

Does Diversity of Authorship Matter? An Analysis of Plastic Surgery's Top 100 Articles

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Background: Diversity, whether related to age, gender, ethnicity, race, geography, or experience, is increasing in all realms of medicine, including plastic surgery. Research has also become more diverse in those who conduct studies and those who participate in them. Fittingly, surgeons who produce prominent research are likely to come from diverse backgrounds. This study was designed to analyze the diversity of authorship in peer-reviewed plastic surgery journals.

Methods: Using the Web of Science database, the authors identified the 100 most-cited articles from the highest-impact plastic surgery journals from January 2010 to December 2020. Author, institutional, and topic information was collected.

Results: There was an average of 5.6 authors on the top 100 articles, of which 96.1% involved collaboration and 75.7% mixed-gender authorship. The average number of affiliations was 2.1, of which 51.5% involved cross-institutional collaboration, 12.6% came from both domestic and international institutions, 30.1% involved multiple specialties, and 10.7% came from both academia and private practice. Having both domestic and international authors was found to be most predictive of more citations on multiple regression, with year as a nonconfounding variable ($P < 0.05$), followed by mixed-gender authorship ($P < 0.10$).

Conclusion: Impactful publications in plastic surgery come from diverse sets of authors and institutions. (*Plast Reconstr Surg Glob Open* 2022;10:e4214; doi: [10.1097/GOX.0000000000004214](https://doi.org/10.1097/GOX.0000000000004214); Published online 24 March 2022.)

INTRODUCTION

Diversity has transformed the work environment across all occupations. Organizations run by diverse leaders at the board and consumer levels are more successful when inclusion and equity are primary tenets.¹ Medicine is not exempt from this.

It is estimated that public health will be further improved in less than a decade, when the amount of medical leaders from diverse backgrounds will be at a peak.² As for surgery, there is already a trend in increasing diversity as it relates to gender, ethnicity, and participation outside the operating room.³ Plastic surgery has had an increasing number of residents who are women^{4,5} and racial minorities,^{5,6} in addition to a movement toward depicting increased patient ethnic variety in social media.⁷ With women now accounting for

the majority of medical students in the United States and therefore gender parity being addressed, the “leaky pipeline” of women representation in plastic surgery leadership positions should begin to see fixes.^{8,9}

Within medicine and surgery, research is also amenable to changes in diversity over time, for both those who conduct studies and those who participate in them. The National Human Genome Research Institute is committed to unmasking variation in disease across different populations to maximize patient care.¹⁰ Surgeon age and experience is known to play a role in research output,¹¹ and funding of the top research in plastic surgery has been shown to come from different sources.¹²

The authors hypothesize that diversity stands to be a key element of success in medicine. By examining the most impactful articles in plastic surgery, and specifically analyzing diversity, one should be able to recognize its importance on the specialty and associated research, even if unknown or under-appreciated at the time of original publication.

METHODS

The Web of Science database was utilized to identify the 100 most-cited articles from the highest-impact plastic

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surgery-specific journals from January 2010 to December 2020. (See appendix, Supplemental Digital Content 1, which shows an alphabetized list of queried journals. <http://links.lww.com/PRSGO/B987>.) Ties at the number 100 spot were included for completion. Publication year and number of citations (excluding online ahead-of-print articles) were recorded. The number, gender (in this study, only the binary women and men were used, based on probabilities from naming databases), institutional affiliation, geographic location (domestic, international), specialty, and practice setting (academic, private) of authors were extracted from the articles themselves, as well as type of article (original article, experimental study, meta-analysis, randomized clinical trial, literature review) and category within plastic surgery (breast reconstruction, general reconstruction, aesthetic surgery, craniofacial surgery, hand surgery, microsurgery).

Descriptive statistics were carried out on all author, institutional, and topic variables. The list of articles was then deemed finite, and outliers from the number of citations dependent variable were determined using the robust regression and outlier removal (ROUT) method¹³ with a false discovery rate modifier (Q) of 5%. Simple linear regression was employed to assess year as a confounding variable with respect to number of citations. Multiple regression was subsequently conducted to identify the most predictive author and institutional independent variables of diversity. A *P* value less than 0.05 was considered statistically significant and less than 0.10 to be approaching statistical significance. Analyses were performed with Prism version 9.0.0 (by GraphPad: San Diego, Calif.).

RESULTS

Author (Table 1), institutional (Table 1), and topic (Table 2) information was obtained from 103 articles, published between 2010 and 2017, with citations ranging from 102 to 512. (See appendix, Supplemental

Takeaways

Question: Does diversity of authorship make a difference in plastic surgery literature?

Findings: The top articles in plastic surgery journals had an average of 5.6 authors with 2.1 affiliations; having both domestic and international collaboration was most predictive of more citations ($P < 0.05$), followed by mixed-gender authorship ($P < 0.10$).

Meaning: Diverse sets of authors and institutions publish impactful plastic surgery articles.

Digital Content 2, which shows list of studied articles. <http://links.lww.com/PRSGO/B988>.) There was an average of 5.6 authors (range 1–15) per article, which included 96.1% collaboration. In terms of gender, 75.7% of articles were written by mixed-gender authorship, while 23.3% were written homogeneously by men; only one article was homogeneously women. The research was sponsored by an average of 2.1 institutions (range 1–9), which included 51.5% collaboration. With regard to location, 55.3% of articles came from institutions within the United States, 32.0% from international institutions, and 12.6% from both (Table 2). Japan was the most common country of origin outside the United States. The authors came from plastic surgery and its subspecialties in 69.9% of articles, whereas 30.1% of articles involved multiple specialties. As for practice setting, 85.4% of articles were academic-based, 3.9% were private-based, and 10.7% were both. Original articles, including retrospective and prospective reviews, comprised 51.5% of the cohort, followed by literature reviews at 23.3%, experimental studies at 12.6%, meta-analyses at 9.7%, and randomized clinical trials at 1.0%. There was one case report and one survey. The most common subject was breast reconstruction, comprising

Table 1. Multiple Regression Analysis of Authors and Institutions from Outlier-excluded Articles

	Article Presence	Parameter Estimate*	95% Confidence Interval	<i>P</i>
Author collaboration				
Individual	3.9%	7.6	[-29.4, 44.7]	0.68
Group	96.1%			
Author gender				
All women	1.0%	-42.7	[-121.6, 36.2]	0.28
All men	23.3%	-13.9		
Mixed	75.7%			
Institutional collaboration				
Individual	48.5%	-9.4	[-24.0, 5.1]	0.20
Group	51.5%			
Institutional location				
United States	55.3%	-22.3	[-42.6, -2.1]	0.031‡
International	32.0%	-26.5		
Both	12.6%			
Institutional specialty				
Plastic surgery	69.9%	-0.2	[-13.9, 13.5]	0.98
Multiple	30.1%			
Institutional practice setting				
Academic	85.4%	14.9	[-5.8, 35.7]	0.16
Private	3.9%	17.5		
Both	10.7%			

*Number of citations above or below reference level.

† $P < 0.10$.

‡ $P < 0.05$.

Table 2. Per Article Topic Information

Type	
Original	51.5%
Experimental	12.6%
Meta-analysis	9.7%
Clinical trial	1.0%
Review	23.3%
Other	1.9%
Category	
Breast reconstruction	37.9%
General reconstruction	26.2%
Aesthetic	17.5%
Craniofacial	3.9%
Hand	2.9%
Microsurgery	6.8%
Other	4.9%

37.9% of the cohort, followed by general reconstruction at 26.2%, aesthetic surgery at 17.5%, microsurgery at 6.8%, craniofacial surgery at 3.9%, and hand surgery at 2.9%. Primary medicine and research techniques made up the remaining subjects.

The ROU method resulted in removal of 11 outliers. Year was not found to be confounding on simple linear regression ($P = 0.62$), indicating that an older article does not necessarily equate to more citations, and was therefore excluded from the multiple regression model (Table 1). Diversity of author gender, institutional collaboration, institutional location, and institutional specialty were associated with more citations. Only institutional location was found to be statistically significant ($P = 0.012$ for international-only institutions and $P = 0.031$ for domestic-only institutions); author gender approached statistical significance (specifically for men-only authored articles at $P = 0.091$). Diversity of author collaboration and institutional practice setting were not associated with more citations.

DISCUSSION

These data are promising: diversity of authorship, as it relates to gender, institutional geography (which could serve as a surrogate for cultural differences), and specialty of focus (relationships within and outside of plastic surgery), is present in the most-cited articles in the plastic surgery literature between 2010 and 2020. We have ascertained that having both domestic and international authors is most predictive of citations, followed by mixed-gender authorship. A future study would best be suited to determine whether such diversity has indeed increased over time or remained static.

This data is not surprising if one explores the business and management literature. Workplace creativity, innovation, morale, productivity, and retention have all been shown to improve when diversity is made a priority.^{14–16} Although the majority of research thus far has dealt with strictly superficial dimensions of diversity, such as gender, age, tenure, and race, there are notable positive associations between these elements and performance.¹⁷ Furthermore, organizations that invest in resources that take advantage of opportunities of diversity outperform the competition, and this benefit can be maximized by a

compounding effect.¹⁸ Additionally, mentorship is influenced by the inclusion of diversity.¹⁹ The alignment and quality of a mentor–mentee relationship is enhanced when the pool of mentors is diverse, allowing for new and wider understanding by the mentee.²⁰

The Harvard Business Review has investigated the role of diversity on financial returns of real-world companies, with results similar to those found in the current study. Public companies in the top quartile of ethnic diversity in management are 35% more likely to bring in revenue above the industry mean, and those in the top quartile of gender diversity (where it is “normatively” accepted) are 15% more likely, which is hypothesized to result from a greater reliance on facts.^{21,22} Forbes has also investigated how diversity affects the bottom line. Consistent across countries, a more diverse management team generates 19% more revenue because of a hypothesized tendency toward innovation.^{23,24} These findings may have implications for practice management within plastic surgery workplaces.

Our study, as well as those from other professions, exemplifies the need for diversity in all facets of medicine, including research. Authors should seek out advice from colleagues within different institutions, departments, and geographic regions, while remaining committed to nonexclusivity based on gender. This will result in more unique minds bringing together more original ideas that can be advanced by an even more diverse group.

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