salary

of \$537 777.<sup>42</sup> According to [SalaryExpert.com](https://www.salaryexpert.com), the average salary for a pediatric cardiologist is \$385 479 per year. There is a significant pay disparity despite similar number of years of training.

There are many factors that may combine to account for the vast differences in clinical revenue between pediatric/congenital and adult/noncongenital cardiologists. Adult heart disease has been described as more prevalent and, at the same time, less variable/complex than congenital heart disease. Frequently, more relative value units may be produced per day by adult cardiologists. If reimbursement is decreased for this set of diseases, one can compensate by increasing volume. On the other hand, pediatric heart disease is dominated by rare, complex lesions. Medicaid reimbursement, which funds a substantial amount of child health services, is usually substantially less than Medicare reimbursement. This results in lower reimbursement pools for those who care for congenital heart disease. This is in contradiction to the level of expertise required for more complex conditions, which should be better compensated.

When considering pay equity, it is important to recognize that in pediatric cardiology, income for both men and women fall short of that for adult cardiologists, despite similar skill sets and years in training. This highlights the need for advocacy to reimburse funding for children's services to be equivalent to that for adults and to provide educational debt relief for pediatric subspecialists who care for a higher proportion of the underserved population.

## WOMEN IN CONGENITAL CARDIOTHORACIC SURGERY

Although women comprise >50% of medical school attendees, interest in a career in cardiothoracic surgery has increased among women; roughly, only 350 women are board-certified, and <9% of those American Board of Thoracic Surgery-certified female surgeons are congenital heart surgeons.<sup>48</sup> Overall, based on a 2017 analysis of the Accreditation Council for Graduate Medical Education and the Association of American Medical Colleges databases, only 17% of cardiothoracic faculty were women, compared with 27% of all surgical faculty and 43% of all clinical faculty.<sup>49</sup> The reasons for these gender disparities fall in



several broad themes including a lack of mentorship or peer group, opportunities for scholarship, inequity in salary, workplace politics, and lack of transparency in prerequisites for professional advancement. A survey demonstrated that a majority (65%) of female congenital heart surgeons, all board certified by the American Board of Thoracic Surgery, reported bias, discrimination, and sexual harassment.<sup>50</sup> A minority of female cardiothoracic surgeons (27.3%) agreed that cardiothoracic surgery is a healthy and positive environment for women, and 46.5% of respondents would encourage a family member to pursue a career in cardiothoracic surgery.<sup>51</sup>

## IMPACT OF RACE AND GENDER

Providers from racially diverse backgrounds offer an important perspective, empathy, and compassionate care, which cultivates nurturing environments for health care delivery and medical education. Diverse medical students become diverse faculty, researchers, and clinicians.<sup>52</sup> As composition of the US physician workforce approaches representation of the composition of the US population by gender, academic promotion and leadership roles for women and those of non-White backgrounds lag dramatically behind. Black, Latino, and Indigenous physicians often contend with several obstacles while meeting the expectations of traditional academic milestones. These obstacles include workplace discrimination that can arise from explicit or implicit biases, microaggressions, and structural racism, all of which remain prevalent in academia.<sup>53</sup> There are little to no data on pay differences between underrepresented-in-medicine women and men. This specific population of physicians makes up <5% of pediatric cardiologists.

## Opportunities for Progress

With the above statistics, it is imperative that potential barriers to pursuing a career in pediatric cardiology for women be recognized. Solutions consisting of mentorship and advocacy must be sought to increase the pipeline of women entering pediatric cardiology (Table 2). The visibility of female role models has a powerful effect on young female doctors trying to decide on a career in pediatric cardiology. There must be intentionality when organizing conferences, symposiums, and such to include our female pediatric cardiologists on panels or as keynote speakers. Many women faculty have found considerable support in WIC groups in various organizations. This speaks to the necessity of advocacy groups such as the Adult Congenital Pediatric Cardiology WIC.<sup>54</sup> Established in 2020 under the auspices of the American College of Cardiology, Adult Congenital Pediatric Cardiology WIC

aims to “address the unique challenges that women in Pediatric and Adult Congenital Cardiology encounter while strengthening the pipeline by creating and supporting professional development, mentoring, and networking opportunities through the WIC Section.” Their continued support and growth are vital to the promotion and retention of women who have decided on a career path in pediatric cardiology. These groups have fostered a raft of others approach, which can help mitigate many issues with gender bias and help guide female physicians along their academic journeys.<sup>55</sup>

Leaders at the institutional level and nationally should support WIC support groups within their organizations (Table 2).<sup>56–67</sup> The increased visibility and awareness of challenges for women in medicine may be a silver lining from the pandemic. With this awareness comes an opportunity to forge a more equitable path including promotion of more women leaders. The National Institutes of Health Gender Inequality Task Force will aid this by investigating gender inequity in biomedical research as measured by start-up packages, authorship roles, and salaries<sup>65</sup> (Tables 3 and 4). The task force has made suggestions in a top-down approach to tackle these differences. The increasing number of women in academic centers will serve as a positive role model for trainees and junior faculty.<sup>18</sup>

Working to close the gender pay gap will take several steps and persistent effort (Table 5).<sup>68–78</sup>

A 2017 position article of the American College of Physicians states that more research examining gender disparities on physician compensation is needed in all practice settings.<sup>79</sup> With the current limited data available, further research and data collection on physician compensation in pediatric cardiology and its subspecialties is needed for a more comprehensive gender-based analysis. With pediatric cardiology’s recent push toward interinstitutional data sharing and transparency on patient outcomes, coupled with our recent successes in quality improvement efforts across the spectrum of cardiac care in the young, our specialty is well suited to address this long-standing challenge. A pay equity analysis, evaluating the hospital or school-wide average salary in the specialty, compared with the average for men and women in the specialty, is a starting place. Gathering 5 to 10 years of pipeline data to see how men and women enter specific roles and ranks is another layer. Once a robust data set is acquired, we can use collaborative quality improvement principles to learn from the most equitable centers and elevate the specialty.

Advocacy at the national legislative level will also be key. The House of Delegates for the American Medical Association passed a resolution proposed by the American College of Cardiology in 2018 to reduce the gender gap in physician compensation.<sup>80</sup> Adopting the Paycheck Fairness Act, first introduced in 1997,

**Table 2. Approaches to Intervention in Mitigating Gender Disparity at Individual, Group, and Institutional Levels for Leadership/Mentoring/Academic Positions/Promotions**

Field of Intervention	Approaches to interventions			
	Individual level	Group level	Institutional level or policy change	Suggestions
Leadership/mentoring/academic positions/promotions	Intervention: Provision of mentorship to the individual. <sup>56</sup> Approach: Empower the individual. (Resources exist to help people recognize and fight their own implicit biases.) <sup>57,58</sup>	Intervention: Participation in support groups. Approach: Enhance representation. Benefits: Support groups have been shown to be met with high satisfaction and can help promote and retain women in academic medicine (Women in Cardiology). <sup>59</sup> In 2017, the American College of Cardiology championed this cause by forming the Taskforce on Diversity and Inclusion. Delivered by the NHS Confederation, the Health and Care Women Leaders Network is a free network for all women working across health care. Introduce bias literacy—education and training staff on unconscious bias. <sup>60–62</sup>	Approach: Enhance representation Infrastructure: Support leadership and mentorship programs. <sup>59</sup> Objective criteria to guide feedback, hiring, and promotion in leadership role. <sup>63,64</sup> AAMC resources exist to facilitate institutional change: <a href="https://www.aamc.org/about-us/equity-diversity-inclusion/unconscious-bias-training">https://www.aamc.org/about-us/equity-diversity-inclusion/unconscious-bias-training</a> . Set up gender inequality task forces (eg: NIH and UNICEF gender disparity taskforce). <sup>65–67</sup>	Encourage women to remain committed to their careers and be mindful of potential challenges such as maternity leave, work-life balance, and traditional gender roles within the family. The emphasis is on actively avoiding or mitigating factors that could negatively affect their career trajectory. Conduct introspective departmental assessment. Implement a third-party service or a disconnected complaint channel. Set up hospital dashboards to reflect gender disparity. Support funding of leadership courses and community of practice for a change in leadership practices.

AAMC indicates Association of American Medical Colleges; NHS, National Health Service; NIH, National Institutes of Health and UNICEF, United Nations International Children's Emergency Fund.

would require the Equal Employment Opportunity Commission to collect confidential pay-related data and the US Department of Labor to create a data collection system to identify trends in pay. Furthermore, Title VII, the equal pay act, should also be revised to allow claims based on sex and race. Increased research on salary and academic advancement, particularly for

women in cardiology and pediatric cardiology aged 25 to 64 years, is important, because those are the ages during which the pay gap between women of color and White men is greatest.<sup>81</sup> Lastly, also important is support of an overall increase in compensation for fields predominated by women, such as pediatrics, and in particular those that have a large proportion of women

**Table 3. Approaches to Intervention in Mitigating Gender Disparity at Individual, Group, and Institutional Levels for Conferences and Speaker Panels, Grants, and Editorial Boards and Article Authorship**

Field of Intervention	Approaches to interventions			
	Individual level	Group level	Institutional level or policy change	Suggestions
Conferences and speaker panels	Awareness	Women supporting women (pushing for junior and women speakers).	24-h childcare services available for participants/employees. <sup>68–70</sup>	Representation: Intentionality when organizing conferences, symposia, and such to include our female pediatric cardiologists on panels or as keynote speakers. Committees should be created to focus on promoting diversity. 24-h childcare services.
Grants	Mentorship	Mentorship		National Institutes of Health Gender Inequality Task Force <sup>68,69</sup>
Editorial boards and article authorship	Mentorship	Mentorship <sup>71</sup>	Positions/responsibilities should not overlap with clinical or academic commitments. <sup>72–74</sup>	Representation: Proportionate to percentage of board-certified specialists. Objective criteria to guide hiring and promotion in leadership role. Journal dashboards should reflect gender disparity.

**Table 4. Approaches to Intervention in Mitigating Gender Disparity At Individual, Group, and Institutional Levels for the Workforce**

Field of Intervention	Approaches to interventions			
	Individual level	Group level	Institutional level or policy change	Suggestions
Workforce	Commitment from women to recognize and understand the potential career challenges posed by maternity leave, work-life interferences, and traditional gendered family views.	Supporting flexibility in scheduling Stepping up and working outside the designated role in case of maternity leave.	<p>Title IX, which requires research universities receiving federal funds to</p> <ul style="list-style-type: none"> <li>Treat pregnancy as a temporary disability for purposes of calculating job-related benefits, including any employer-provided leave; and</li> <li>Provide unpaid, job-protected leave for a reasonable period of time if the institution does not maintain a leave policy for employees.<sup>75</sup></li> </ul> <p>Flexible scheduling: To account for maternity, institutions should allow for flexibility for scheduling, like exchange research time during maternity and allow for easy switching.</p> <p>Predicting FTE: Leadership should account for maternity in FTE at the hiring level.</p> <p>Pumping rooms to be available at every floor.</p> <p>Technological advancement: Insurance companies should cover modern pumps that allow women to work while pumping (without having to excuse themselves from work rooms).</p>	<p>Paid maternity and parental leave at the time of a birth event or adoption event in the case of new parents (at least 6 wk of guaranteed paid leave following childbirth, without limitations).</p> <p>Policies that do not depend on the accrual of sick or vacation leave.</p> <p>Policies model Family and Medical Leave Act eligibility requirements.</p> <p>Title IX reviews should look at these policies to ensure that universities are in compliance.</p>

FTE indicates full-time employment.

of color,<sup>35</sup> as well as focusing efforts on the pipeline, recruitment, and retention of female minorities who are underrepresented in medicine within adult and pediatric cardiology, by ensuring appropriate compensation for work done, sponsorship for leadership opportunities, support for promotion, and equal pay.<sup>12</sup>

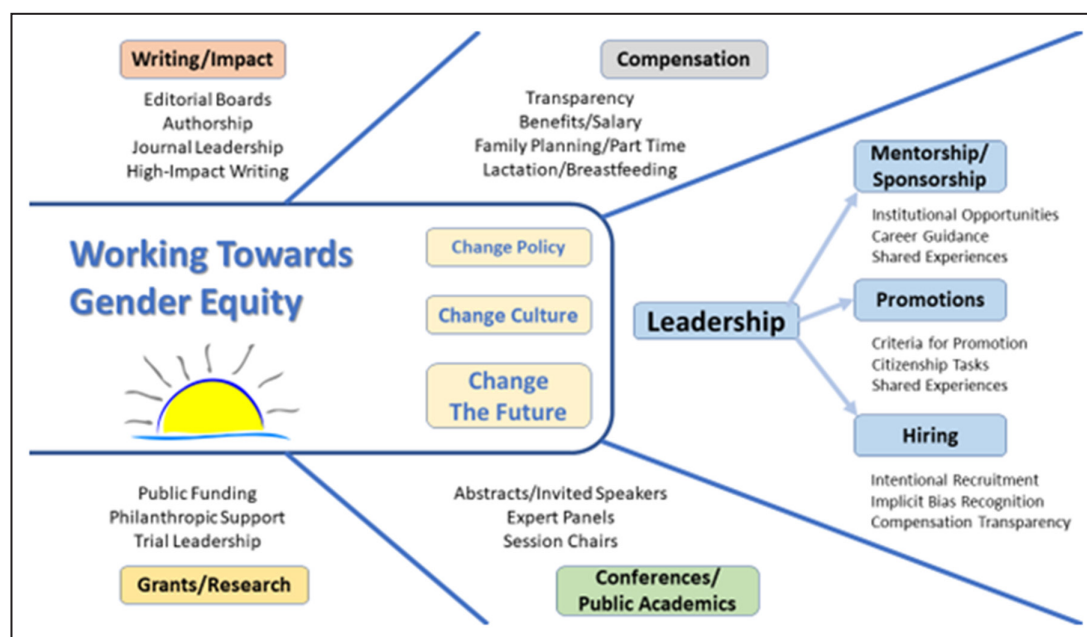
## DISCUSSION

Women are an integral and important part of the workforce and leadership. Productivity is significantly higher in gender-balanced board member groups.<sup>82</sup> In medicine, elderly hospitalized patients treated by female internists

**Table 5. Approaches to Intervention in Mitigating Gender Disparity at Individual, Group, and Institutional Levels for Salary**

Field of Intervention	Approaches to interventions			
	Individual level	Group level	Institutional level or policy change	Suggestions
Salary	Awareness Negotiation skills <sup>76</sup>	Support an overall increase in compensation for fields predominated by women such as pediatrics, and in particular those that have a large proportion of women of color.	<p>Federal law guarantees women equal pay for equal work under<sup>77</sup>:</p> <ul style="list-style-type: none"> <li>Title VII of the Civil Rights Act of 1964 (Title VII).</li> <li>Equal Pay Act.</li> <li>Lilly Ledbetter Fair Pay Act (2009).</li> </ul> <p>Paycheck Fairness Act, first introduced in 1997, which requires the Equal Employment Opportunity Commission to collect confidential pay-related data and the US Department of Labor to create a data collection system to identify trends in pay.</p> <p>The Association of American Medical Colleges has developed a set of tools and resources to help institutions: <a href="https://www.aamc.org/about-us/equity-diversity-inclusion/unconscious-bias-training">https://www.aamc.org/about-us/equity-diversity-inclusion/unconscious-bias-training</a></p> <p>The Equal Pay Act of 1963 requires that men and women be given equal pay for equal work in the same establishment.</p> <p>Title VII of the Civil Rights Act of 1964 prohibits many types of workplace discrimination (eg, race discrimination, sexual harassment) in addition to gender discrimination based on pay.</p> <p>In <i>EEOC v. Maryland Insurance Administration</i>, the 4th Circuit Court of Appeals held that it is not enough for an employer's defensive evidence to show that factors other than sex could explain the wage disparity, but that the proffered reason other than sex actually does explain the wage disparity.</p> <p>The Massachusetts Equal Pay Act was passed in 2016 and became effective on July 1, 2018. The law prohibits employers from paying employees of a different gender at different rates for comparable work, allows employees to freely discuss their salaries with coworkers, and prohibits employers from requiring applicants to provide their salary history before receiving a formal job offer.</p> <p>The NHS has a requirement for all large employers to publish their data on an annual basis.</p> <p>The NHS has a practical guide designed to help employers in the NHS report gender pay gap figures and develop a set of measurable actions.<sup>73</sup></p>	<p>Conduct a pay equity analysis/audit.<sup>78</sup></p> <p>Pay transparency: Promote interinstitutional data sharing of salaries. Take affirmative steps to remedy pay disparities where they exist. Implement an objective, standardized system for making pay determinations.</p> <p>Continue to reevaluate data on an ongoing basis, because turnover, mergers, and other personnel changes continuously impact the pay equity balance.</p> <p>Fund research to track pay and advancement in academia, particularly for women in cardiology and pediatric cardiology from ages 25 to 64 y, which are the ages during which the pay gap between women of color and White men is greatest.</p>

NHS indicates National Health Service.



**Figure.** Various strategies of intervention toward gender equity in pediatric cardiology.

have lower mortality and readmissions compared with those cared for by male internists.<sup>1</sup> Despite the extensive and growing evidence of gender bias in clinical practice published in scientific journals since the 1990s, our review has shown that only a few studies have proposed opportunities and interventions to address this bias. The root causes of gender inequity encompass all societal spheres, and a multisector approach is required. Institutional changes and structural changes with new policies will be critical for successful and sustainable parity. Leadership in institutions and societies must act to help eliminate unconscious bias and remove those in power who demonstrate overt discrimination or harassment. Institutions must also refocus on transparency in pay and pay parity and ensure that women receive needed mentorship and resources for on-time promotion.

We have many unique opportunities for progress in the coming years (Figure). Although women are not overtly underrepresented at the pediatric cardiology trainee level in the United States, they are underrepresented in the higher tiers.<sup>12</sup> It is extremely important we retain these trainees and junior faculty to become a balanced generation of senior faculty and leaders. Our theme analysis showed that women require more support groups/mentoring. Institutions need to encourage development and sustainability of these groups. Our programs should also foster interventions for men to be better allies. Hospital dashboards reflecting gender parity should be available. The leadership should think in advance and account for flexibility in scheduling and maternity leave in full-time employment. Breastfeeding and pumping are unique to women, and little has been done to structure time to support this component of

the workday. Innovative techniques like comfortable workplace pumps for pumping breast milk could help minimize interruption to daily workflow. On-site child-care would minimize the time for drop-off and pick-up and would enable mothers to directly breast feed their infants instead of pumping during the workday.

This article has suggested individual and institutional changes that could be made to recruit and retain women, monitor the climate of the institution, and identify and eliminate bias in areas such as salary and promotions. An important consideration is that some of these circumstances and points may relate to issues specific to the US medical system, although other observations are more universal. Ultimately, to reduce gender disparity, implicit bias must be eliminated. Because equity in care for our patients is important, it should likewise be important for equity in our profession.

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## Disclosures

None.

## REFERENCES

1. Tsugawa Y, Jena AB, Figueroa JF, Orav EJ, Blumenthal DM, Jha AK. Comparison of hospital mortality and readmission rates for medicare patients treated by male vs female physicians. *JAMA Intern Med*. 2017;177:206–213. doi: [10.1001/jamainternmed.2016.7875](https://doi.org/10.1001/jamainternmed.2016.7875)
2. Dezső CL, Ross DG. Does female representation in top management improve firm performance? A panel data investigation. *Strateg Manag J*. 2012;33:1072–1089. doi: [10.1002/smj.1955](https://doi.org/10.1002/smj.1955)
3. Boffa D, Prencipe A, D'Amico L, Corsi C. Gender inclusiveness and female representation on the Board of Directors of the benefit company model: evidence from Italy. *Sustainability*. 2023;15:5852. doi: [10.3390/su15075852](https://doi.org/10.3390/su15075852)
4. Lau ES, Hayes SN, Volgman AS, Lindley K, Pepine CJ, Wood MJ. Does patient-physician gender concordance influence patient perceptions or outcomes? *J Am Coll Cardiol*. 2021;77:1135–1138. doi: [10.1016/j.jacc.2020.12.031](https://doi.org/10.1016/j.jacc.2020.12.031)
5. Sharma G, Lewis S, Singh T, Mehta LS, Mieres J, Poppas A, Harrington R, Piña IL, Volgman AS, Aggarwal NR. The pivotal role of women in cardiology sections in medical organizations: from leadership training to personal enrichment. *CJC Open*. 2021;3:S95–s101. doi: [10.1016/j.cjco.2021.07.015](https://doi.org/10.1016/j.cjco.2021.07.015)
6. Walsh MN. Women as leaders in cardiovascular medicine. *Clin Cardiol*. 2018;41:269–273. doi: [10.1002/clc.22920](https://doi.org/10.1002/clc.22920)
7. Meryl Cohen M. *Women in Pediatric Cardiology: Where We Have Been and Where We Are Going 2020*. American College of Cardiology; 2020. Accessed March 5, 2024. <https://www.acc.org/Membership/Sections-and-Councils/Adult-Congenital-and-Pediatric-Cardiology-Section/Section-Updates/2020/10/01/21/40/Women-in-Pediatric-Cardiology-Where-We-Have-Been-and-Where-We-Are-Going/>
8. Safren MA. The effect of title VII of the 1964 civil rights act on employment selection techniques. *Hosp Prog*. 1973;54:69–75.
9. Mencarini L. Gender equity. In: Michalos AC, ed *Encyclopedia of quality of life and well-being research*. Dordrecht: Springer Netherlands; 2014:2437–2438.
10. Catenaccio E, Rochlin JM, Simon HK. Association between workforce gender distribution and lifetime earning potential in the pediatric subspecialties. *Acad Pediatr*. 2022;22(7):1153–1157. doi: [10.1016/j.acap.2022.02.012](https://doi.org/10.1016/j.acap.2022.02.012)
11. Frintner MP, Sisk B, Byrne BJ, Freed GL, Starmer AJ, Olson LM. Gender differences in earnings of early- and midcareer pediatricians. *Pediatrics*. 2019;144(4):e20183955. doi: [10.1542/peds.2018-3955](https://doi.org/10.1542/peds.2018-3955)
12. Balasubramanian S, Pasquali SK, Cousino MK, Lowery RE, Les AS, Yu S, McCormick AD, West CL, Fifer CG, Goldberg CS, et al. Representation of women and minority faculty and fellows in academic pediatric cardiology training programs. *J Am Coll Cardiol*. 2023;81:1181–1188. doi: [10.1016/j.jacc.2023.01.022](https://doi.org/10.1016/j.jacc.2023.01.022)
13. American Board of Pediatrics. *Pediatric Physicians Workforce Data Book, 2020–2021*. Chapel Hill; 2021.
14. DeFilippis EM, Lau ES, Wei J, Hayes SN, Wood MJ. Where are the women in academic cardiology? *Lancet (London, England)*. 2018;392:2152–2153. doi: [10.1016/S0140-6736\(18\)32618-7](https://doi.org/10.1016/S0140-6736(18)32618-7)
15. Mehta LS, Fisher K, Rzeszut AK, Lipner R, Mitchell S, Dill M, Acosta D, Oetgen WJ, Douglas PS. Current demographic status of cardiologists in the United States. *JAMA Cardiol*. 2019;4:1029–1033. doi: [10.1001/jamacardio.2019.3247](https://doi.org/10.1001/jamacardio.2019.3247)
16. The American Board of Pediatrics. *Results: Continuing Certification (MOC) Enrollment Surveys for 2018 to 2020*. American Board of Pediatrics; 2023. Accessed March 5, 2024. <https://www.abp.org/dashboards/results-continuing-certification-moc-enrollment-surveys-2018-2022>
17. Association of American Medical Colleges. Accessed March 5, 2024. <https://www.aamc.org/data-reports/data/2018-2019-state-women-academic-medicine-exploring-pathways-equity>
18. Blumenthal DM, Olenski AR, Yeh RW, DeFaria YD, Sarma A, Stefanescu Schmidt AC, Wood MJ, Jena AB. Sex differences in faculty rank among academic cardiologists in the United States. *Circulation*. 2017;135:506–517. doi: [10.1161/CIRCULATIONAHA.116.023520](https://doi.org/10.1161/CIRCULATIONAHA.116.023520)
19. Lewis SJ, Mehta LS, Douglas PS, Gulati M, Limacher MC, Poppas A, Walsh MN, Rzeszut AK, Duvernoy CS. American College of Cardiology Women in cardiology leadership council. Changes in the professional lives of cardiologists over 2 decades. *J Am Coll Cardiol*. 2017;69:452–462. doi: [10.1016/j.jacc.2016.11.027](https://doi.org/10.1016/j.jacc.2016.11.027)
20. Michos ED, Volgman AS, Tamirisa KP. Getting into the rhythm of gender parity in electrophysiology. *J Am Coll Cardiol*. 2021;78:910–913. doi: [10.1016/j.jacc.2021.06.036](https://doi.org/10.1016/j.jacc.2021.06.036)
21. Sarma AA, Nkonde-Price C, Gulati M, Duvernoy CS, Lewis SJ, Wood MJ. Cardiovascular medicine and society: the pregnant cardiologist. *J Am Coll Cardiol*. 2017;69:92–101. doi: [10.1016/j.jacc.2016.09.978](https://doi.org/10.1016/j.jacc.2016.09.978)
22. National Academies of Sciences E, Medicine. The Impact of COVID-19 on the Careers of Women in Academic Sciences, Engineering, and Medicine. In: Higginbotham E, Dahlberg ML, eds Washington, DC: The National Academies Press; 2021:194.
23. Andersen JP, Nielsen MW, Simone NL, Lewiss RE, Jaggi R. COVID-19 medical papers have fewer women first authors than expected. *elife*. 2020;9:e58807. doi: [10.7554/eLife.58807](https://doi.org/10.7554/eLife.58807)
24. Ferns SJ, Gautam S, Hudak ML. COVID-19 and gender disparities in pediatric cardiologists with dependent care responsibilities. *Am J Cardiol*. 2021;147:137–142. doi: [10.1016/j.amjcard.2021.02.017](https://doi.org/10.1016/j.amjcard.2021.02.017)
25. Corona-Sobrinho C, García-Melón M, Poveda-Bautista R, González-Urango H. Closing the gender gap at academic conferences: a tool for monitoring and assessing academic events. *PLoS One*. 2020;15:e0243549. doi: [10.1371/journal.pone.0243549](https://doi.org/10.1371/journal.pone.0243549)
26. Yong CM, Balasubramanian S, Douglas PS, Agarwal P, Birgersdotter-Green U, Gummidipundi S, Batchelor W, Duvernoy CS, Harrington RA, Mehran R. Temporal trends in the proportion of women physician speakers at major cardiovascular conferences. *Circulation*. 2021;143:755–757. doi: [10.1161/CIRCULATIONAHA.120.052663](https://doi.org/10.1161/CIRCULATIONAHA.120.052663)
27. Burgos LM, Farina J, Sauce Perez AL, Ortiz Lopez HIA, Gupta SD, Baranchuk A, Saldarriaga Giraldo CI. Gender equity imbalance in cardiology scientific sessions in the Americas. *Curr Probl Cardiol*. 2021;46:100785. doi: [10.1016/j.cpcardiol.2020.100785](https://doi.org/10.1016/j.cpcardiol.2020.100785)
28. Ouyang D, Sing D, Shah S, Hu J, Duvernoy C, Harrington RA, Rodriguez F. Sex disparities in authorship order of cardiology scientific publications. *Circ Cardiovasc Qual Outcomes*. 2018;11:e005040. doi: [10.1161/CIRCOUTCOMES.118.005040](https://doi.org/10.1161/CIRCOUTCOMES.118.005040)
29. Mehran R, Kumar A, Bansal A, Shariff M, Gulati M, Kalra A. Gender and disparity in first authorship in cardiology randomized clinical trials. *JAMA Netw Open*. 2021;4:e211043. doi: [10.1001/jamanetworkopen.2021.1043](https://doi.org/10.1001/jamanetworkopen.2021.1043)
30. Lerchenmueller MJ, Schmollenbach L, Bley M, Lerchenmüller C. Gender disparities in altmetric attention scores for cardiovascular research. *Commun Biol*. 2023;6:741. doi: [10.1038/s42003-023-05058-9](https://doi.org/10.1038/s42003-023-05058-9)
31. Oliveira DFM, Ma Y, Woodruff TK, Uzzi B. Comparison of National Institutes of Health Grant amounts to first-time male and female principal investigators. *JAMA*. 2019;321:898–900. doi: [10.1001/jama.2018.21944](https://doi.org/10.1001/jama.2018.21944)
32. Nikaj S, Roychowdhury D, Lund PK, Matthews M, Pearson K. Examining trends in the diversity of the U.S. National Institutes of Health participating and funded workforce. *FASEB J*. 2018;32:6410–6422. doi: [10.1096/fj.201800639](https://doi.org/10.1096/fj.201800639)
33. Krebs ED, Narahari AK, Cook-Armstrong IO, Chandrabhatla AS, Mehaffey JH, Upchurch GR Jr, Showalter SL. The changing face of academic surgery: overrepresentation of women among surgeon-scientists with R01 funding. *J Am Coll Surg*. 2020;231:427–433. doi: [10.1016/j.jamcollsurg.2020.06.013](https://doi.org/10.1016/j.jamcollsurg.2020.06.013)
34. Forscher PS, Cox WTL, Brauer M, Devine PG. Little race or gender bias in an experiment of initial review of NIH R01 grant proposals. *Nat Hum Behav*. 2019;3:257–264. doi: [10.1038/s41562-018-0517-y](https://doi.org/10.1038/s41562-018-0517-y)
35. Bravender T, Selkie E, Sturza J, Martin DM, Griffith KA, Kaciroti N, Jaggi R. Association of Salary Differences between Medical Specialties with sex Distribution. *JAMA Pediatr*. 2021;175:524–525. doi: [10.1001/jamapediatrics.2020.5683](https://doi.org/10.1001/jamapediatrics.2020.5683)

36. Jaggi R, Griffith KA, Stewart A, Sambuco D, DeCastro R, Ubel PA. Gender differences in the salaries of physician researchers. *JAMA*. 2012;307:2410–2417. doi: [10.1001/jama.2012.6183](https://doi.org/10.1001/jama.2012.6183)
37. Colleges AoAM. Promising practices for understanding and addressing salary equity at U.S. Medical Schools. 2019.
38. Female physicians earn an estimated \$2 million less than male physicians over a simulated 40-year career. *Health Aff*. 2021;40:1856–1864. doi: [10.1377/hlthaff.2021.00461](https://doi.org/10.1377/hlthaff.2021.00461)
39. Cech EA, Blair-Loy M. The changing career trajectories of new parents in STEM. *Proc Natl Acad Sci USA*. 2019;116:4182–4187. doi: [10.1073/pnas.1810862116](https://doi.org/10.1073/pnas.1810862116)
40. Blau FD, Kahn LM. The gender pay gap: have women gone as far as they can? *Acad Manag Perspect*. 2007;21:7–23. doi: [10.5465/amp.2007.24286161](https://doi.org/10.5465/amp.2007.24286161)
41. Doximity. 2023 Physician Compensation Report. 2023. Accessed March 5, 2024. <https://press.doximity.com/reports/doximity-physician-compensation-report-2023.pdf>.
42. Doximity. Physician compensation report 2021. 2021. Accessed March 5, 2024. <https://c8y.doxdn.com/image/upload/v1/Press%20Blog/Research%20Reports/Doximity-Compensation-Report-2021.pdf>.
43. Catenaccio E, Rochlin JM, Simon HK. Addressing gender-based disparities in earning potential in academic medicine. *JAMA Netw Open*. 2022;5:e220067. doi: [10.1001/jamanetworkopen.2022.0067](https://doi.org/10.1001/jamanetworkopen.2022.0067)
44. Colleges AoAM. AAMC Faculty Salary Report. Washington D.C. 2021. Accessed March 5, 2024.
45. Yong CM, Abnoui F, Rzeszut AK, Douglas PS, Harrington RA, Mehran R, Grines C, Altin SE, Duvernoy CS; American College of Cardiology Women in Cardiology Leadership Council (ACC WIC), et al. Sex differences in the pursuit of interventional cardiology as a subspecialty among cardiovascular fellows-in-training. *J Am Coll Cardiol Intv*. 2019;12:219–228.
46. Shah MJ, Dubin AM, Etheridge SP, Saarel EV, Stephenson EA, Escudero CA. Mind the gap: sex disparity in salaries among pediatric and congenital cardiac electrophysiologists. *JACC Clin Electrophysiol*. 2022;8:913–915. doi: [10.1016/j.jacep.2022.02.011](https://doi.org/10.1016/j.jacep.2022.02.011)
47. Eshtehardi P, Bullock-Palmer RP, Bravo-Jaimes K, Bozkurt B, Dorbala S, Gillam LD, Grines CL, Mehran R, Mieres JH, Singh T, et al. Women leaders: transforming the culture in cardiology. *Open Heart*. 2022;9:e001967. doi: [10.1136/openhrt-2022-001967](https://doi.org/10.1136/openhrt-2022-001967)
48. Masterfile AP. *Active Physicians by Sex and Specialty*. American Association of Medical Colleges; 2017. Accessed March 5, 2024. [aamc.org/data-reports/workforce/data/active-physicians-sex-and-specialty-2017](https://aamc.org/data-reports/workforce/data/active-physicians-sex-and-specialty-2017)
49. Ortmeyer KA, Raman V, Tiko-Okoye C, Espinosa J, Cooke DT, Erkmen CP. Women and minorities underrepresented in academic cardiothoracic surgery: it's time for next steps. *Ann Thorac Surg*. 2021;112:1349–1355. doi: [10.1016/j.athoracsur.2020.08.057](https://doi.org/10.1016/j.athoracsur.2020.08.057)
50. Donington JS, Little VR, Sesti J, Colson YL. The WTS report on the current status of women in cardiothoracic surgery. *Ann Thorac Surg*. 2012;94:452–459. doi: [10.1016/j.athoracsur.2012.03.102](https://doi.org/10.1016/j.athoracsur.2012.03.102)
51. Ceppa DP, Antonoff MB, Tong BC, Timsina L, Ikonmidis JS, Worrell SG, Stephens EH, Gillaspie EA, Schumacher L, Molena D, et al. 2020 women in thoracic surgery update on the status of women in cardiothoracic surgery. *Ann Thorac Surg*. 2022;113:918–925. doi: [10.1016/j.athoracsur.2021.03.091](https://doi.org/10.1016/j.athoracsur.2021.03.091)
52. Johnson AE, Talabi MB, Bonifacino E, Culyba AJ, Davis EM, Davis PK, De Castro LM, Essien UR, Gonzaga AM, Hogan MCV, et al. Racial diversity among American cardiologists: implications for the past, present, and future. *Circulation*. 2021;143:2395–2405. doi: [10.1161/CIRCULATIONAHA.121.053566](https://doi.org/10.1161/CIRCULATIONAHA.121.053566)
53. Filut A, Alvarez M, Carnes M. Discrimination toward physicians of color: a systematic review. *J Natl Med Assoc*. 2020;112:117–140. doi: [10.1016/j.jnma.2020.02.008](https://doi.org/10.1016/j.jnma.2020.02.008)
54. American College of Cardiology. WIC-Adult Congenital and Pediatric Cardiology (ACPC) Work Group. Accessed March 5, 2024. <https://www.acc.org/Membership/Sections-and-Councils/Women-in-Cardiology-Section/Get-Involved/Work-Groups>.
55. Parwani P, Han JK, Singh T, Volgman AS, Grapsa J. Raft of others: women in cardiology: let us stick together. *JACC Case Rep*. 2020;2:2040–2043. doi: [10.1016/j.jaccas.2020.09.006](https://doi.org/10.1016/j.jaccas.2020.09.006)
56. Abudayyeh I, Tandon A, Wittekind SG, Rzeszut AK, Sivaram CA, Freeman AM, Madhur MS. Landscape of mentorship and its effects on success in cardiology. *JACC Basic Transl Sci*. 2020;5:1181–1186. doi: [10.1016/j.jacbts.2020.09.014](https://doi.org/10.1016/j.jacbts.2020.09.014)
57. Dasgupta N. Chapter five—implicit attitudes and beliefs adapt to situations: a decade of research on the malleability of implicit prejudice, stereotypes, and the self-concept. In: Devine P, Plant A, eds *Advances in Experimental Social Psychology*. 47: Academic Press; 2013:233–279. doi: [10.1016/B978-0-12-407236-7.00005-X](https://doi.org/10.1016/B978-0-12-407236-7.00005-X)
58. Mavin S. Queen bees, wannabees and afraid to bees: no more 'best enemies' for women in management? *Br J Manag*. 2008;19:S75–S84. doi: [10.1111/j.1467-8551.2008.00573.x](https://doi.org/10.1111/j.1467-8551.2008.00573.x)
59. Farkas AH, Bonifacino E, Turner R, Tilstra SA, Corbelli JA. Mentorship of women in academic medicine: a systematic review. *J Gen Intern Med*. 2019;34:1322–1329. doi: [10.1007/s11606-019-04955-2](https://doi.org/10.1007/s11606-019-04955-2)
60. Javier D, Solis LG, Paul MF, Thompson EL, Maynard G, Latif Z, Stinson K, Ahmed T, Vishwanatha JK. Implementation of an unconscious bias course for the National Research Mentoring Network. *BMC Med Educ*. 2022;22:391. doi: [10.1186/s12909-022-03466-9](https://doi.org/10.1186/s12909-022-03466-9)
61. Luaces MA, Galliat JM, Mabachi NM, Zackula R, Binion D, McGee J. Lessons learned from implementing unconscious bias training at an Academic Medical Center. *Kans J Med*. 2022;15:336–346. doi: [10.17161/kjm.vol15.18094](https://doi.org/10.17161/kjm.vol15.18094)
62. Devine PG, Forscher PS, Austin AJ, Cox WT. Long-term reduction in implicit race bias: a prejudice habit-breaking intervention. *J Exp Soc Psychol*. 2012;48:1267–1278. doi: [10.1016/j.jesp.2012.06.003](https://doi.org/10.1016/j.jesp.2012.06.003)
63. Rice DB, Raffoul H, Ioannidis JPA, Moher D. Academic criteria for promotion and tenure in biomedical sciences faculties: cross sectional analysis of international sample of universities. *BMJ (Clinical Research Ed)*. 2020;369:m2081. doi: [10.1136/bmj.m2081](https://doi.org/10.1136/bmj.m2081)
64. Atasoylu AA, Wright SM, Beasley BW, Cofrancesco J Jr, Macpherson DS, Partridge T, Thomas PA, Bass EB. Promotion criteria for clinician-educators. *J Gen Intern Med*. 2003;18:711–716. doi: [10.1046/j.1525-1497.2003.10425.x](https://doi.org/10.1046/j.1525-1497.2003.10425.x)
65. National Institutes of Health. Addressing gender inequality in the NIH intramural research program action task force report and recommendations. 2016. Accessed March 5, 2024.
66. National Institutes of Health. National Institutes of Health. Accessed March 5, 2024. <https://diversity.nih.gov/programs-partnerships/gender-inequality-task-force-report>.
67. UNICEF. Accessed March 5, 2024. <https://www.unicef.org/media/independent-task-force-workplace-gender-discrimination-and-harassment-unicef>
68. Bos AL, Sweet-Cushman J, Schneider MC. Family-friendly academic conferences: a missing link to fix the “leaky pipeline”? *Politics, Groups Identities*. 2019;7:748–758. doi: [10.1080/21565503.2017.1403936](https://doi.org/10.1080/21565503.2017.1403936)
69. Calisi RM. Opinion: how to tackle the childcare-conference conundrum. *Proc Natl Acad Sci USA*. 2018;115:2845–2849. doi: [10.1073/pnas.1803153115](https://doi.org/10.1073/pnas.1803153115)
70. Langin K. Are conferences providing enough child care support? We decided to find out. 2018. Accessed March 5, 2024. <https://www.sciencemag.org/content/article/are-conferences-providing-enough-child-care-support-we-decided-to-find-out>.
71. Grapsa J. Mentoring program on peer review and publishing: a pilot program under JACC: case reports. *JACC Case Rep*. 2021;3:1249–1250. doi: [10.1016/j.jaccas.2021.06.020](https://doi.org/10.1016/j.jaccas.2021.06.020)
72. Fox C, Duffy M, Fairbairn D, Meyer J. Gender diversity of editorial boards and gender differences in the peer review process at six journals of ecology and evolution. *Ecol Evol*. 2019;9:9–13649. doi: [10.1002/ece3.5794](https://doi.org/10.1002/ece3.5794)
73. Minello A, Martucci S, Manzo LKC. The pandemic and the academic mothers: present hardships and future perspectives. *Eur Soc*. 2020;23:1–13.
74. Pinho-Gomes AC, Vassallo A, Thompson K, Womersley K, Norton R, Woodward M. Representation of women among editors in chief of leading medical journals. *JAMA Netw Open*. 2021;4:e2123026. doi: [10.1001/jamanetworkopen.2021.23026](https://doi.org/10.1001/jamanetworkopen.2021.23026)
75. Marc Goulden PD, Frasch K, Mary Ann Mason JD. Staying competitive. Patching America's Leaky Pipeline in the Sciences. 2009.
76. Simone AM, Simone M, Block L, LaVine N. Contract negotiation skills: a workshop for women in medicine. *MedEdPORTAL*. 2020;16:10910. doi: [10.15766/mep\\_2374-8265.10910](https://doi.org/10.15766/mep_2374-8265.10910)
77. Phillips F. Mind the gap: pay equity issues in healthcare 2018. 2018. Accessed March 5, 2024. <https://www.lexology.com/library/detail.aspx?g=c5e93158-1284-44b4-b1e9-21ea19cd1304>.
78. Karen L. Corman S, Arps, Slate, Meagher & Flom LLP, With Practical Law Labor & Employment. Conducting a pay equity audit. 2019.

- 
79. 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. doi: [10.7326/M17-3438](https://doi.org/10.7326/M17-3438)
  80. Sr. KAW. AMA passes ACC resolution about gender equity in physician compensation 2018. 2018. Accessed March 5, 2024. <https://www.healio.com/news/cardiology/20180612/ama-passes-acc-resolution-about-gender-equity-in-physician-compensation>.
  81. Yearby R. When equal pay is not enough: the influence of employment discrimination on health disparities. *Public Health Rep.* 2019;134:447–450.
  82. Turban S, Wu D, Zhang L. Research: when gender diversity makes firms more productive. *Harvard business review.* 2019.