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Scholarly activity in academic plastic surgery: the gender difference

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ABSTRACT

Background: The number of women in medicine has grown rapidly in recent years. Women constitute over 50% of medical school graduates and hold 38% of faculty positions at United States medical schools. Despite this, gender disparities remain prevalent in most surgical subspecialties, including plastic surgery. The purpose of this study was to analyze gender authorship trends.

Materials and methods: A cross-sectional study of academic plastic surgeons was performed. Data were collected from departmental websites and online resources. National Institute of Health (NIH) funding was determined using the Research Portfolio Online Reporting Tools database. Number of published articles and h-index were obtained from Scopus (Elsevier Inc, New York, NY). Statistical analysis was performed in SPSS (SPSS Inc, Chicago, IL).

Results: A total of 814 plastic surgeons were identified in the United States. Compared to men, women had significantly fewer years in practice ($P < 0.001$), lower academic ranks ($P < 0.001$), and published less ($P < 0.001$). There was no difference in the number of PhD degrees between genders; women with PhDs published less than men with PhDs ($P = 0.04$). 5.1% of women and 6.9% of men received NIH funding during their career ($P = 0.57$). There was no gender difference in scholarly output among NIH-funded surgeons. Overall, years in practice, academic rank, chief/program director title, advanced degrees, and NIH funding all positively correlated with academic productivity.

Conclusions: This study identifies significant gender disparities in scholarly productivity among plastic surgeons in academia. Future efforts should focus on improving gender equality and eliminating barriers to academic development.

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Introduction

The number of women in medicine has grown rapidly in recent years. Women constitute over 50% of medical school graduates and hold 38% of faculty positions at United States medical schools.[1] Despite this, gender disparities persist in most surgical subspecialties, including plastic surgery; only 14% of practicing plastic surgeons are women.[2]

In the academic workforce, gender differences are even more apparent.[3,4] Studies show a deficit of women in senior faculty and leadership positions across a variety of specialties.[5-7] Some of this difference may be attributed to gender-based hiring practices of previous generations and high rates of attrition for women at mid-career levels.[3] In addition, women are also promoted at a slower rate than male colleagues.[8]

Research productivity is a benchmark of achievement and is often used as a metric for promotion in academic medicine.[9-11] Studies show that women publish less[12-14] and apply for fewer research grants,[15] which likely contributes to promotional lag. Given the importance of research in professional advancement, the goal of this study was to highlight gender differences in authorship trends and identify factors that affect scholarly output in academic plastic surgery.

The Hirsch index (h-index) is a widely used, citation-based measure of scholarly output meant to assess a researcher's impact.[16] An author's h-index is defined as number of published articles that have been cited an equivalent number of times. Its use within academic plastic surgery has been validated in previous studies,[13,14,17] and therefore was chosen as the primary means to evaluate scholarly output in this study.

Materials and methods

A cross-sectional study of all practicing, board-certified, U.S.-based, academic plastic surgeons was performed. The American Council of Academic Plastic Surgeons website (http://acaplasticsurgeons.org/residency-resources/fellowship-programs.cgi) was used to identify integrated and independent residency programs. All programs were Accreditation Council for Graduate Medical Education accredited. Individual program websites were queried, and a list of faculty surgeons was compiled. Board certification was verified on the American Board of Plastic Surgeons website (https://www.abplasticsurgery.org/) for each faculty surgeon. Surgeons without active plastic surgery board certification and those listed as "retired" were excluded. Number of years in practice was calculated using the date of initial board certification.

Data were collected on gender, degrees, titles, and leadership positions from program websites and online resources, including Healthgrades, Doximity, and WebMD. Graduate level degrees, including DDS/DMD, PharmD, JD, PhD, and master's degrees of any type (MS, MA, MPH, and MBA), were identified. All surgeons in this study have a primary medical degree (MD, DO, MBBCh, or MBBS)—a prerequisite for board certification. Titles of assistant professor, associate professor, or professor were noted for each faculty member. Surgeons with titles of adjunct professor, clinical professor, instructor, or staff surgeon were grouped together in the "Other" category for academic rank. Plastic Surgery division or department chief and residency program director titles were considered leadership positions.

National Institute of Health (NIH) funding was determined using the Research Portfolio Online Reporting Tools database (https://projectreporter.nih.gov), which was queried for individual surgeons as principal investigators/project leaders. All funding types, including research grants (R series), career development awards (K series), research training and fellowships (T and F series), program project/center grants (P series), and resource grants, were included. Data on all available fiscal years were evaluated.

Number of published articles, citations, and *h*-index for each surgeon were obtained from Scopus (Elsevier Inc, New York, NY) (https://www.scopus.com/). All data were collected in May 2017.

Data were compiled in Microsoft Excel (Microsoft Corp, Redmond, WA), then transferred to SPSS (SPSS Inc, Chicago, IL) for statistical analysis. Men and women were evaluated independently. The student's *t*-test was used to compare means for continuous data. Fisher's exact test was used for categorical data. Factors known to influence academic productivity, including years in practice, academic rank,[18,19] leadership positions,[20] affiliation with an integrated residency program,[20] advanced degrees,[21] and NIH funding,[22] were considered to be potential confounding variables. Multivariate logistical regression was used to control for these. Tests were two-tailed, and results were considered significant for values of $P \leq 0.05$.

These data received exempt status from the Indiana University Institutional Review Board.

Results

A total of 814 plastic surgeons were identified from 91 accredited training programs in the United States. Mean years in practice was 15.3, and the majority was male (83.2%). Average number of published articles, citations, and *h*-index were 45.5, 974.9, and 11.6, respectively.

Compared to men, women had significantly fewer years in practice (9.9 *versus* 16.4, $P < 0.001$), held lower academic ranks (57.3% *versus* 33.9% assistant professor, $P < 0.001$ compared to 6.6% *versus* 29.0% full professor, $P < 0.001$), and published less (20.0 *versus* 50.2 articles, $P < 0.001$, and 7.3 *versus* 12.6 *h*-index,

Table 1 – Average years in practice and scholarly output by gender.

Variable	Female	Male	*P* value
n (total = 814)	136 (16.7%)	678 (83.3%)	<0.001
Years in practice	9.9	16.4	<0.001
Articles (number)	22	50.2	<0.001
Citations (number)	448.9	1080.4	<0.001
h-index	7.3	12.5	<0.001