Research Productivity in Home vs. External Orthopaedic Surgery Residents: A Quantitative Multicenter Analysis

Frances Akwuole B.S., Cole Christenson M.S., Freddy Jacome B.S., James MacLeod M.D., Omar Shaikh B.S., Vincent Parise B.S., Sara Ungerleider B.A., Sanders Salomon B.S., Avani Chopra B.S., Annemarie Leonard M.D., Alfonso Mejia M.D., MPH, Max McDonnell B.S.

Western Michigan University Homer Stryker M.D. School of Medicine, Kalamazoo, MI

INTRODUCTION

The number of applicants for orthopedic surgery residencies has increased over the past five years, while the match rate of US MD applicants into orthopedic surgery residency programs has decreased [1]. **In the 2024 match cycle, there was 1,492 applicants competing for 916 orthopedic surgery residency positions, a match rate of 61.4%** [1]. Variables influencing match success include having a home program, access to specialty-specific mentors, clinical exposure, and research experience.

During the COVID-19 pandemic, restrictions on away rotations have increased the advantage of home applicants as evidenced by a **shift in the rate of residency positions filled by home applicants from 21.8% from 2017-2020 up to 28.2% in the 2021 match cycle** [2]. To date, there are no studies comparing the research statistics of home program applicants to those of external applicants. This study compares the research productivity of residents who matched into their home orthopedic surgery programs to those who matched at external institutions, with an emphasis on metrics including **total publications, first-author publications, H-index, and Alpha Omega Alpha (AOA) membership rates.**

METHODS

Data on **3,034 orthopedic surgery residents** from **116 ACGME-accredited programs** were acquired from publicly available program websites and social media pages between February and April 2024 (PGY 1-5, 2019-2023). Home residents were defined as graduates of the affiliated medical, while external residents were graduates of other institutions. Python scripts were developed to ensure accuracy in publication data collection, accounting for name variations. Study metrics included **total publications, first-author publications, H-index, and AOA membership.** Geographic analyses were divided into Regions 1 (Northeast, NE), 2 (Midwest, MW), 3 (South, S), and 4 (West, W), based on ERAS regions. Given the unequal sample sizes of home and external residents, results were analyzed using **Welch's t-test** and statistical comparisons were performed using GraphPad Prism software with statistical significance set at $P < 0.05$. *Exclusion Criteria* included:

- Programs with <10% or >50% home residents
- Programs affiliated with osteopathic (D.O.) medical schools
- Programs without an affiliated allopathic (M.D.) medical school
- Programs affiliated with U.S. Armed Services
- International medical applicants

RESULTS

Table 1: Research Productivity and AOA Status by Sub-Cohort

Study Parameters	External Residents	Internal Residents	*P*-value
Total Residents = 3,034	2,247 (74.1%)	787 (25.9%)	-
Female Applicants	553 (24.6%)	169 (21.2%)	0.06
AOA Members	675 (30.0%)	229 (29.1%)	0.65
Avg. Total Publications	4.33	3.79	0.08
Avg. First-Author Publications	**1.23**	**0.91**	**0.01**
Avg. H-index of Publications	1.26	1.17	0.23

Table 2: Number of Orthopaedic Surgery Residency Programs and Residents by Region

Region	No. of Included Residency Programs	No. of External Residents Included	No. of Internal Residents Included
Region 1 (NE)	28	600	190
Region 2 (MW)	28	590	194
Region 3 (S)	39	679	287
Region 4 (W)	19	378	116

Table 3: Number of Total Publications by Region

Region	External Residents	Internal Residents	*P*-value
Region 1 (NE)	**6.292**	**4.758**	**0.01**
Region 2 (MW)	3.651	2.912	0.06
Region 3 (S)	3.439	3.307	0.82
Region 4 (W)	3.878	4.862	0.24

Table 4: Number of First-Author Publications by Region

Region	External Residents	Internal Residents	*P*-value
Region 1 (NE)	**1.745**	**1.153**	**0.01**
Region 2 (MW)	1.032	0.8247	0.13
Region 3 (S)	0.9264	0.7143	0.12
Region 4 (W)	1.241	1.138	0.64

CONCLUSION

Of the 3,034 residents, 787 residents had matched into their home orthopedic surgery programs, while 2,247 residents matched into residency programs that were not affiliated with their medical school. The average number of total publications for external residents and internal residents was 4.33 and 3.79 ($P = 0.08$), respectively. There was a **statistically significant difference in the number of first-author publications as external residents had an average of 1.23 first-author publications and home residents had an average of 0.91 ($P = 0.01$).**

In Region 1 (NE), a statistically significant difference was observed in the average number of first-author publications *and* total publications with home residents in this region averaging **1.15 first-authorships and 4.76 total publications compared to an average 1.74 first-authorships and 6.29 total publications for external residents ($P = 0.01$, 0.01, respectively).** Conclusively, applicants who matched at their home institution had, on average, **12.5% fewer total publications and 26% fewer first-author publications compared to their external resident counterparts.** These findings suggest home residents benefit more from subjective factors, such as institutional familiarity, while external applicants rely more on objective metrics, such as research productivity.

ACKNOWLEDGEMENT & FUTURE DIRECTION

We would like to thank the Department of Orthopedic Surgery at the UIC College of Medicine and Northwestern University Feinberg School of Medicine for their guidance. With their help, we hope to continue research at the intersection of medical education and orthopedic surgery; namely, we want to explore the relationship between external students' match success and their decisions regarding away rotations.

REFERENCES

[1] National Resident Matching Program. Results and Data: 2024 Main Residency Match. Published June 28, 2024. Available from: https://www.nrmp.org/match-data/2024/06/results-and-data-2024-main-residency-match/

[2] Nestler AJ, Feibel BM, Beason AM, Besserman K, Mounce SD, Baily JR, Delfino KR, Allan DG. The Student You Know: Orthopedic Surgery Home Program Match Rates and Geographic Relationships Before and After COVID-19. J Surg Educ. 2023 Mar;80(3):476-482. doi: 10.1016/j.surg.2022.10.011 Epub 2022 Nov 23. PMID: 36435733; PMCID: PMC9682412.