The Race To Publish: The Role Of Research In The Orthopedic Surgery Match

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INTRODUCTION: In 2022, the average number of research publications reported by United States Medical Doctors (USMD) was found to be 16.5, 50.82% greater than the national average reported on a self-reported survey from the Electronic Residency Application Service (ERAS). However, this may be a misleading figure as ERAS categorizes abstracts, presentations, and peer-reviewed manuscript publications into one data point. The purpose of this study is to accurately represent the number of peer-reviewed publications from matriculants prior to submitting their applications into orthopedic surgery residency programs in the US. Furthermore, we distinguished the author's involvement in research through order of authorship and the publications submitted into orthopedic surgery-related journals. We hypothesize that matriculants in the class of 2027 will have higher research output given the trends seen over the past ten years.

METHODS: Orthopedic surgery residency programs were evaluated using the Doximity online website. The programs were identified using the website's residency navigator search tool which categorized the nation's orthopedic residencies based on reputation. The top, middle, and bottom ten programs were identified from the website. Only programs that were in the US were included in our study. Our study targeted matriculants into the class of 2023 and class of 2027, in order to evaluate for a trend in publications before and after the announcement of a pass/fail Step 1 exam. A literature search was performed for each individual resident to determine their history of work published by September 1st, on the year of their application submitted to residency; for residents in the class of 2023 the cutoff date was 09/01/2017, and for residents in the class of 2027 the cutoff date was 09/01/2021. Resident data was collected by searching their first and last name on PubMed and Google scholar. The last literature search was performed on August 6th, 2023. The authors of this study considered only the following as publications: Original research, case reports and series, review articles, systematic reviews, meta-analysis, and observational studies (retrospective,
prospective). The residents' authorship was confirmed by cross referencing their names and affiliations (medical school attended, undergraduate program attended, previous work history). The possibility of variations in the residents' names was also considered, especially in individuals who married and had their names legally changed or in residents who published under their preferred name instead of their full legal name. If the above steps were inconclusive, the residents' professional profiles on Doximity, ResearchGate, and LinkedIn were cross-checked for accuracy. The data collected was transferred to an excel file, which included the names of the residents, total publications, individual DOIs, order of authorship (first or second), and orthopedic journal-associated publications. The primary outcome measure was total number of publications. Secondary outcome measures included number of first and second author contributions and total number of publications submitted into orthopedic-associated journals. Mean and standard deviation statistical analyses were completed on Microsoft Excel. 1-way ANOVA and 2-sample T-test analyses were completed on SAS.

RESULTS SECTION: Ten programs from each tier (top, middle, bottom) were identified through Doximity. Matriculants into the class of 2023 and class of 2027 were analyzed for research productivity prior to applying for the orthopedic surgery match. The class of 2023 consisted of 42 residents from top-tier, 34 residents from middle-tier, and 29 residents from bottom-tier. The class of 2027 consisted of 78 residents from top-tier, 53 residents from middle-tier, and 28 residents from bottom-tier. The average total publications including all tiers for the class of 2023 was 2.33 and for the class of 2027 was 3.92 (Table 1). A 2-sample T-test analysis demonstrated that the class of 2027 had a significant increase ($p<0.05$) in all outcome measures to the class of 2023 (Table 2). 1-way ANOVA analyses demonstrated that class of 2023 matriculants into top-tier programs had increased number of total publications, second author contributions, and publications into orthopedic surgery-associated journals. Class of 2027 matriculants into top tier programs had increased total publications, first and second author contributions, and publications into orthopedic surgery-associated journals (Table 3).

DISCUSSION: The class of 2027 was the second matriculating class into orthopedic surgery residency after the announcement of a pass/fail grading system for the United States Medical Licensing Examination Step 1. However, the implementation of this grading scheme would take into effect in the year 2022, affecting applicants applying for orthopedic surgery residency class of 2029. The 10-year trend in orthopedic surgery residency has shown an increase in competitiveness from an increased ratio of applicants to available residency program seats. Self-reported surveys by ERAS have also suggested an increase in research productivity over the past ten years. A future study investigating the effects of a pass/fail Step 1 exam on research productivity can shed more light on the ongoing competitive nature of matching. There was consistency in the increased research productivity between the top-tier programs and the middle and low-tier programs. Top-tier programs have historically emphasized academia and research, demonstrated by the increased total publications and second-author contributions of in the class of 2023.

SIGNIFICANCE/CLINICAL RELEVANCE: With the announcement of the most important exam of a student's application (Step 1) changing into a pass/fail grading scheme, program directors will have to consider other aspects of an application when determining the best-fit candidates. With the ever-increasing competitiveness of matching into orthopedic surgery residency, there may be an "arms-race" to publish.

IMAGES AND TABLES:

Table 1. Mean and standard deviation analyzed for high-tier, middle-tier, and low-tier programs for the graduating residency classes of 2023 and 2027.

2023

	First Author	Second Author	Total Publications	Total Ortho Pubs
Top Tier	1.75 (1.51)	1.25 (1.02)	3.92 (2.48)	2.67 (2.57)
Middle Tier	0.23 (0.50)	0.39 (0.67)	1.11 (1.58)	0.62 (1.46)
Bottom Tier	0.07 (0.28)	0.20 (0.53)	0.31 (0.82)	0.18 (0.75)
Total Sample	0.86 (1.37)	0.90 (1.33)	2.33 (2.41)	1.24 (2.27)

2027

	First Author	Second Author	Total Publications	Total Ortho Pubs
Top Tier	2.20 (2.47)	1.90 (1.83)	8.53 (6.79)	5.20 (5.38)
Middle Tier	0.57 (0.81)	0.57 (0.91)	2.36 (2.98)	1.38 (1.93)
Bottom Tier	0.33 (0.54)	0.11 (0.31)	1.33 (2.18)	0.89 (1.97)
Total Sample	1.07 (2.00)	0.77 (1.53)	3.92 (5.69)	2.29 (4.15)

Table 2. 2-sample T-test analysis between the class of 2023 and class of 2027.

First Author	Second Author	Total Publications	Ortho Publications
-2.50 (0.0133)	-2.72 (0.0072)	-3.45 (0.0007)	-2.91 (0.0040)

Table 3. 1-way ANOVA analyses comparing top-tier, middle-tier, and low-tier residency programs within the class of 2023 and class of 2027.

2023

First Author	Second Author	Total Publications	Ortho Publications
2.87 (0.0611)	4.64 (0.0118)	6.59 (0.002)	3.67 (0.029)

2027

First Author	Second Author	Total Publications	Ortho Publications
4.76 (0.0098)	6.01 (0.0031)	8.08 (0.0005)	6.81 (0.0015)