Are There Sex-Based Differences in Academic Productivity Amongst Faculty at The Top 25 Orthopaedic Surgery Residency Programs?

Erin Lindsey Brown, Eli Tsakiris, Mia V Rumps[1], Mary K Mulcahey
[1]Loyola University Medical Center

INTRODUCTION: Academic productivity is an important characteristic that significantly contributes to the reputation of an orthopaedic surgery residency program and attracts prospective applicants. Little is known regarding the sex differences in academic productivity of at highly ranked orthopaedic surgery programs. The purpose of this study was to evaluate sex-related differences in publication rates among faculty at top-ranked academic orthopaedic surgery residency programs.

METHODS: The number of publications, H-index, textbook authorship, and educational leadership of orthopaedic surgery faculty at the top 25 most academically productive programs were evaluated using program websites, Scopus database, and other public sources from December 2022-April 2023. An orthopaedic surgery program was considered a top-ranked program if it was among the top 25 most academically productive programs as determined by Trikha's 2022 study "Assessing the Academic Achievement of United States Orthopaedic Departments." This study was based upon 2014-2018 data that took into consideration National Institutes of Health funding, leadership positions in orthopaedic surgery societies, editorial board positions of top orthopaedic surgery journals, total number of publications, and H-index. 1 The M-index was calculated by dividing the H-index by years since medical school graduation to account for differences in career length. This data was analyzed using R statistical analysis software.

RESULTS: A total of 1,173 orthopaedic surgeons were identified at the top 25 orthopaedic residency programs, 161 (13.7%) were female and 1,012 (86.3%) were male (P<.001). Male faculty had a higher average H-index (22.22, range of 0 to 112) compared to female faculty (10.98, range of 0 to 64) (P<.001). Male faculty had a higher average M-index (0.93 versus 0.60) (P<.001). When stratifying average M-indices by academic rank for male and female orthopaedic surgeons, male faculty's average M-indices were higher than female faculty's at the assistant, associate, and professor levels. The differences were only statistically significant at the ranks of assistant and associate professor (P=.0004 and P=.018) (Table 1). In addition, female orthopaedic surgery faculty were significantly underrepresented in proportion at every academic rank. Starting at the level of assistant professor and onward, the number of female faculty grew smaller at each successive academic rank. Among the studied institutions, female orthopaedic surgery faculty had a higher average M-index than their male counterparts at only four programs: Hospital for Special Surgery, University of California Los Angeles, Icahn School of Medicine, and University of California San Diego (Table 2 and 3).

DISCUSSION AND CONCLUSION: Female faculty at the top 25 ranked orthopaedic residency programs had significantly lower H and M indices compared to their male counterparts. The study revealed that existing orthopaedic surgery residency program rankings did not reflect the programs with the most female research productivity. Further research is necessary to better understand the discrepancy in research productivity between female and male orthopaedic surgery faculty so that appropriate support can be offered.

Table 1: Average M-Index Stratified by Sex and Academic Rank at the Top 25 Most Academically Productive Orthopaedic Surgery Residency Programs

Academic Rank	Average M-Index	Maximum M-Index	Minimum M-Index
Instructor	1.10	5.00	0.07
Assistant Professor	0.47	1.73	0
Associate Professor	0.62	2.93	0.04
Professor	0.90	2.06	0.05
Academic Rank	Average M-Index	Maximum M-Index	Minimum M-Index
Instructor	0.57	4.38	0
Assistant Professor	0.81	5.13	0
Associate Professor	0.87	4.10	0
Professor	1.12	5.39	0

Table 2: Average Female Faculty M-Index at the Top 25 Most Academically Productive Orthopaedic Surgery Residency Programs

Residency Program	Average M-Index (Female)
Hospital for Special Surgery	1.26
University of California Los Angeles	0.98
University of Pennsylvania	0.90
Massachusetts General Hospital / Brigham / Harvard	0.81
Mayo Clinic	0.73
University of California San Diego	0.71
Duke University	0.70
Stanford University	0.68
University of Michigan	0.59
University of Connecticut	0.58
Icahn School of Medicine	0.55
Washington University (St. Louis)	0.55
Yale University	0.55
University of California San Francisco	0.54
Sidney Kimmel Medical College	0.51
University of Rochester	0.45
New York Presbyterian / Columbia	0.41
Cleveland Clinic	0.40
University of Colorado	0.37
Rush University	0.29
University of Pittsburgh	0.28
University of Utah	0.25
University of Iowa	0.24
Brown University	0.20
Virginia Commonwealth University	0.15

Table 3: Average Male Faculty M-Index at the Top 25 Most Academically Productive Orthopaedic Surgery Residency Programs

	Residency Program	Average M-Index (Male)
1	Rush University	1.47
2	Mayo Clinic	1.38
3	Washington University (St. Louis)	1.25
4	Hospital for Special Surgery	1.22
5	University of Iowa	1.19
6	Duke University	1.07
7	University of Pennsylvania	1.07
8	New York Presbyterian / Columbia	1.04
9	Sidney Kimmel Medical College	1.01
10	University of Utah	1.00
11	Stanford University	0.96
12	Massachusetts General Hospital / Brigham / Harvard	0.90
13	University of Michigan	0.88
14	University of California San Francisco	0.79
15	University of Pittsburgh	0.78
16	Cleveland Clinic	0.77
17	University of California Los Angeles	0.73
18	University of Rochester	0.72
19	University of Connecticut	0.71
20	University of Colorado	0.61
21	Brown University	0.60
22	Yale University	0.60
23	University of California San Diego	0.54
24	Icahn School of Medicine	0.45
25	Virginia Commonwealth University	0.31