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Inequities in Academic Compensation by Gender: A Follow-Up to the National Faculty Survey Cohort Study

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Abstract

Purpose—Cross-sectional studies have demonstrated gender differences in salaries within academic medicine. No research has assessed longitudinal compensation patterns. This study

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sought to assess longitudinal patterns by gender in compensation, and to understand factors associated with these differences in a longitudinal cohort.

Method—A 17-year longitudinal follow-up of the National Faculty Survey was conducted with a random sample of faculty from 24 U.S. medical schools. Participants employed full-time at initial and follow-up time periods completed the survey. Annual pre-tax compensation during academic year 2012–13 was compared by gender. Covariates assessed included race/ethnicity; years since first academic appointment; retention in academic career; academic rank; departmental affiliation; percent effort distribution across clinical, teaching, administrative, and research duties; marital and parental status; and any leave or part-time status in the years between surveys.

Results—In unadjusted analyses, women earned a mean of $20,520 less than men ($P = .03$); women made 90 cents for every dollar earned by their male counterparts. This difference was reduced to $16,982 ($P = .04$) after adjusting for covariates. The mean difference of $15,159 was no longer significant ($P = .06$) when adjusting covariates and for those who had ever taken a leave or worked part-time.

Conclusions—The continued gender gap in compensation cannot be accounted for by metrics used to calculate salary. Institutional actions to address these disparities include both initial appointment and annual salary equity reviews, training of senior faculty and administrators to understand implicit bias, and training of women faculty in negotiating skills.

Multiple studies over the past 20 years have demonstrated salary inequities disadvantaging female faculty in academic medical careers compared with their male counterparts.[1–5] These inequities were attributed to factors known to be the major determinants of compensation, including part-time status, specialty choice, and work distribution between administrative, teaching, research, and clinical work. However, studies, including our own,[1,2,5,6] have demonstrated that even controlling for these differences, women continue to be compensated less for the same work compared to men.

There are limited data indicating whether awareness of these salary gaps has resulted in changes to compensation processes to reduce and eliminate these inequities. Recent data suggest that for new faculty, even those with similar academic backgrounds and research funding success, gender gaps in compensation early in their careers are already present.[6] To our knowledge, there are currently no longitudinal data to determine if gender inequities in faculty compensation have decreased or persisted over time. We therefore conducted this longitudinal assessment of medical faculty to address this question.

Method

We conducted a 17-year follow-up to the National Faculty Survey, which surveyed a representative sample of full-time faculty in academic medicine. In 1995, we identified all medical schools in the continental United States with at least 200 faculty, 50 of them women, and 10 minority faculty. We randomly selected 24 schools. The schools were balanced for geographic region, and private/public status. Within each medical school, six full-time faculty members were randomly sampled within each of 24 cells: four areas of medical specialization (generalist fields, medical specialties, surgical specialties, and basic sciences), three graduation cohorts (before 1970, 1970–1980, after 1980), and gender. In

order to oversample for underrepresented faculty and senior women, all underrepresented minority faculty and all women who graduated before 1970 were sampled. The initial survey response rate was 60%, with 1,790 full-time faculty responding. A subset of 1,335 faculty responded to a question on the survey indicating that they were willing to participate in future or follow-up studies; this comprised the potential sample for this follow-up study.

Using the name, academic specialty and background, and prior institution of the faculty members as of 1995, in 2012 we conducted a web-based search to obtain the current location and contact information of participants. Where valid email addresses were identified, we provided an email invitation to the survey and four follow-up reminder emails. When no email address was available, we attempted contact by telephone or mailing address. Respondents were invited to participate by completing a follow-up survey, either online or by mail. In order to ensure matches between the original and follow-up surveys, the follow-up survey asked for gender, year of birth, and race/ethnicity. Respondents provided written informed consent for paper surveys, and completed the online consent process before they could begin the online survey. They were provided a modest remuneration for their time in completing the survey. Institutional review board approval for the study was received from Boston University, Tufts Medical Center, and for Massachusetts General Hospital through a Reliance Agreement with Tufts Medical Center.

The follow-up survey was conducted during the 2012–13 academic year. We asked participants to provide their pre-tax compensation for the current academic year, or for those who were retired, for the last year they held an academic appointment. We asked them to include salary, clinical payments, and incentives, but to exclude fringe benefits. For those who were retired, we converted their most recent salary into 2013 dollars.

For this analysis, we included only those faculty who were employed full-time in academic medicine during the 1995 survey, and employed full-time (or retired from full-time employment) in any occupation during the 2012–13 survey. In order to adjust for covariates, we asked respondents if they remained in academic medicine, were retired, or had entered a different employment setting, including private practice, foundation, industry, government, and other employment. Race/ethnicity was dichotomized as white versus minority, including African American, Hispanic, Asian, and multiracial or other. We dichotomized academic rank as professor versus all others. Departmental affiliation was dichotomized into four categories: generalists, medical specialties, surgical specialties, and basic sciences. Percent effort distribution was calculated for administrative, research, clinical, and teaching activities. Marital status was dichotomized as married/partnered versus all others. Parental status was dichotomized as any versus no children. We calculated number of years since first academic appointment based upon data from the 1995 survey. We asked faculty whether they had taken any leave (not including sabbatical leave), or worked part-time between 1995 and 2012–13. We used a binary indicator for taking a leave or working part-time for more than two months between the 1995 and 2012–13 surveys.

Descriptive statistics were calculated for subject characteristics. To assess compensation differences by gender, we calculated unadjusted differences, and then developed two linear regression models to adjust for confounders. Race/ethnicity and gender were forced into the

model. Other variables significant at $P < .10$ in bivariate analyses were candidates for the model, and were retained if $P < .05$ in backward elimination. For the first model, we considered the following variables as potential covariates: race/ethnicity, retention in academic careers, department type, effort distribution, marital and parental status, academic rank, and the number of years since first academic appointment. The second model replicated the first model, and added the variable for any leave or part-time status of more than two months. We analyzed change in compensation from 1995 until the time of the follow-up survey using the same methods as for the compensation outcome. Approximate normality of the model residuals was verified by inspection of residual plots. All data analyses were performed with SAS statistical software, version 9.4 (SAS Institute, Cary NC).

Results

Of the 1,335 participants who agreed to be followed for future studies, 60 had died prior to the follow-up survey, leaving a potential sample of 1,275 participants, of whom 607 (48%) participated in the survey. Response rates were lower for medical (38%) and surgical specialists (45%) compared with generalists (58%) and basic scientists (58%, $P < .0001$), but were similar for women (49%) and men (46%, $P = .28$). We removed 62 individuals who were employed part-time in 2012–13. An additional 55 did not provide compensation information, resulting in a final analytic sample of 490 participants.

Table 1 provides the demographic information for the sample, stratified by gender. The majority of respondents were white (87%), which did not differ by gender. By study design, women and men were similar in the number of years since their first academic appointment, and by their department. Effort distribution across administrative, research, clinical, and teaching did not differ by gender. Women were less likely than men to be married (79% versus 89%, $P < .01$), and have children (81% versus 92%, $P < .001$), but more likely than men to have worked part-time or taken a leave of absence for more than two months (22% versus 15%, $P = .03$). Among faculty who took a leave of absence, the median (25–75% interquartile range) for leaves of absence was 6 (3–12) months for women and 8.5 (3–18) months for men. The median number of years working part-time was 2.75 (1.5–4) for women and 1.67 (1–4) for men over the 17 years between the surveys. Women and men were equally likely to have remained in academic medicine; however, men (77%) were more likely to be at the professorial rank than women (67%, $P = .01$).

Major differences in unadjusted compensation were seen between men and women (Table 2). Pre-tax unadjusted mean compensation was $200,100 (SD = $104,500) for men, compared with $179,600 (SD = $106,000) for women for a mean compensation difference of $20,520 ($P = .03$). These unadjusted differences were present for each of the four departmental categories with the gender difference, ranging between $8,800 for basic science faculty to $31,500 for primary care faculty.

Table 3 shows the adjusted compensation differences between women and men in 2012–13 using the two models for adjustment. Race/ethnicity, years since first academic appointment, marital status, and parental status were not significant predictors of compensation in either

model. Covariates that remained significant in Model 1 were: remaining in academics versus career moves to industry, government, private practice, or other; department (basic science, medical specialty, surgical specialty, or generalist); and distribution of work among administrative, research, clinical, and teaching activities. In Model 1, after adjusting for these covariates (Tables 3 and 4), women continued to earn a mean of $16,982 (95% CI −$32,954, +$1,010) less than men ($P = .04$). In Model 2, we also adjusted for faculty who had spent more than two months part-time or on leave. Although the median length of part-time status was less than three years and the median leave was less than nine months, for both men and women, this time away from career was associated with a −$27,899 (95% CI −$29,050, −$6,748) change in mean salary after 17 years of follow-up ($P = .01$). In this model, women earned a mean of $15,159 less than men (95% CI −$31,080, +$763) ($P = .06$). We also compared the change in salary between 1995 and 2012–13 and found that mean salaries for men increased $84,212, and for women increased $82,670. The effect of gender on change in salary over time was not significant in both the unadjusted and adjusted models (Table 4).

Discussion

In our nationally representative sample of faculty followed over 17 years, women continued to earn on average $20,000 less than men, or 90 cents for every dollar that a man earned. The unadjusted differential between men and women was present for basic science, medical specialties, surgical specialties, and generalists. After adjusting for covariates that predict academic salary differentials including specialty, academic setting, academic rank and promotion, and percent effort distribution, the mean difference between male and female salaries was $16,982 and remained significant. When we adjusted for consistent full-time status in the model, the gender difference was $15,159, and no longer statistically significant. Our adjusted models for change in compensation over time do not show a significant difference between genders (Table 4). Our published findings from the original 1995 cohort showed a $27,000 unadjusted mean salary gap between men and women.[1] These findings suggest that the disparities women face in compensation at entry level positions lead to a persistent trend of unequal pay for equal work throughout the course of their careers.

Our findings indicate that the gender gap in compensation is partially but not completely accounted for by those factors which make up salary determinations, including academic rank, specialty of practice, and distribution of activities within clinical, education, research, and administrative duties. Salary inequities still remained after these adjustments. Career specialty is a major contributor to salary differentials, although women were equally represented in the medical and surgical specialties within our sample. Within each specialty group, women had a lower mean salary compared to men. Some of the gender differences in the adjusters may represent gender bias, for example, promotion to full professor, in which gender bias may play a role throughout a career, from early mentorship to opportunities for collaboration, to encouragement from department leadership. Academic rank accounted for a $60,000 differential in pay between faculty at full professor and other ranks in our sample, and with 10% fewer women achieving full professor rank, was a major contributor to the unadjusted difference in salary. In the final model, the gender salary gap narrowed and was

no longer significant once we added a variable to mark those with less than full-time employment over the course of the 17 years of follow-up. For those faculty members who took a leave or went part-time, these in general were quite short in our sample, yet the gaps were associated with major reductions in salary compared with their counterparts with no leave or part-time status. While a reduction in effort may result in lost opportunities for advancement and commensurate salary increases, the magnitude of this loss is substantial, especially given the fact that the median leave of absence for women was six months, and median part-time status was under three years for women over 17 years of a career. This may play a role in how women are undercompensated compared with men, since women are more likely to seek opportunities for temporary part-time status and leave to provide child and elder care, and may reflect bias in perception of the commitment and productivity of the faculty. Others have found that part-time faculty report lower compensation and opportunities, which in turn lowered career satisfaction.[7] Current policies for protected periods of family leave, designed to support job retention, may be inadequate to prevent penalizing those who take such leaves from reductions in compensation. Policies should also consider review of salary equity issues with part-time status.

Our findings suggest that little has changed in gaps in compensation, and support recent literature that demonstrate continued gaps in compensation by gender.[5,6] Over the 17 years of follow-up in our study, changes in compensation did not differ by gender. This suggests that the compensation differences are not solely attributable to career activities over the intervening 17 years, but that early salary gaps by gender remain throughout one's career. This would indicate that initial salary is a critical point to ensure gender equity. It is therefore concerning that recent data has demonstrated gender inequities for new cohorts of faculty. Jagsi and colleagues surveyed junior investigators who received highly competitive junior faculty (K award) funding through the National Institutes of Health between 2011 and 2012.[6] Although men and women had similar training backgrounds, and similar evidence of high achievement, women reported starting salaries $30,000 lower than men. Subspecialty-specific salary reviews in primary care, emergency medicine, pediatrics, and life sciences show a similar pattern of gender inequities even within a field and with similar work.[2,4,8–12] Even in new fields, such as hospital medicine, women earn substantially less than their male colleagues, although working similar hours.[13,14] Recent work has also demonstrated that there are significant gender inequities in institutional research support.

There are several reasons that salary inequities persist, even if not intentional. Data indicate that implicit gender bias exists across all segments of our society, including with senior administrators, women and men alike, who implicitly undervalue contributions by women over men.[15,16] Implicit bias may play a more prominent role in initial salary, if there is limited guidance provided at an institution to ensure equity, as opposed to annual increases, which often have a narrowly prescribed range by the employing organization. Second, initial salary decisions are determined at the division or departmental level, and unless there is explicit institutional oversight, there may be no clear process of equity comparison to ensure that salary equity exists. Once a compensation level is determined, increases are often capped, making equity adjustments difficult to accomplish. In the past, litigation was not possible for past gender inequities beyond six months, even if the employee had no means of being aware of these. With the Lilly Ledbetter Fair Pay Act of 2009,[17] individuals are

allowed to seek redress for past inequities after they become aware of them. Lastly, prior work has demonstrated that negotiation skills are not part of most medical school or residency curriculum, and the lack of such skills may disproportionately affect women.[18,19] Women have reported lower comfort and self- confidence with the assertiveness required for negotiation, and may specifically benefit from training.

Limitations of our study include the response rate, although achieving a 48% response among faculty after 17 years is higher than many reporting cohort or cross-sectional studies among this group.[20,21] The response rate was lower for specialists than generalists or basic scientists, but not by gender, which may limit bias in our analysis. Compensation information was by self-report only. Our work does not include those who were part-time during the initial survey. Part-time work status and its impact on academic advancement is a major concern to female faculty,[22,23] one this study was only able to partially address. For those working full-time, leaves or working part-time for at least two months in the intervening years did predict a significant reduction in their salary at the follow-up time period. Strengths of our study are the ability to follow a cohort of faculty, and include those who leave academic careers who are otherwise not captured in cross-sectional studies of faculty. Our ability to capture data on covariates to understand the predictors of compensation is a major strength of our study.

Conclusions

Women in academic medicine make 90 cents for every dollar made by their male counterparts. This gap cannot be accounted for by the metrics which are used to define salary, and point to inequities that must be addressed. While the gap for women in academic medicine is not as large as the 82 cents per dollar noted in the overall U.S. economy,[24] it continues to reflect inequities in compensation. These findings point to several actionable steps for all within academic medicine who determine faculty compensation, including those at the provost, dean, departmental, and division level of leadership. First, all administrative leaders in academic medicine should receive training on implicit bias,[25] which has been demonstrated to increase personal awareness of one’s individual biases and may decrease the impact of unconscious gender bias in compensation decisions. Second, all academic institutions should develop institutional policies and oversight of initial compensation packages for new faculty. The strongest way to eliminate future gender inequities in compensation is to prevent them, by having systems to ensure equitable pay for equivalent work beginning at first appointment. Efforts to review initial compensation decisions across an institution may result in improved equity. Third, academic institutions must address inequities in compensation for existing faculty. Fourth, institutions can develop programs to address differences in promotion rates by gender, including professional development to train faculty in understanding the promotion process. Last, data indicate that women may be less prepared to negotiate the terms of the first and subsequent appointments.[18,26,27] Providing training in negotiating skills to our trainees will help to equalize the playing field for women in obtaining equitable compensation for their work.

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Table 1

Demographic Characteristics of Men and Women Faculty Participants as of 2012, From a 24-Institution Follow-Up Study to the National Faculty Study Analyzing Compensation, 1995–2012[a]

Characteristics	Men (n = 251)	Women (n = 239)	*P* value
Race, %—			
White	88	87	.54
Rank, %			
Professor	77	67	.013
Department, %			
Basic sciences	30	28	.83
Generalists	32	33	
Medical specialty	22	25	
Surgical specialty	16	15	
Years since initial academic appointment, mean (SD)	26 (9)	25 (9)	.10
Currently in academic setting, %			
Yes	80	82	.67
Marital status, %			
Married or partnered	89	79	.0025
Parental status, %			
1 or more children	92	81	.0005
Percentage of effort distribution, mean (SD)			
Administrative	24 (25)	27 (24)	.21
Research	31 (30)	28 (28)	.28
Clinical	25 (31)	24 (31)	.77
Teaching	18 (16)	20 (18)	.29
Part-time status between 1996 and 2012, %	15	22	.03

[a]Data sources: Longitudinal survey of faculty from 24 randomly selected medical schools in 1995, with follow-up survey data in 2012–13. Table includes those faculty who were full-time employed at both the baseline (1995) and follow-up (2012–13) survey.

Table 2

Unadjusted Mean Income by Participants' Gender and Department as of 2012–13, From a 24-Institution Follow-Up Study to the National Faculty Study Analyzing Compensation, 1995–2012[a]

Unadjusted mean salary	Mean $ (SD) men (n = 251)	Mean $ (SD) women (n = 239)
Basic scientists	150,400 (65,640)	141,600 (61,110)
Generalists	200,600 (85,980)	169,100 (84,390)
Medical specialists	223,000 (102,900)	202,200 (109,700)
Surgical specialists	260,500 (149,600)	237,500 (165,400)
All faculty	200,100 (104,500)	179,600 (106,000)

[a]Data sources: Longitudinal survey of faculty from 24 randomly selected medical schools in 1995, with follow-up survey data in 2012–13. Table includes those faculty who were full-time employed at both the baseline (1995) and follow-up (2012–13) survey.

Table 3

Adjusted Models to Estimate Differences in Compensation between Women and Men, From a 24-Institution Follow-Up Study to the National Faculty Study Analyzing Compensation, 1995–2012[a]

	Model 1[b]			Model 2[c]		
Characteristic	**Parameter estimate**	**95% Wald confidence limits**	***P* value**	**Parameter estimate**	**95% Wald confidence limits**	***P* value**
Women	−$16,982	−$32,954, −$1,010	.04	−$15,159	−$31,080, +$763	.06
Race: minority vs. white	−$2,342	−$26,571, +$21,886	.85	−$328	−$24,437, +$23,781	.98
Academic position	+$60,927	+$40,257, +$81,596	<.0001	+$56,991	+$36,249. $77, 733	<.0001
Professor	+$61,114	+$41,901, +$80,327	<.0001	+$57,873	+$38,635, +$77,110	<.0001
Department						
Basic sciences	−$14,910	−$38,373, +$8,553	<.0001	−$16,486	−$39,817, +$6,844	<.0001
Medical specialties	+$27,417	+$5,644, +$49,190		+$26,336	+$4,699, +$47,973	
Surgical specialties	+$59,967	+$34,910, +$85,024		+$58,658	+$33,755, +$83,561	
Generalists	Ref.			Ref.		
Effort distribution, for each 1% increase in the category						
Clinical	+$425	+$58, +$792	<.0001	+$428	+$63, +$792	<.0001
Teaching	−$1,075	−$1,610, −$540		−$1,098	−$1,629, −$566	
Research	−$524	−$888, −$161		−$553	−$915, −$192	
Administration[d]	–	–		–	–	
Part-time or leave of absence	–	–	–	−$27,899	−$49,050, −$6,748	.01
Intercept	$120,327	$86,644, $154,011	<.0001	$131,974	$97,378, $166,569	<.0001

[a]Data sources: Longitudinal survey of faculty from 24 randomly selected medical schools in 1995, with follow-up data in 2012–13 from survey Table includes those faculty who were full-time employed at both the baseline (1995) and follow-up (2012–13) survey.

[b]Model 1 adjusted for gender, race/ethnicity, academic setting, academic rank, department, and effort distribution. N = 476, due to missing values on covariates.

[c]Model 2 adjusted for all variables in Model 1 and any part-time work or leave of absence for more than two months between 1995–2013. N = 476, due to missing values on covariates.

[d]Percent effort in administration was 100% minus the sum of the other categories. It was excluded from the model to avoid multicollinearity.

Table 4

Difference in Compensation for Women Compared with Men, From a 24-Institution Follow-Up Study to the National Faculty Study Analyzing Compensation, 1995–2012[a]

	Unadjusted		Adjusted model 1[b]		Adjusted model 2[c]	
Outcome	**Mean difference (SD)**	***P* value**	**Mean difference (SD)**	***P* value**	**Mean difference (SD)**	***P* value**
Difference in mean salary between men and women in 2012–13	−$20,520 (−$39,131, −$1,909)	.03	−$16,982 (−$32,954, −$1,010)	.04	−$15,159 (−$31,080, +$763)	.06
Difference in change in mean salary between women and men from 1995–2013	−$1,542 (−$18,323, +$15,240)	.86	−$1,920 (−$17,560, +$13,720)	.81	−$1,422 (−$17,000, +$14,156)	.86

[a]Data sources: Longitudinal survey of faculty from 24 randomly selected medical schools in 1995, with follow-up survey data in 2012–13. Table includes those faculty who were full-time employed at both the baseline (1995) and follow-up (2012–13) survey.

[b]Model 1 adjusted for race/ethnicity, academic setting, academic rank, department, and effort distribution.

[c]Model 2 adjusted for all variables in Model 1 and whether any part-time work or leave of absence for more than two months between 1995–2013.