# Gender Disparity in Orthopaedic Textbook Authorship: The Opportunity Gap

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INTRODUCTION:
Orthopaedic surgery is the least gender diverse medical specialty and extends from residency up through academic leadership positions, where males predominate. As scholarly productivity is an important metric for promotion up the ranks of academia, we aimed to explore if gender differences in orthopaedic textbook authorship exist between male academic orthopaedic surgeon (AOS) and female AOS textbook authors versus the proportion of those practicing in each subspecialty. Secondly, we aimed to determine if a statistically significant gender difference exists between the number of women versus men AOS given repeat authorship opportunities in orthopaedic surgery textbooks. Finally, we explored whether or not a difference is present in the distribution of authorship opportunities given to females versus males based on editor gender.
METHODS:
The most recent editions of the top three recommended textbooks from each orthopaedic sub-specialty were mined for professional and demographic characteristics of editors, contributors, section authors and chapter authors. Gender was assigned by cross-referencing author names to pronouns used on institutional websites they were affiliated with. Authors whose gender could not be classified by these means were excluded. A series of risk ratios with 95% confidence intervals (95% CI) were performed to assess the risk of decreased female authorship opportunities and recurrent authorship opportunities in orthopaedic surgical academic textbooks. A Poisson regression was performed to assess the risk of female authorship opportunities when a female was a book editor compared to no females as a book editor.
RESULTS:
Twenty-nine orthopaedic subspecialty textbooks were analyzed, with 3,462 authorship opportunities identified. Of those authorship opportunities, across all subspecialties, 57.9% were awarded to male academic orthopaedic surgeons (AOS) and 5.5% were offered to female AOS. The subspecialties with the highest and lowest female authorship percentages were pediatrics (17.5%:67.7%, f:m) and arthroplasty (0.7%:50.7%, f:m), respectively. Overall, female AOS were awarded significantly fewer authorship opportunities (8.7%) when compared to their numbers in practice (10%) [RR 0.85, p= 0.003]. Statistically significant disparities in authorship opportunities amongst female AOS, compared to their numbers in practice were also identified within the subspecialties of trauma [RR 0.63 (CI 0.48-0.84), $p < 0.001$], foot and ankle [RR 0.39 (CI 0.24-0.63), $p < 0.001$], and total joints [RR 0.38 (CI 0.13-0.99), $p = 0.029$].
Across all specialties, 35% of all men AOS authors were extended >1 authorship opportunity, compared to only 3% of all women AOS authors, with a risk ratio of 0.69 (p-value = 0.022). Looking at repeat authorship broken down by subspecialty, women AOS were awarded significantly fewer repeat opportunities in the fields of oncology [RR 0.43 (CI 0.23-0.81), $p < 0.001$], pediatrics [RR 0.44 (CI 0.26-0.75), $p < 0.001$], general orthopaedics [RR 0.47 (CI 0.29-0.76), $p < 0.001$], and foot and ankle [RR 0.30 (CI 0.09-0.99), $p = 0.004$].
DISCUSSION AND CONCLUSION:
Orthopaedic surgery is the least gender diverse medical specialty. This disparity extends from residency up through academic leadership positions, where males overwhelmingly predominate . When examining the reasons why women do not rise in the academic ranks as readily as men, several studies have identified a lack of mentorship, need for improved work-life integration, discrimination, and widespread implicit bias as causative factors. These are all subjective measures and, as such, are difficult to quantify. Scholarly productivity, measured in the form of journal publications, presentations at academic conferences, textbook authorship, and awards are all linked to career advancement and can be measured objectively. While the discrepancy in gender representation in many of these parameters has been well explored, there exists a gap in knowledge with regard to any potential disparity in orthopaedic textbook authorship. In the current study, we examined twenty-nine orthopaedic textbooks with 3,462 total authorship opportunities and found that only 5.5% of these were offered to women academic orthopaedic surgeons. Regarding repeat authorship, male AOS were ten times more likely to be extended more than one authorship opportunity compared to women AOS. Interestingly, the literature shows a correlation between increased women journal editors and a parallel increase in women accepted for journal publications. In light of this, we examined whether a similar pattern would be seen with orthopaedic textbook authorship. Our study shows that when an orthopaedic textbook had at least one female editor, the number of women academic orthopaedic surgeon authors increased by over three, a significant change.
Orthopaedic textbook authorship, an additional metric used to evaluate for academic promotion, is disproportionately offered to men over women. Our study provides a novel strategic target for increasing scholarly productivity for women in the field of academic orthopaedic surgery, and therefore, an avenue for career advancement.