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ORIGINAL RESEARCH

Sex Disparity Persists in Pain Medicine: A Cross-Sectional Study of Chairpersons Within ACGME-Accredited Chronic Pain Fellowship Programs in the United States

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INTRODUCTION

The importance of sex equity among medical providers is becoming increasingly recognized within academia. Attaining a diverse workforce in health care has been linked to reduced health disparities, increased trust in the health care system by marginalized patient groups, and increased provider comfort with diverse patient populations.^{1,2} Although sex representation among medical students has seen significant improvements with women now representing slightly more than half of all medical students, sex gaps remain a significant issue among trainees, providers, and leaders of various medical specialties including pain medicine.^{3,4} In 2019, fewer than 20% of all active physicians practicing within pain medicine identified as women.^{3,4} More recently, a study showed roughly 30% of chronic pain medicine fellowship programs had a female program director.³ Despite these findings, the degree of sex disparity among leadership ranks within pain medicine, specifically departmental and divisional chairpersons, has yet to be studied.

The importance of female representation within pain medicine leadership ranks cannot be overstated.⁴ It is likely to foster an inherent attraction of talented female trainees to the field, promote interest in academia, provide a mentorship pipeline essential to success in academia, and facilitate retention of female providers within the field. In this cross-sectional

study, we sought to assess sex disparity within chairpersons of Accreditation Council for Graduate Medical Education (ACGME)-accredited chronic pain medicine programs across the country and its associations with various demographic, academic, and program metrics. We hypothesize that female chairpersons would be underrepresented and that they would have fewer academic accomplishments, including fewer publications and lower academic rank status.

MATERIALS AND METHODS

This study was approved by the Mayo institutional review board. The requirement for written informed consent was waived.

All ACGME-accredited chronic pain fellowship programs were identified on the ACGME website (<http://www.acgme.org/acWebsite/home/home.asp>) on April 19, 2021. Next, we proceeded to identify the name of all departmental/divisional chairpersons leading each ACGME-accredited chronic pain program. Chairperson information was unavailable on the ACGME website and, thus, specific program chairperson names were identified through institutional and departmental program websites. If chairperson name was unavailable online, we contacted the respective program secretary to obtain this information first via email. If we did not receive a response after 2 separate email requests after 3 weeks, we proceeded to contact the program secretary via phone to request this information.

After determining the final list of chairperson names, we used publicly available sources including fellowship program websites, state licensure boards, and online curriculum vitae to identify the chairperson's age, sex, academic degree (MD, PhD, and/or MBA), academic rank (professor, associate professor, assistant professor, or instructor), number of publications and Hirsch-index (H-index), board certification status (initial or continued), and residency training specialty (anesthesiology, physical medicine and rehabilitation, neurology, psychiatry, emergency medicine). The ACGME website was queried to abstract data on the following variables: total approved and filled fellow positions, and fellowship program accreditation status.

Senior academic rank status was defined as having either professor or associate professor rank. The H-index was calculated by the following formula: "n" publications authored by an individual having obtained at least "n" citations.⁵ The number of publications and H-index for each chairperson were obtained on the Scopus database (<https://www.scopus.com/freelookup/form/author.uri>). If there was more than 1 entry for the same chairperson on the Scopus database, we incorporated both entries when calculating the H-index. We defined the duration of clinical practice as the difference in years between employment start date after fellowship (as

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an attending physician) and the date data collection was initiated (April 19, 2021). To limit data that may vary rapidly with time, such as number of publications, data collection was completed within a 1-month period (April 19, 2021, to May 19, 2021).

The primary outcome included comparisons of the following demographic, academic, and program-related characteristics between female and male program chairpersons:

(1) Demographic characteristics: age, geographic location (Midwest, Northeast, South, West). Geographic regions were determined based on the US Census Bureau Regions and Divisions (Appendix A).⁶

(2) Academic characteristics: academic rank, dual appointment as chairperson and program director, completion of MD/PhD degree, completion of MBA degree, duration of clinical practice, number of publications, H-index, board certification status, chairperson residency training specialty.

(3) Program characteristics: number of approved fellow positions, number of filled fellow positions, program accreditation status.

Continuous outcomes are reported as medians with a 25% to 75% interquartile range (IQR), and dichotomous categorical outcomes are reported as numbers with percentages. The Mann-Whitney rank-sum test was used to compare continuous outcomes between female and male chairpersons, and the Fisher's exact test was used to compare categorical variables between female and male chairpersons. A P value $< .05$ was considered statistically significant.

RESULTS

Identification and Selection of Chairperson

We identified a total of 111 ACGME-accredited chronic pain fellowship programs at the time of study initiation (April 19, 2021). Chairperson name was obtained from the departmental and/or institutional website for a total of 80 programs (CONSORT diagram displayed in Figure 1). An additional 7 fellowship programs provided the chairperson name

and contact information after we contacted them via email and/or phone call. Twenty-four programs did not provide chairperson information, as they did not respond to email or phone requests.

Demographic Characteristics of Chairpersons

Characteristics of all chairpersons included in our study, as well as based on sex of the chairpersons, are displayed in Table 1. Our overall cohort comprised 17 female chairpersons (19.5%) and 70 male chairpersons (80.5%). No differences in age were detected between female and male chairpersons ($P = .645$). The proportion of female and male chairpersons based on geographic location was similar.

Academic Characteristics of Chairpersons Based on Sex

When comparing academic characteristics based on sex, a higher proportion of female chairpersons (35.3%) reported an academic rank of assistant professor compared with male chairpersons (11.4%, $P = .027$); however, similar proportions of other academic rankings (senior academic rank, full professor, associate professor, and instructor position) were noted between female and male chairpersons. Male chairpersons published more peer-reviewed articles (32.0 publications, 10.0-92.0 IQR) compared with female chairpersons (10.0 publications, 2.5-17.5 IQR, $P = .001$). Concordantly, male chairpersons achieved a higher H-index score (10.0, 5.0-28.0 IQR) compared with female chairpersons (3.0, 1.0-6.0 IQR; $P = .001$). There were no differences in other academic characteristics, including dual appointment as program director, academic degrees (PhD, MBA), years in clinic practice, board certification status, and primary residency training specialty.

Program-related Characteristics Based on Sex

The ACGME reported 1 program was assigned probationary accreditation. Six (6.9%) programs had initial ACGME accreditation status, and 80 (92.0%) had continued ACGME accreditation status. No differences in fellow positions and program accreditation status were identified when stratified by chairperson sex.

DISCUSSION

The role of the chronic pain chairperson involves multiple responsibilities, including managing complex financial responsibilities in this era of complex payer mixes,⁷ negotiating arrangements and coverage of personnel across the health care system, including satellite locations, advancing departmental research projects, and overseeing expanding fellowship programs in the era of work-hour restrictions. Despite the demanding nature of the job, departmental chairperson positions remain highly coveted and are few in number. Studies have previously speculated that potential factors that influence the selection of chairpersons include research output, age, number of advanced degrees, clinical experience, previous appointment at the hiring institution, and other factors.⁷ However, to date, there are no studies that have investigated the role of sex in pain chairperson attributes. This cross-sectional study assessed the relationship between chairperson sex and demographic, academic, and program-related factors in ACGME-accredited chronic pain fellowship programs. Our major findings of female chairpersons being underrepresented, publishing fewer peer-reviewed articles, and achieving lower H-index scores compared with male chairpersons are consistent with our hypotheses.

The finding of fewer publications among female chairpersons has been demonstrated consistently in the current literature across other leadership positions in pain medicine, as well as other medical and surgical specialties, which generally highlight that male leaders have produced more publications, achieved higher H-indices, and accomplished greater publication visibility.^{4,8-12} Potential explanations for the underrepresentation of female chairpersons and other female leaders in scientific publications may include tendency for fewer authorship invitations offered to women and preference for trainees and junior researchers to select male supervisors as research mentors.^{4,13}

Another notable finding is the preponderance of male chairpersons compared with female chairpersons (80.5% vs 19.5%). This is consistent with findings

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in the literature, which demonstrate a trend of female underrepresentation within leadership ranks. This observed disparity appears to be more pronounced than that observed among pain fellowship program directors.⁴ Possible contributing factors include lower number of publications and lower H-indices among academic female pain medicine physicians, which are often necessary for academic promotion and eligibility for leadership positions, paucity of sex-concordant mentors available to female physicians in the field, and overall underrepresentation of female physicians in academic pain medicine programs. However, it is important to note that the median duration of clinical practice was 21.0 years in our overall cohort. Furthermore, the Association of American Medical Colleges only recently noted that women outnumbered male medical school matriculants in 2018-2019. Thus, the current discrepancy in female representation in the pain medicine chairperson position may be a reflection of the sex bias and predominance of male physicians encountered approximately 2 decades ago. Given that the data on sex composition are unavailable from 2 decades ago, our study is limited because it does not establish a baseline of female inequality among physicians entering pain medicine. Thus, these results may not reflect current hiring and promotion practices, as it typically takes many years to attain a chairperson position.

Although female underrepresentation in the chairperson position has been well documented in other surgical specialties, such as general surgery¹⁴ and plastic surgery,¹⁵ our study remains novel, as this issue has not been investigated in the pain medicine field and each specialty presents unique impediments to female academic advancement. Furthermore, with the advent of neuromodulation and other novel surgical interventions, pain medicine continues to mature as a surgical specialty, and addressing sex disparity early during this evolution of our specialty would foster a more balanced and well-represented workforce in the future.

We reported that both female and male chairpersons have achieved similar

proportions of senior academic rank status in our study. This is contradictory to the current body of evidence that has consistently revealed greater rates of academic promotion in male leaders in health care compared with their female colleagues.^{9,15,16}

Interestingly, we observed that roughly one-third of chairpersons also had a dual appointment as fellowship program directors. Although a dual appointment could facilitate a shared vision between a department/division and its associated fellowship program, it could limit the leadership opportunities available to rising and underrepresented physicians in academia. In addition, the many responsibilities of such a dual appointment, depending on program size, could potentially discourage interest especially from those with less access to academic mentors, such as seen among female physicians.

The authors note with interest that 15 (17.2%) of 87 chairpersons carried a dual MD/PhD degree. Although not associated with sex-related differences, all 15 chairpersons who carried a dual MD/PhD degree achieved senior academic rank status (12 of 15 were full professor, 3 of 15 were associate professor). This likely reflects the higher number of publications produced by those with a dual MD/PhD degree, which helps with academic rank promotion. The authors also note that 7 (8%) of 87 chairpersons also obtained an MBA degree. Physicians who have obtained an MBA degree have reported that this may help with leadership and career advancement, team-building, improvement of negotiation skills, and comprehension of financial aspects.¹⁷ This is especially pertinent to the role of the chairperson in facing the dynamically evolving health care structure and complex financial responsibilities in our era of complex payer mixes.

Female representation in pain medicine leadership and clinicians is crucial. Population-based research has demonstrated that pain prevalence is generally higher among women relative to men, and it is not uncommon for pain practices to have a greater composition of female patients.¹⁸ Furthermore, research has demonstrated that patient-physician sex concordance may be associated with

greater patient satisfaction scores.¹⁹ Thus, female patients may be able to relate more to female providers caring for them. This association is also reflected in the leadership setting, where female program directors are more likely to have female fellows in the pain program they lead, and vice versa, male program directors are more likely to have male fellows in the pain program they lead.²⁰ Finally, studies have reported that female physicians may communicate differently, such as being more likely to discuss lifestyle and social concerns with patients, and present a more participatory decision-making style in their consultations, which may be advantageous in the chronic pain population.²¹

Our study provides a comprehensive description of sex disparities based on academic and program traits among chairpersons in ACGME-accredited fellowships with a high response and inclusion rate of approximately 80% of eligible chairpersons. These data highlight important details on current pain chairpersons and simply serve as a “snapshot” of characteristics for those currently in leadership positions. These characteristics may change as programs continue to grow, adapt, and change their quality, goals, and philosophy. Leadership in academic institutions is often a dynamic process and may pursue different directions based on perceived needs of the institution and department. More studies are warranted on how sex disparity in senior leadership impacts the hiring process and professional growth of newly hired faculty.

Future studies should investigate strategies that may decrease sex disparity within the workplace, such as fostering mentor-mentee connections between female trainees and mentors who have achieved leadership positions, and encourage professional medical societies to promote sex representation and host seminars that educate on leadership among female physicians. It would be of interest for future studies to evaluate if sex equality within leadership and staff may have a positive impact on measures such as academic department productivity and patient care. Because of the multiple responsibilities within the role of the chairperson,

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curriculum additions to medical school, residency, and fellowship programs to include leadership and business skills may be warranted. Future studies should investigate if early exposure and training in these skills may motivate more women to pursue leadership positions. Furthermore, among anesthesia trainees, one study identified that women trained in greater proportions within other ACGME-accredited anesthesiology fellowships compared with pain medicine.³ Given that pain medicine is a multidisciplinary specialty shared not only by anesthesiology, but also other base specialties, including physical medicine and rehabilitation, neurology, and psychiatry, it would be interesting to investigate if these other disciplines are performing better in fostering sex diversity and whether strategies from a successful specialty may be emulated.

Certain study limitations should be noted. Our study used data from public databases, institutional and departmental websites, and online curriculum vitae, introducing the risk for reporting bias. The H-index variable is affected by age of a publication, with older articles being cited more often over time, even though the scientific merit and quality may be low. We did not abstract other pertinent data that may be important to this study, including other leadership positions held before program chair role and other demographic information, such as race.

CONCLUSION

Academic program chairpersons play a vital role in the recruitment, retention, and success of a diverse academic faculty. Our study demonstrates that this important role

is currently and overwhelmingly held by men within the specialty of pain medicine, with significant underrepresentation among female physicians. This disparity is also reflected in other academic metrics, including number of peer-reviewed publications, H-indices, and attainment of assistant professor rank. This study highlights the need for continued measures designed to address and eliminate barriers that persistently preclude female representation from leadership positions within our specialty.

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Author Contributions:

Ryan D'Souza helped with study conception and design, background of research, analysis and interpretation of data, and revised the manuscript critically for intellectual content and gave final approval of the manuscript. Roderick King, Natalie Strand, and Ross Barman helped perform background of research, data collection, and drafted manuscript. Oludare Olatoye helped with study conception and design, performed data collection, and revised manuscript critically for intellectual content and gave final approval of the manuscript

Abstract

Objective: To compare the representation of female and male chairpersons and evaluate their respective demographic, academic, and program-related characteristics in academic chronic pain institutions.

Methods: We identified all chronic pain fellowship programs that are accredited by the Accreditation Council for Graduate Medical Education (ACGME) on April 19, 2021. We queried institutional websites or contacted programs directly to identify the respective departmental/divisional program chairperson. We abstracted data on program chairpersons from public databases and performed statistical comparisons of demographic, academic, and program-related characteristics between female and male program chairpersons.

Results: Of the 111 ACGME-accredited chronic pain fellowship programs, we identified the current chairperson at 87 programs (78.4%). There were 17 female chairpersons (19.5%) and 70 male chairpersons (80.5%). A higher proportion of female chairpersons reported an academic rank of assistant professor compared with male chairpersons (35.3% vs 11.4%, $P = .027$). Male chairpersons published more peer-reviewed articles compared with female chairpersons (median 32.0 vs 10.0 publications, $P = .001$). Concordantly, male chairpersons achieved a higher H-index score compared with female chairpersons (median 10.0 vs 3.0, $P = .001$). No differences were identified in other academic or program-related characteristics.

Conclusion: This cross-sectional study illuminates important details on sex-related differences in the chronic pain program chair role. Women chairpersons are underrepresented, have fewer peer-reviewed publications, and achieved a lower H-index score compared with male chairpersons. Establishing these baseline associations provides a reference for future studies to evaluate changes over time.

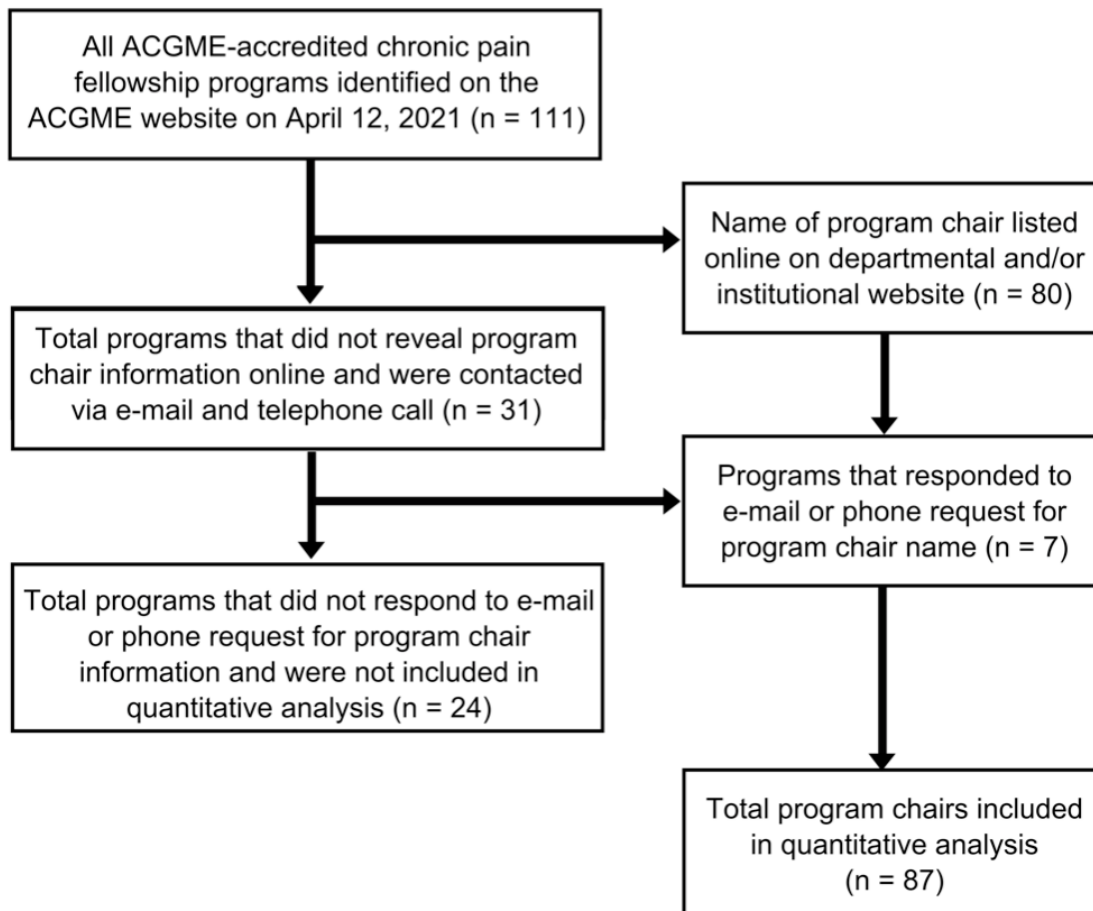
Keywords: Chronic pain, education, leadership, academic advancement, chairperson

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Figure

Figure 1. CONSORT flow diagram. This diagram displays the identification and selection process of chronic pain chairpersons from institutions with ACGME-accredited chronic pain fellowship programs.



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Table

Table 1. Comparison Between Female and Male Chronic Pain Chairpersons

	Overall Cohort (n = 87)	Female (n = 17)	Male (n = 70)	P Value
Demographic Characteristics				
Age ^a	55.0 (47.0–63.0)	53.0 (49.5–59.5)	57.0 (46.0–63.0)	.645
Geographic Region				
Midwest	21 (24.1)	5 (29.4)	16 (22.8)	.544
Northeast	26 (29.9)	5 (29.4)	21 (30.0)	1.000
South	24 (27.6)	4 (23.5)	20 (28.6)	.771
West	16 (18.4)	3 (17.6)	13 (18.6)	1.000
Academic Characteristics				
Academic rank ^b				
Senior academic rank ^c	71 (81.6)	11 (64.7)	60 (85.7)	.075
Professor	46 (52.9)	5 (29.4)	41 (58.6)	.056
Associate professor	25 (28.7)	6 (35.3)	19 (27.1)	.556
Assistant professor	14 (16.1)	6 (35.3)	8 (11.4)	.027 ^d
Instructor	1 (1.1)	0 (0)	1 (1.4)	1.000
Dual appointment as program director	29 (33.3)	7 (41.2)	22 (31.4)	.567
Carries MD/PhD degree ^b	15 (17.2)	2 (11.8)	13 (18.6)	.725
Carries MBA degree ^b	7 (8.0)	1 (5.9)	6 (8.6)	1.000
Duration of clinical practice (y) ^a	21.0 (12.2–27.0)	18.0 (9.5–25.5)	21.0 (13.0–28.0)	.327
Number of publications ^a	21.0 (8.2–66.5)	10.0 (2.5–17.5)	32.0 (10.0–92.0)	.001*
H-index ^a	6.5 (3.2–22.0)	3.0 (1.0–6.0)	10.0 (5.0–28.0)	.001*
Board certification status ^b				
Initial	10 (11.5)	2 (11.8)	8 (11.4)	1.000
Continued	77 (88.5)	15 (88.2)	62 (88.6)	

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Residency training specialty ^b				
Anesthesiology	74 (85.0)	15 (88.2)	59 (84.3)	1.000
Physical medicine/rehabilitation	8 (9.2)	2 (11.8)	6 (8.6)	.651
Neurology	2 (2.3)	0 (0)	2 (2.8)	1.000
Emergency medicine	1 (1.1)	0 (0)	1 (1.4)	1.000
Psychiatry	1 (1.1)	0 (0)	1 (1.4)	1.000
Program Characteristics				
Number of approved fellow positions ^a	4.0 (2.0–5.0)	3.0 (3.0–4.0)	4.0 (2.0–6.0)	.127
Number of filled fellow positions ^a	3.0 (2.0–5.0)	3.0 (2.0–4.0)	4.0 (2.0–6.0)	.062
Accreditation status ^b				
Initial accreditation	6 (6.9)	1 (5.9)	5 (7.1)	1.000
Continued accreditation	80 (92.0)	15 (88.2)	65 (92.8)	.729
Probation	1 (1.1)	1 (5.9)	0 (0)	.195

^aMedian value (25%-75% interquartile range).

^bNumber (%); percentages for values provided in the overall cohort column were based on the denominator equaling the total cohort sample size (n = 87); similarly, percentages for values provided in the female and male columns were based on the denominator equaling their respective total sample size (n = 17 for women; n = 70 for men). There was no academic rank data on one male chairperson.

^cSenior academic rank entails having either full professorship or associate professorship ranking.

^d $P < .05$, Mann-Whitney U test to compare continuous outcomes, and Fisher's exact test to compare categorical outcomes.

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Appendix

Appendix A. Geographic Regions of States Within the United States

<u>Northeast</u>	<u>Midwest</u>	<u>South</u>	<u>West</u>
Connecticut	Indiana	Alabama	Alaska
Maine	Illinois	Arkansas	Arizona
Massachusetts	Iowa	Delaware	California
New Hampshire	Kansas	District of Columbia	Colorado
New Jersey	Michigan	Florida	Hawaii
New York	Minnesota	Georgia	Idaho
Pennsylvania	Missouri	Kentucky	Montana
Rhode Island	Nebraska	Louisiana	Nevada
Vermont	North Dakota	Maryland	New Mexico
	Ohio	Mississippi	Oregon
	South Dakota	North Carolina	Utah
	Wisconsin	Oklahoma	Washington
		South Carolina	Wyoming
		Tennessee	
		Texas	
		Virginia	
		West Virginia	

This is based on the US Census Bureau designations for state regions.