

Evaluating Changes in the Language Used in Letters of Recommendations to Describe Men and Women Orthopaedic Surgery Residents Over the Past Decade

Elena K Dai, Cassandra Appiah-Ofori, Taishi G Ikeda, Avinash V Murthy, Lianna E Mack, Kathryn Lee Williams, Andrea Spiker

INTRODUCTION:

Orthopaedic surgery remains the most unequally distributed medical specialty in regards to gender. According to data from 2022, only 6.2% of practicing orthopaedic surgeons in the United States are women compared to 37.6% of the total physician workforce being women. This disparity within orthopaedic surgery is ever-slightly decreasing: 20.1% of active orthopaedic surgery residents in 2022-2023 were women and during the 2023-2024 residency application cycle, women represented 21.9% of total orthopaedic surgery applicants.

Letters of recommendation (LOR) are highly endorsed by residency program directors as being important in determining invitations for interviews and ultimately determining rank lists. Past studies have uncovered discrepancies in the language used to describe women and men applicants in LOR for a diverse set of specialties, despite similarities in academic and clinical performance. However in recent years, other studies have found no significant differences in the way that men and women applicants are written about in LOR, which could be an indication that medicine as a whole is trending towards a more unbiased use of language.

As the specialty with the most disparate gender gap in medicine, these findings come at a time when more women than ever are entering into the medical profession and orthopaedic surgery residency. Our goal is to provide data and analysis on if and how LOR, often from established faculty in the field, most of whom are men, have changed in language over the last decade when describing men and women applicants to orthopaedic surgery residency.

METHODS:

We included LOR from application packets of applicants invited to interview at a single orthopaedic surgery residency program from 2014-2022. LOR were either narrative passages from traditional LOR or electronic Standardized Letter of Recommendation (eSLOR). The body of each LOR was analyzed for total word count and frequency of words in distinct word categories using the Linguistic Inquiry Word Count (LIWC) software. Statistical analysis was done using t-tests and chi-square tests of association to look for gender dyad differences between men and women applicants and LOR authors. We used linear regression to analyze the interaction between gender and time and their effects on LIWC outcomes of interest. Alpha level was 0.05 and beta of 0.80.

RESULTS:

A total of 2,523 LOR from 667 interviewed applicants were included. Men comprised 77.2% (n=515) of all applicants and women were 22.8% (n=152). 89.7% (n=2,263) of LOR authors were men and 10.3% (n=260) were women. Women-authored LOR increased from 4.6% in 2014 to 14.3% in 2022. LOR written by women authors were on average 29 words longer than LOR written by men authors (p=0.0087), regardless of the gender of the applicant. There was no significant difference in overall change of word count within or between genders of the LOR authors over time. When evaluating all LOR, women wrote LOR with no significant difference between applicant gender in any of the word categories, excepting the categories of Male and Female. Men authored letters with higher scores for Clout (p=0.0041), Achieve (p=0.0039) and Power (p=0.0143) categories when writing about women applicants. Men authors used more words in the Research category (p=0.0054) and more use of the word "young" (p=0.0004) when writing about men applicants. Overall, use of the word "young" significantly decreased over the study period for all applicants (p < 0.0001), which matched an increase in average applicant age. Certain categories (Analytic, Tone, and Lifestyle) decreased over the study period for all applicants, while others (Authentic, Ability) increased. When evaluating the status of LOR word categories in relation to author academic rank, the higher the academic rank of the letter author, the less authentic tone their letter conveyed. This was found for both men (p < 0.0001) and women (p=0.0006) applicants when evaluating letters written by Professors, Associate Professors, and Assistant Professors. Similarly, LOR written by Professors had higher scores in the Clout category when compared to Associate and Assistant Professors, with p values of < 0.0001 for LOR of men applicants and p=0.0004 for LOR of women applicants.

DISCUSSION AND CONCLUSION:

Over the nine year study period, we found that while women make up a small percentage of LOR authors, they are writing letters that are more equal in word category use whereas men authors favor certain categories more when describing men or women applicants. These findings are true for LOR overall as well as remain stable with year-over-year trending. However, there has been fluctuation of the use of certain word categories as a whole, confirming that LOR writing likely responds to nuanced trends and changes in culture in how applicants are described, regardless of gender.

Women letter writers have greatly increased their foothold, with a more than threefold increase between 2014 and 2022 but they still wrote nearly tenfold fewer letters for orthopaedic applicants. With time, we may begin to see a greater shift towards LOR language parity in word categories as women authorship increases. However, as this study has found, the

current outcome of LOR language differences is driven by the male dominant field of orthopaedic surgery faculty who are writing letters, and who are doing so with clear distinction when either describing a man or a woman applicant.