

Gender, Productivity, and Philanthropic Fundraising in Academic Oncology

Subha Perni, MD^{1,2,*}; Danielle Bitterman, MD^{1,2,*}; Jennifer Ryan, BA²; Julie K. Silver, MD^{3,4}; Eileen Mitchell, BS²; Sarah Christensen, MS, MBA⁵; Megan Daniels, BA²; Mara Bloom, JD, MS²; Ephraim Hochberg, MD²; David Ryan, MD²; Daphne Haas-Kogan, MD⁶; Jay S. Loeffler, MD²; Nancy J. Tarbell, MD²; Aparna R. Parikh, MD^{2,†}; and Jennifer Wo, MD^{2,†}

ABSTRACT

Background: Philanthropic donations are important funding sources in academic oncology but may be vulnerable to implicit or explicit biases toward women. However, the influence of gender on donations has not been assessed quantitatively. **Methods:** We queried a large academic cancer center's development database for donations over 10 years to the sundry funds of medical and radiation oncologists. Types of donations and total amounts for medical oncologists and radiation oncologists hired prior to April 1, 2018 (allowing ≥ 2 years on faculty prior to query), were obtained. We also obtained publicly available data on physician/academic rank, gender, specialty, disease site, and Hirsch-index (*h*-index), a metric of productivity. **Results:** We identified 127 physicians: 64% men and 36% women. Median *h*-index was higher for men (31; range, 1–100) than women (17; range, 3–77; $P = .003$). Men were also more likely to have spent more time at the institution (median, 15 years; range, 2–43 years) than women (median, 12.5 years; range, 3–22 years; $P = .025$). Those receiving donations were significantly more likely to be men (70% vs 30%; $P = .034$). Men received significantly higher median amounts (\$259,474; range, \$0–\$29,507,784) versus women (\$37,485; range, \$0–\$7,483,726; $P = .019$). On multivariable analysis, only *h*-index and senior academic rank were associated with donation receipt, and only *h*-index with donation amount. **Conclusions:** We found significant gender disparities in receipt of philanthropic donations on unadjusted analyses. However, on multivariable analyses, only productivity and rank were significantly associated with donations, suggesting gender disparities in productivity and promotions may contribute to these differences.

J Natl Compr Canc Netw 2021;19(12):1401–1406
doi: 10.6004/jnccn.2021.7008

¹Harvard Radiation Oncology Program, ²Massachusetts General Hospital Cancer Center, ³Department of Physical Medicine and Rehabilitation, Massachusetts General Hospital, Brigham and Women's Hospital, and ⁴Spaulding Rehabilitation Hospital, Boston, Massachusetts; and ⁵University of Miami Health System, Miami, Florida; and ⁶Department of Radiation Oncology, Brigham and Women's Hospital and Dana-Farber Cancer Institute, Boston, Massachusetts.

*These authors are co-first authors.

†These authors are co-last authors.

Background

Philanthropic donations (PDs) are an important source of funding in academic oncology, often substantially supplementing federal and industry support for biomedical research.¹ Medical institutions typically employ trained development staff and encourage physicians to solicit PDs. Previous work has explored the ethical concerns that arise in PD solicitation, including conflicts of interest, fairness in patient treatment, and effects on physician–patient relationships.^{2–4} An additional concern is exacerbation of gender workforce disparities. Such disparities have been shown to exist for female physician-scientists in terms of federal grant funding, industry support, publications, medical promotions, leadership positions, and salaries.^{5–9}

Philanthropic fundraising, in contrast to traditional private and public grant-based funding mechanisms, is less reliant on rigorous evaluation of scientific merit for determination of awards, and more reliant on interpersonal relationships and provider proactiveness in broaching opportunities. As such, philanthropy may be particularly vulnerable to implicit and explicit biases toward women. Among other factors, men may be more likely to be perceived as leaders, whereas women may face societal stereotypes about “pushiness” and caregiving.¹⁰

In a recent survey of oncologists, 71% reported having been exposed to fundraising or development staff. However, of the respondents, men were significantly more likely to feel comfortable talking to patients about PDs. At the same time, women were significantly more likely to believe that there would be negative consequences if they refused to participate in philanthropy.¹¹

Although women report less comfort with soliciting PDs, to our knowledge, there have been no studies examining the influence of gender on receipt of PDs in academic oncology, and no prior evaluation of associations among donations, productivity, and physician/academic rank. To better understand these relationships, we analyzed development records at a large academic cancer center, identifying factors associated with PD receipt and PD amount.

Methods

We queried the internal institutional development office database at Massachusetts General Hospital Cancer Center for total amounts of philanthropic funds from the past 10 years as evaluated by PDs present in an individual medical or radiation oncologist principal investigator's sundry fund. Sundry funds can be used to support any research-related activity and could potentially be transferred from one individual to another. Types of donations, including individual, corporate/foundation, estate/trust, and miscellaneous, as well as total amounts in sundry funds for medical oncologists and radiation oncologists hired prior to April 1, 2018 (allowing ≥ 2 years on faculty prior to query) were obtained. A few corporate donations were private grant funds requiring applications.

Publicly available data on academic rank, gender, specialty, and disease site were obtained from institutional websites. The Scopus database (www.scopus.com) was queried for Hirsch-index (*h*-index), one academic productivity metric defined as number of publications (*h*) cited at least *h* times.¹²

Statistical analyses were conducted using JMP 14 (SAS Institute Inc). Chi-square and Wilcoxon rank sum tests were used to compare categorical and continuous variables, respectively. Univariable and multivariable logistic regression analyses were used to explore factors associated with PD receipt, including gender, *h*-index, academic rank, and years at institution. Multivariable linear regression analyses were used to explore factors associated with received PD amount, which was modeled logarithmically to achieve a more approximately normal distribution. Statistical significance was set a priori at a 2-sided α of 0.05.

Additionally, multivariable analyses were conducted for the subset of medical oncologists. Multivariable analyses were not conducted on the subset of radiation oncologists given the small numbers. Finally, to characterize the population of the most successful fundraisers, we conducted descriptive analyses of the top 10 fundraisers by gender.

Results

We identified 127 physicians, of which 64% were men and 36% were women; 82% were medical oncologists and 18% were radiation oncologists. The most common disease site focuses were hematologic (26%), breast (16%), and thoracic (12%). Regarding academic rank, 41% were instructors, 24% were assistant professors, 15% were associate professors, and 20% were full professors. Median time at institution was 14 years (range, 2–43 years), and median *h*-index was 24 (range, 1–100).

Table 1 shows potential factors influencing PDs by gender. Specialty, disease site, and academic rank were not significantly different by gender. However, the median *h*-index of men was 31 (range, 1–100), which was

Table 1. Oncologist Factors by Gender

	Men n (%)	Women n (%)	P Value
Total, n	81	46	
Specialty			.424
Medical oncology	68 (84)	36 (78)	
Radiation oncology	13 (16)	10 (22)	
Academic rank			.082
Instructor	27 (33)	25 (54)	
Assistant professor	22 (27)	9 (20)	
Associate professor	12 (15)	7 (15)	
Full professor	20 (25)	5 (11)	
Years at institution			.025
Median (range)	15 (2–43)	12.5 (3–22)	
<i>h</i> -index			.003
Median (range)	31 (1–100)	17 (3–77)	

Bold indicates statistically significant P value.

significantly higher than that of women (17; range, 3–77; $P=.003$). Median *h*-index was 12.5 (range, 1–42) for instructors, 31 (range, 12–44) for assistant professors, 34 (range, 1–72) for associate professors, and 67 (range, 6–100) for full professors ($P<.0001$). Men were at the institution significantly longer (median, 15 years; range, 2–43 years) compared with women (median, 12.5 years; range, 3–22 years; $P=.025$).

Overall, there was \$158,864,002.68 in PDs over 10 years, distributed among 52,180 gifts. Most were from individuals (91%); corporate foundations gave 7%, estates and trusts 1%, and miscellaneous sources 1%. The median amount of PDs was \$161,691.45 (range, \$0–\$29,507,783.50).

Table 2 shows differences in characteristics of oncologists who received PDs versus those who did not. PD receipt was significantly associated with male gender and academic rank. Oncologists that received PDs were also significantly more likely to have been at the institution longer (median, 16 years [range, 2–42 years] vs 9 years [range, 3–43 years]; $P<.001$). Median *h*-index was significantly higher among those that received PDs (median, 34 [range, 1–100] vs 12 [range, 1–44]; $P<.001$).

As shown in Figure 1A and B, men overall had significantly higher median number of donations of every type, with significantly higher median total fundraising amount. Those receiving donations were significantly more likely to be men (70% vs 30%; $P=.034$), and received significantly higher median amounts (\$259,474.30; range, \$0–\$29,507,784) compared with women (\$37,485; range, \$0–\$7,483,726; $P=.019$). In the subset that received donations ($n=84$), gender did not correlate with total fundraising amount, but men received significantly more donations of every type (Figure 1C, D).

Table 2. Oncologist Factors by Receipt of PDs

	0 PDs n (%)	≥1 PDs n (%)	P Value
Total, n	43	84	
Gender			.034
Men	22 (51)	59 (70)	
Women	21 (49)	25 (30)	
Specialty			.384
Medical oncology	37 (86)	67 (80)	
Radiation oncology	6 (14)	17 (20)	
Academic rank			<.001
Instructor	35 (81)	17 (20)	
Assistant professor	7 (16)	24 (29)	
Associate professor	1 (2)	18 (21)	
Full professor	0 (0)	25 (30)	
Years at institution			<.001
Median (range)	9 (3–43)	16 (2–42)	
<i>h</i> -index			<.001
Median (range)	12 (1–44)	34 (1–100)	

Bold indicates statistically significant *P* value.

Abbreviation: PDs, philanthropic donations.

On multivariable analysis, *h*-index was most strongly associated with PD receipt, followed by senior academic rank; gender and years at institution were not significant (Table 3). On multivariable analysis for total donation amount, *h*-index was the only significant covariate (Table 3).

We additionally analyzed the subset of medical oncologists. Among the 104 medical oncologists, there were no significant differences in PD receipt by gender: 71% of men and 53% of women received PDs ($P=.07$). However, men had significantly higher median fundraising than women (\$259,474.30 [range, \$0–\$29,507,784] vs \$30,020 [range, \$0–\$7,483,726]; $P=.049$). On multivariable analysis, *h*-index and senior academic rank were significantly associated with PD receipt (Table 4), whereas only *h*-index was significantly associated with total donation amount (Table 4).

We finally analyzed the top 10 fundraisers for each gender. The top 10 women fundraisers raised a median of \$2,087,911.88 (range, \$600,970.00–\$7,483,725.97) over a median of 281 gifts (range, 13–7,409). Of them, 5 were full professors, 2 were associate professors, and 3 were assistant professors. They had spent a median of 18.5 years (range, 5–22 years) at the institution, and had a median *h*-index of 46 (range, 27–77). The top 10 men raised a median of \$5,607,497.24 (range, \$3,369,081.14–\$29,507,783.50) over a median of 726 gifts (range, 41–5,982); 8 were full professors and 2 were assistant professors. They had spent a median of 21 years (range, 7–39 years) at the institution, and their median *h*-index was 68.5 (range, 6–100).

Discussion

In this study, we found gender differences in likelihood of receiving PDs of every kind, including from individuals, corporations/foundations, and estates/trusts. Men were more likely to receive donations and raise more total funds. However, on multivariable analyses, senior academic rank and *h*-index were the only significant predictors of donation receipt and *h*-index was the only significant predictor of donation amount, suggesting that previously documented disparities in promotions and productivity could be a driver of the observed differences in PDs.^{5,8}

Previous studies have shown the *h*-index metric's association with future productivity and NIH funding, as well as corroborate its association with academic rank in radiation oncology.^{13–15} Our study further adds to these data, suggesting its association with PD receipt. We found that *h*-index was the only factor associated with both PD receipt and donation amount. This finding potentially suggests that past productivity may increase the likelihood of philanthropic fundraising, even accounting for academic rank and years in practice.

In this study, men had nearly double the median *h*-index of women medical and radiation oncologists. This finding is in line with several other studies by researchers of various specialties that demonstrate gender differences in *h*-index.^{8,16–21} These disparities are likely multifactorial, with cited reasons including lack of mentorship and sponsorship, gender discrimination in the workplace, pregnancy and childrearing burdens, and more allocation of time to teaching and clinical work.^{22,23} At the same time, women face disparities in administrative, grant, and research support that are crucial for publication productivity, which may in turn affect chances of PD receipt.^{6,7,24} The *h*-index also does not reflect place on the authorship list, and “courtesy” authorship offers may be more likely to be extended to men. This metric does not capture self-citation, which men have been shown to practice more frequently.¹⁹ Articles by women may, for example, be less likely to be cited than those by men for reasons that are unrelated to publication importance. Interestingly, some work does suggest that gender differences in *h*-index may be most prominent at junior levels but disappear when analyzing physicians of more senior academic rank.^{8,18,20} This effect could possibly be related to delay in careers during childbearing and rearing of young children, or selection bias due to attrition of women from academia.

Multipronged strategies to support women and address gender discrimination at academic hospitals are crucial to improving productivity and philanthropic fundraising. Institutional efforts to support women at early career stages, including formal mentorship programs, robust family leave policies, onsite childcare, and work flexibility, could help address productivity barriers.^{21,25,26} Additionally, dedicated task forces and search committee

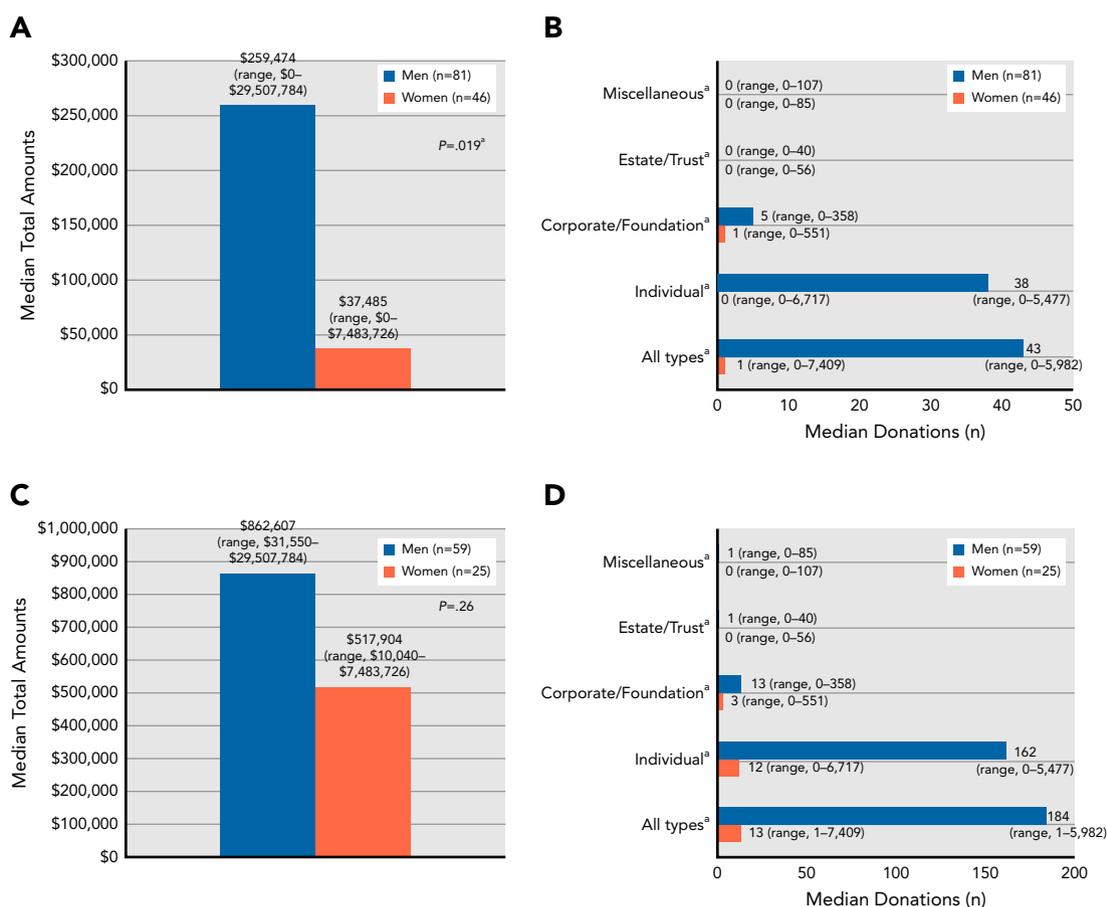


Figure 1. Median total amounts and numbers, by donation type, of philanthropic donations to male and female oncologists (**A, B**) for all physicians (n = 127) and (**C, D**) in the subset of physicians with ≥1 donation (n = 84).

^aStatistical significance of comparison between 2 groups using Wilcoxon rank-sum test.

trainings can improve recruitment of women faculty to leadership positions and contribute to advocacy for equitable hiring practices and resources.^{8,25,26} Development offices could also promote the academic work of women

physicians, as well as provide education to improve comfort with solicitation of PDs. Additionally, PDs could be distributed across departments, disease sites, or institutions, rather than going to individual physicians.

Table 3. Factors Associated With Philanthropic Donation Receipt and Total 10-Year Donation Amount

Donation receipt	Odds Ratio	95% CI	P Value
Gender (men vs women)	1.14	0.42–3.08	.794
<i>h</i> -index (per unit change)	1.09	1.04–1.15	<.001
Senior academic rank ^a	14.69	1.60–134.62	.002
Years at institution (per unit change)	0.99	0.93–1.06	.836
Total 10-year donation amount ^b	β Coefficient	SE	P Value
Gender (men vs women)	0.17	0.18	.343
<i>h</i> -index (per unit change)	0.04	0.01	<.001
Senior academic rank ^a	−0.08	0.20	.682
Years at institution (per unit change)	−0.01	0.02	.759

Bold indicates statistically significant *P* value.

^aFull/Associate versus assistant/instructor professor levels.

^bLogarithmic transformation.

Table 4. Factors Associated With PD Receipt and Total 10-Year Donation Amount in Subset of Medical Oncologists

Donation receipt	Odds Ratio	95% CI	P Value
Gender (men vs women)	1.11	0.38–3.23	.852
<i>h</i> -index (per unit change)	1.09	1.04–1.15	<.001
Senior academic rank ^a	10.63	1.04–108.86	.015
Years at institution (per unit change)	0.99	0.93–1.06	.806
Total 10-year donation amount ^b	β Coefficient	SE	P Value
Gender (men vs women)	0.14	0.20	.497
<i>h</i> -index (per unit change)	0.04	0.01	<.001
Senior academic rank ^a	–0.04	0.23	.873
Years at institution (per unit change)	0.01	0.02	.818

Bold indicates statistically significant *P* value.

Abbreviation: philanthropic donation.

^aFull/Associate versus assistant/instructor professor levels.

^bLogarithmic transformation.

Our results are limited because it is a small study, representative of a single institution, and there are likely other unaccounted covariables. Gender could also be associated with differences in patient volume, clinical patterns, and referrals, potentially providing men with more opportunities for contact with wealthier patients and solicitation of PDs. Additionally, although most gender-related disparities research discusses gender in binary terms, it exists on a spectrum, which our data do not reflect. In addition, use of the *h*-index to measure productivity has flaws and may not fully capture research productivity. The *h*-index also does not capture the clinical productivity of a physician, which might assist in relationship-building for philanthropic fundraising, and does not capture physician value.

Despite these limitations, our work is the first to quantitatively assess the relationship between productivity, gender, and PDs. Further research and focused interventions are needed to ensure that female physicians are equitable recipients of PDs, and to better understand relationships with gender-related disparities in academic productivity, promotions, and compensation.

Conclusions

In this study of philanthropic fundraising among medical and radiation oncologists at a large academic cancer center, we found significant gender disparities in

likelihood of receiving PDs and total fundraising amount on unadjusted analyses. However, on multivariable analyses, *h*-index and academic rank were significantly associated with PDs, suggesting that gender disparities in promotions and productivity may contribute to these differences.

Submitted October 27, 2020; final revision received January 3, 2021; accepted for publication January 14, 2021.

Author contributions: *Study concept:* Perni, Bitterman, Haas-Kogan, Tarbell, Parikh, Wo. *Data curation:* Perni, Bitterman. *Formal analysis:* Perni, Parikh, Wo. *Investigation:* Perni, Bitterman, Parikh, Wo. *Methodology:* Perni, Bitterman, Haas-Kogan, Tarbell, Parikh, Wo. *Project administration:* Perni. *Resources:* J. Ryan, Mitchell, Christensen, Daniels, Bloom, Hochberg, D. Ryan, Loeffler, Parikh, Wo. *Supervision:* Wo. *Visualization:* Perni, Silver. *Writing—original draft:* Perni. *Writing—review and editing:* Bitterman, J. Ryan, Silver, Mitchell, Christensen, Daniels, Bloom, Hochberg, D. Ryan, Haas-Kogan, Loeffler, Tarbell, Parikh, Wo.

Disclosures: Dr. Parikh has disclosed serving on a data safety monitoring board for Roche; receiving institutional research support from Novartis, Bristol Myers Squibb, PMV Pharma, Takeda, Plexxicon, and Puretech; serving as a scientific advisor for C2i; and serving on an advisory board for Eli Lilly, Pfizer, and Checkmate Pharmaceuticals. The remaining authors have disclosed that they have not received any financial consideration from any person or organization to support the preparation, analysis, results, or discussion of this article.

Correspondence: Jennifer Wo, MD, Department of Radiation Oncology, Massachusetts General Hospital, 55 Fruit Street, Cox Building 3, Boston, MA 02214-2696. Email: jwo@mgh.harvard.edu; and Aparna R. Parikh, MD, Department of Medicine, Division of Hematology/Oncology, Massachusetts General Hospital, 50 Blossom Street BAR, Boston, MA 02114-2696. Email: aparna.parikh@mgh.harvard.edu

References

- Dorsey ER, de Roulet J, Thompson JP, et al. Funding of US biomedical research, 2003–2008. *JAMA* 2010;303:137–143.
- Collins ME, Rum SA, Sugarman J. Navigating the ethical boundaries of grateful patient fundraising. *JAMA* 2018;320:975–976.
- Collins ME, Rum S, Wheeler J, et al. Ethical issues and recommendations in grateful patient fundraising and philanthropy. *Acad Med* 2018;93:1631–1637.
- Wright SM, Wolfe L, Stewart R, et al. Ethical concerns related to grateful patient philanthropy: the physician's perspective. *J Gen Intern Med* 2013;28:645–651.
- Carr PL, Raj A, Kaplan SE, et al. Gender differences in academic medicine: retention, rank, and leadership comparisons from the National Faculty Survey. *Acad Med* 2018;93:1694–1699.
- Holliday E, Griffith KA, De Castro R, et al. Gender differences in resources and negotiation among highly motivated physician-scientists. *J Gen Intern Med* 2015;30:401–407.
- Jagsi R, Griffith KA, Stewart A, et al. Gender differences in the salaries of physician researchers. *JAMA* 2012;307:2410–2417.

8. Holliday EB, Jagsi R, Wilson LD, et al. Gender differences in publication productivity, academic position, career duration, and funding among U.S. academic radiation oncology faculty. *Acad Med* 2014;89:767–773.
9. Tringale KR, Marshall D, Mackey TK, et al. Types and distribution of payments from industry to physicians in 2015. *JAMA* 2017;317:1774–1784.
10. Eagly AH, Karau SJ. Role congruity theory of prejudice toward female leaders. *Psychol Rev* 2002;109:573–598.
11. Walter JK, Griffith KA, Jagsi R. Oncologists' experiences and attitudes about their role in philanthropy and soliciting donations from grateful patients. *J Clin Oncol* 2015;33:3796–3801.
12. Hirsch JE. An index to quantify an individual's scientific research output. *Proc Natl Acad Sci USA* 2005;102:16569–16572.
13. Rezek I, McDonald RJ, Kallmes DF. Is the H-index predictive of greater NIH funding success among academic radiologists? *Acad Radiol* 2011;18:1337–1340.
14. Zhang C, Murata S, Murata M, et al. Factors associated with increased academic productivity among US academic radiation oncology faculty. *Pract Radiat Oncol* 2017;7:e59–64.
15. Hirsch JE. Does the H index have predictive power? *Proc Natl Acad Sci USA* 2007;104:19193–19198.
16. Chauvin S, Mulsant BH, Sockalingam S, et al. Gender differences in research productivity among academic psychiatrists in Canada. *Can J Psychiatry* 2019;64:415–422.
17. Okafor S, Tibbetts K, Shah G, et al. Is the gender gap closing in otolaryngology subspecialties? An analysis of research productivity. *Laryngoscope* 2020;130:1144–1150.
18. Myers SP, Reitz KM, Wessel CB, et al. A systematic review of gender-based differences in Hirsch index among academic surgeons. *J Surg Res* 2019;236:22–29.
19. Astegiano J, Sebastián-González E, Castanho CT. Unravelling the gender productivity gap in science: a meta-analytical review. *R Soc Open Sci* 2019;6:181566.
20. Lopez SA, Svider PF, Misra P, et al. Gender differences in promotion and scholarly impact: an analysis of 1460 academic ophthalmologists. *J Surg Educ* 2014;71:851–859.
21. Eloy JA, Svider PF, Cherla DV, et al. Gender disparities in research productivity among 9952 academic physicians. *Laryngoscope* 2013;123:1865–1875.
22. Jagsi R, Guancial EA, Worobey CC, et al. The "gender gap" in authorship of academic medical literature—a 35-year perspective. *N Engl J Med* 2006;355:281–287.
23. Patton EW, Griffith KA, Jones RD, et al. Differences in mentor-mentee sponsorship in male vs female recipients of National Institutes of Health grants. *JAMA Intern Med* 2017;177:580–582.
24. Warner ET, Carapinha R, Weber GM, et al. Gender differences in receipt of National Institutes of Health R01 grants among junior faculty at an academic medical center: the role of connectivity, rank, and research productivity. *J Womens Health (Larchmt)* 2017;26:1086–1093.
25. Carr PL, Gunn C, Raj A, et al. Recruitment, promotion, and retention of women in academic medicine: how institutions are addressing gender disparities. *Womens Health Issues* 2017;27:374–381.
26. Agrawal P, Madsen TE, Lall M, et al. Gender disparities in academic emergency medicine: strategies for the recruitment, retention, and promotion of women. *AEM Educ Train* 2019;4(Suppl 1):S67–74.

RECORDED PRESENTATIONS



2021

Virtual Congress:



Hematologic Malignancies™

VIEW NOW: education.nccn.org/hem2021

JNCCN-N-0304-1221