Journal of Orthopaedic Experience & Innovation
Clinical, Economic, and Innovative Orthopaedic Experience

Acevedo, Daniel, Kiranjit Kaur, Colton C. Mowers, Garrett R. Jackson, Vani J. Sabesan, and Aghdas Movassaghi. 2024. "Promoting Diversity in Orthopedic Surgery Residency Programs: A Cross-Sectional Analysis of Visiting Student Diversity Scholarships." *Journal of Orthopaedic Experience & Innovation*, November. https://doi.org/10.60118/001c.122554.

Research Article

Promoting Diversity in Orthopedic Surgery Residency Programs: A Cross-Sectional Analysis of Visiting Student Diversity Scholarships

Daniel Acevedo[1a], Kiranjit Kaur[1b], Colton C. Mowers[2c], Garrett R. Jackson, MD[3d], Vani J. Sabesan, M.D[3e], Aghdas Movassaghi, BS[4f]

[1] Nova Southeastern University Dr. Kiran C. Patel College of Allopathic Medicine, [2] Orthopaedic Surgery, Rush University Medical Center, [3] Orthopaedic Surgery, HCA Florida JFK Hospital, [4] HCA Florida JFK Hospital

Keywords: Underrepresented in medicine, orthopaedic surgery, diversity, scholarships, medical students, away rotations

https://doi.org/10.60118/001c.122554

Journal of Orthopaedic Experience & Innovation

a Daniel Acevedo is a medical student at Nova Southeastern University pursuing a career in orthopaedic surgery.

Connect with Daniel Acevedo on LinkedIn

Conflicts of Interest Statement for Daniel Acevedo

b Kiranjit Kaur is a fourth year medical student at Nova Southeastern, Dr. Kiran C Patel College of Allopathic Medicine.

Conflicts of Interest Statement for Kiranjit Kaur

c Colton Mowers received his bachelor's degree in Genetics with a certificate in Leadership from the University of Wisconsin – Madison and is currently an M.D. candidate class of 2026 at Rush Medical College. Colton's current research focuses on implant pathology and corrosion properties in failed total shoulder arthroplasty (TSA) prostheses. Future work will also be aimed at novel identification techniques of periprosthetic joint infections in TSAs. Past research includes medial collateral ligament (MCL) repair and construction, along with genetic analysis and manipulation using CRISPR in mouse models.

Conflicts of Interest Statement for Colton Mowers

d Dr. Garrett Jackson is an orthopaedic surgery resident at the University of Missouri School of Medicine. Prior to residency, he served as a research fellow at Rush University Medical Center with a focus on sports medicine injuries, joint preservation, and meniscus/cartilage restoration. Dr. Jackson has authored over 100 peer-reviewed journal articles in prestigious scientific journals and contributed to numerous book chapters. He has presented his research at both international and national orthopaedic conferences, demonstrating his commitment to advancing orthopaedic research and practice.

Connect with Dr. Garrett Jackson on LinkedIn

Conflicts of Interest Statement for Dr. Garrett Jackson

e Dr. Vani Sabesan is a board-certified Orthopaedic Surgeon and Shoulder and Elbow specialist in Palm Beach, FL. She served as program director for a new orthopaedic residency program at JFK/University of Miami, Chief of Quality Officer, and held the Lang Family Endowed Chair in Orthopaedic Research at Cleveland Clinic Florida. Before that she served as program director for the Orthopaedic Surgery Residency program at Beaumont/Wayne State University in Detroit, MI. She has mentored over 100 medical students and 50 residents. Dr. Sabesan completed her undergraduate degree from Duke University majoring in Biology and Religion. She went on to earn her medical degree from Indiana University School of Medicine and a Doris Duke Clinical Research Fellowship in Orthopaedic Surgery at the University of Iowa. After this she completed an Orthopaedic Surgery residency at Duke University Medical Center and received her fellowship training in Shoulder and Elbow Surgery/Sports Medicine at the Cleveland Clinic. Dr. Sabesan is passionate about research and leadership in her Orthopaedic community. She has published over 100 articles in the peer reviewed literature and has served on a number of regional, national, and international committees and boards. She is committed to educating and training the next generation of orthopaedic surgeons and is passionate about increasing diversity in our field.

Visit Dr. Vani Sabesan

Connect with Dr. Vani Sabesan on LinkedIn

Conflicts of Interest Statement for Dr. Vani Sabesan

Visit the Open Payments Data Page for Dr. Vani Sabesan

f Aghdas Movassaghi is a rising 4th year medical student at Michigan State University College of Human Medicine, pursuing a career in orthopaedic surgery. Aghdas is currently completing a research fellowship year under Dr. Sabesan, with a focus on improving gender diversity and inclusion in orthopaedics, as well as investigating clinical outcomes in shoulder arthroplasty. Her research interests include examining the impact of gender and racial bias in surgical literature and optimizing patient outcomes in orthopaedic procedures.

Visit Aghdas Movassaghi

Conflicts of Interest Statement for Aghdas Movassaghi

Background

Underrepresented minority students in medicine (URiM) encounter numerous obstacles while pursuing careers in medicine. One significant challenge is the financial burdens of pursuing a career in medicine. Specifically the application process for residency away rotations can be financially costly, and these rotations have become increasingly vital for medical students to match into competitive specialties. Because of these financial obstacles, residency programs have implemented visiting student diversity scholarships to alleviate this financial burden and foster diversity in orthopedic surgery. The aim of this investigation was to provide a comprehensive review and centralized source of information for the growing number of student diversity scholarships for away rotations in orthopedic surgery.

Methods

We conducted a cross-sectional analysis of ERAS-participating orthopedic surgery programs (n=203) from the 2023/2024 application cycle. The study utilized residency and program web domains to collect information on the monetary value of the scholarship, number of scholarships being offered, eligibility criteria, and required application documents.

Results

This study found that approximately 34% (n=67) of programs offer a scholarship for URiM visiting medical students. The average number of scholarships offered per program was 5 ± 4.6 with an average value per scholarship of $1,856.6 ± $706.6. Most programs defined eligibility of URiM status in a statement similar to that of the AAMCs. Low socioeconomic status was accounted for in 8 (11.9%) programs. Most programs (90%) catered only to 4th-year medical students, 15 required USMLE Step 1 scores, and 16 required letters of recommendation. The application deadline was anywhere from January 30th to June 30th of that year.

Conclusion

This study serves as a centralized resource for URiM students seeking away rotations in orthopedic surgery. It is encouraging to see numerous URiM scholarships are available and enhancing their availability will advance inclusivity in the field. Perhaps programs can collectively list their URiM scholarships on the AAMC website to increase awareness and encourage application for these resources which will hopefully positively impact our field of orthopaedic surgery.

INTRODUCTION

The underrepresentation of minority groups in orthopedic surgery is a pressing issue in the United States. Despite the growth of minority populations, their representation in the field remains limited (Brotherton and Etzel 2019; Poon, Kiridly, Mutawakkil, et al. 2019; Adelani, Harrington, and Montgomery 2019) which is particularly concerning considering the importance of patient-physician racial concordance to improve patient care, increase patient involvement in decision-making, and improve patient satisfaction (Cooper-Patrick, Gallo, Gonzales, et al. 1999; Cooper et al. 2003; Saha, Arbelaez, and Cooper 2003; Kundhal and Kundhal 2003; Ramirez and Franklin 2019; Jetty et al. 2022). Thus, increasing race concordance through enhancing diversity in orthopaedic surgery should be a priority to optimize patient care.

It remains crucial to improve physician diversity in orthopedic surgery by increasing physicians considered underrepresented in medicine (URiM). URiM is defined by the Association of American Medical Colleges (AAMC) to describe racial and ethnic populations that are underrepre-

sented in the medical profession relative to the general population ("Underrepresented in Medicine Definition," n.d.). Previously underrepresented minority (URM) was the term used before the adoption of URiM in 2006. The definition of URiM is more open and adaptable to reflect the changing demographics of society. The lack of diversity in orthopedics extends beyond URiM students; women are also largely underrepresented in the specialty (Scerpella et al. 2022; Heest, Agel, and Samora 2021) which stems from the low number of URiM and women students applying to orthopedic residency (Poon, Nellans, Rothman, et al. 2019; Day, Lage, and Ahn 2010).

Reasons for this underrepresentation range from a perceived lack of diversity in the field, stereotypes of the field, and a lack of mentorship and exposure (Okike et al. 2020, 2019; Hill et al. 2013; Winfrey et al. 2022; Rahman et al. 2021). To address these challenges, early exposure to orthopedics during medical school, such as through structured courses, can increase interest in the field and provide valuable mentorship opportunities (Bernstein, Dicaprio, and Mehta 2004). Additionally, away rotations during the fourth year of medical school offer increased exposure, mentorship, and insights into different residency programs. Completing just one orthopedic rotation has been shown to improve URiM student perceptions of diversity and inclusion within the specialty (Rahman et al. 2021), potentially leading to increased interest in pursuing orthopedics.

Away rotations are considered essential for a strong residency application, especially in orthopedics (Andrews et al. 2016). The likelihood of matching at a program where students have rotated increased by approximately 50% (Camp, Sousa, Hanssen, et al. 2016; Higgins et al. 2016; Baldwin et al. 2009). Therefore, orthopedic surgery applicants typically incur higher total costs due to completing more away rotations compared to other specialties. However, the cost of away rotations can be a significant barrier. On average orthopedic surgery applicants spend approximately $2,850 on away rotations, compared to an overall average of $950 across all specialties (O'Donnell et al. 2017; Winterton, Ahn, and Bernstein 2016). The financial burden may deter URiM students from applying for orthopedics, further perpetuating the lack of diversity. To address this issue, many programs have implemented away rotation scholarships for URiM medical students. However, navigating the Visiting Student Learning Opportunities (VSLO) catalog and program-specific websites containing various program requirements, deadlines, and fees can be time-consuming and challenging. Additionally, some programs may not use VSLO, which students may overlook. Thus, the aim of this investigation was to provide a comprehensive review and detailed analysis of visiting rotation scholarships for URiM students in orthopedic residency programs.

METHODS

STUDY DESIGN

A comprehensive search was conducted by two authors (initials blinded for peer-review) by querying the Fellowship and Residency Electronic Interactive Database (FREIDA) of the American Medical Association (AMA) in June 2023 for all ACGME (Accreditation Council for Graduate Medical Education) accredited orthopedic surgery residency programs listed as participating in ERAS. Each institutional and program website, Google.com, Instagram.com, and Twitter.com were thoroughly searched for URiM scholarships, as defined by the individual program/institution, for visiting 3rd and 4th-year medical students. Multiple programs included women and LGBTQIA+ in their definition of URiM. Scholarships that were not directly provided by the orthopedic surgery department, or the institution at large, were excluded. If a scholarship could be used to rotate on specialties other than orthopaedic surgery, it was included in our study so long as orthopaedic surgery was one of the specialties available to rotate on. If the scholarship did not include orthopaedic surgery as an available specialty, it was not included in our study. Scholarships for opportunities that were not a formal away rotation, such as summer research programs, were also excluded.

DATA COLLECTION

Data extraction was performed by two research students and entered into a spreadsheet using Microsoft Excel version 16.63 (Microsoft Corp, Redmond WA). Data included the program name, post-graduate year-1 class size, program type (community, community with university affiliation, and university), regions as defined by the AAMC [East South Central (AL, KY, MS, TN), East North Central (IL, IN, MI, OH, WI), Mid-Atlantic (DE, DC, MD, NJ, NY, PA), Mountain (AZ, CO, ID, MT, NV, NM, UT, WY), New England (CT, ME, MA, NH, RI, VT), South Atlantic (FL, GA, NC, SC, VA, WV), Pacific (AK, CA, HI, OR, WA), West South Central (AR, LA, OK, TX), West North Central (IA, KS, MN, MO, NE, ND, SD), and Territories (PR, GU, VI, AS, MP)], number of scholarships offered, the monetary value of the scholarship, application deadline, availability to 3rd and/or 4th-year students, if a mentor/advisor is provided, if housing is provided, and required application documents (personal statement, letters of recommendation, curriculum vitae [CV], photographed headshot, transcript, United States Medical License Exam [USMLE] Step 1 score).

STATISTICAL ANALYSIS

Descriptive statistics were used to report demographic characteristics of each program. Categorical variables were presented as counts with percentages. Continuous variables were presented as mean ± standard deviation. Two-sided Student's t-tests and chi-squared tests were used to assess differences between the number of scholarships offered by university-based programs compared to all other program types. The level of significance was established at a two-sided alpha level of $p<0.05$. All statistical analyses were performed utilizing R (version 4.2.2; R Foundation for Statistical Computing).

RESULTS

RESIDENCY PROGRAM DEMOGRAPHICS

A total of 202 programs were initially identified, of which, 67 (33.2%) programs offered a scholarship for URiM visiting medical students. Most programs defined eligibility of URiM status in a statement similar to the AAMC's. Low socioeconomic status was accounted for in 8 programs (11.9%). Fifty-six programs were university-based (83.6%) and 5 were community-based, and 6 were community-based with university affiliation. Twenty-two (32.8%) institutions specified the number of scholarships being offered (mean, 5 ± 4.6; range, 1 – 20). Thirty-three (49.3%) programs offered orthopedic-specific scholarships, whereas 34 (50.7%) programs offered scholarships for multiple specialties including orthopedic surgery **(Table 1)**.

SCHOLARSHIP CHARACTERISTICS

The average value per scholarship was $1,856.56 ± $706.60 (range, $500 - $4000). Four scholarships (6%) did not report the monetary value of the scholarship. The application deadline ranged from January 30th, 2023 to June 30th, 2024 of the academic year for the 46 (68.7%) programs that listed deadlines. Three (4.5%) programs reported a fee associated with the application, ranging from $15 to $200. Most programs (90%) catered only to 4th-year medical students; 7 (10.4%) programs allowed 3rd-year students to apply. One program offered a stipend solely for out-of-state students. Nineteen programs (28.4%) provided visiting students with an advisor or mentor. Two (3%) programs provided on-campus housing, whereas one (1.5%) provided off-campus housing **(Table 1)**.

APPLICATION REQUIREMENTS

As for application requirements, twenty-two programs (32.8%) required a letter of recommendation (range, 0 – 3) with 14 programs only requiring one. Fifty-three programs (79.1%) required an essay, with an average number of essays being 1 ± 0.7 (range, 0 - 3). Seven programs (10.4%) required a letter from a dean. Twenty-two programs (32.8%) required a CV, 19 programs (28.4%) required a transcript, 17 programs (25.4%) required a personal statement, 15 (22.4%) programs required a USMLE Step 1 score, and 7 programs (10.4%) of programs required a photo **(Table 2)**.

DISCUSSION

URiM students face many obstacles, including the financial burden of away rotations, which have become crucial for their careers. These rotations cost around $2,000 on average, posing a significant barrier, especially for URiM students from low socioeconomic backgrounds. To address this, orthopedic surgery residency programs have introduced diversity scholarships for visiting students, aiming to alleviate the financial burden and promote diversity. This investigation provides a comprehensive source of information on funded opportunities for URiM students seeking away rotations in orthopedic surgery. Our study revealed that in 2023 33.1% of graduate medical education orthopedic surgery programs currently offer URiM visiting student scholarships, indicating almost 1/3 of all GME programs offered some type of support for URiM visiting student scholarships in orthopedic programs. This is very encouraging that orthopedic residency programs understand the importance of promoting exposure to their programs and see the economic burden away rotations can place on students. Notably, of these programs that offered scholarships, most (83.6%) were university-based, and hopefully future efforts can be made to provide community-based program visiting scholarships enhancing this pipeline of URiM students, as the need for diversity in our communities is equally important. Interestingly, our study also uncovered that certain scholarship programs lacked clear guidelines and crucial information, such as stipend amounts or application requirements on their respective websites. Hopefully, our study can help encourage programs to provide the additional information needed and enhance their recruitment efforts for this type of support for URiM students. Our results demonstrated the majority of URiM visiting student scholarships were offered by university programs (83.6%). These findings suggest that university programs may demonstrate greater sensitivity or increased resources put toward diversity recruitment initiatives. The impact of these scholarships has been previously assessed in emergency medicine, where these programs have successfully increased diversity within their respective programs (Duong et al. 2021). Broadening scholarship opportunities will be crucial to increasing diversity in all residency training programs and practice settings. Community programs not only have important outreach opportunities but are critical for care concordance given many residents remain in or near the communities in which they train. From our results we report that the prevalence of these opportunities is mainly offered at university programs, therefore encouragement for expansion for a wider range of programs is important as we continue to move forward.

Beyond their practical benefits, offering URiM scholarships also serves as a testament to a program's commitment to cultivating a diverse community of trainees. According to the 2017 National Resident Matching Program Applicant Survey, 37% of applicants across all specialties considered the cultural, racial, ethnic, and gender diversity of an institution as an important factor when selecting programs to apply ("Program NRM: Results of the 2017 NRMP Applicant Survey by Preferred Specialty and Applicant Type.," n.d.). Recognizing that prospective applicants primarily rely on program websites to gather information; we utilized both program and institution websites to identify URiM scholarships. While these scholarships can serve as an indicator of a program's dedication to diversity, it is essential to acknowledge that there is a limited number of URiM applicants competing for these positions. Therefore, it becomes imperative to implement additional initiatives earlier in a student's medical school career, such as mentorship programs focusing on rotation choices, career trajec-

Table 1. Orthopaedic Surgery Residency Programs which offered a URiM Scholarship for the 2023/2024 Application Cycle.

Program Name	PGY-1 Class Size	University- vs Community-Based	No. of Scholarships	Specialties Offered	Scholarship Amount	Application Deadline	Application Fee	3rd and/or 4th Year Students	Out of State Students Only	Mentor/Advisor Provided	Housing Provided
Case Western Reserve University/University Hospitals Cleveland Medical Center	6	University	5	Many	$2,500	1/30/23	$0	4th	NR	NR	Off-Campus
Albert Einstein College of Medicine Montefiore Medical Center	6	University	9	Many	$2,000	2/15/23	$200	4th	NR	NR	On campus
Alliance of Minority Physicians - University of Pennsylvania Health System	6	Community	NR	Orthopaedic Surgery	$1,000	5/1/23	$0	4th	NR	Yes	NR
Atrium Health	6	University	NR	Many	$2,000	NR	$0	Both	Yes	Yes	NR
Baylor University Medical Center	5	University	NR	Orthopaedic Surgery	$2,000	3/1/23	$0	4th	NR	NR	No
Brown University	6	University	NR	Many	$1,500	NR	$0	4th	NR	Yes	NR
Cedars-Sinai Medical Center	5	University	NR	Many	$2,000	4/1/23	$0	4th	NR	NR	NR
Cleveland Clinic	6	University	NR	Orthopaedic Surgery	$2,000	3/3/23	$0	4th	NR	NR	NR
1. Columbia/New York Orthopedic Hospital 2. Columbia/New York Orthopedic Hospital (Pride Orthopaedics)	5	Community-based University Affiliated	NR	Many	1. $1,500 2. NR	6/1/23	$0	1. Both 2. 4th	NR	Yes	On Campus
Community Memorial Hospital	5	University	NR	Many	$2,000	NR	$0	Both	NR	NR	NR
George Washington University	5	University	12	Many	$1,500	5/30/23	$0	4th	NR	Yes	NR
Henry Ford Health	7	University	NR	Many	NR	NR	$0	4th	NR	NR	NR
Howard University Hospital	6	University	2	Orthopaedic Surgery	$4,000	5/1/23	$0	4th	NR	Yes	NR
Icahn School of Medicine	3	Community	12	Many	$1,000	NR	$0	4th	NR	Yes	NR
Indiana University School of Medicine	6	University	4	Orthopaedic Surgery	$1,500	NR	$0	4th	NR	NR	NR
John Peter Smith Health Network	4	University	4	Orthopaedic Surgery	$3,500	6/16/23	$0	4th	NR	Yes	NR
Lenox Hill Hospital	6	University	3	Orthopaedic Surgery	$1,000	5/1/23	$0	4th	NR	NR	NR
Lewis Katz School of Medicine	6	University	2	Orthopaedic Surgery	$1,200	4/21/23	$0	4th	NR	Yes	NR
Louisiana State University School of Medicine	4	University	NR	Many	$1,500 to $2,000	4/24/23	$0	4th	NR	NR	NR
Loyola University Medical Center	5	University	NR	Orthopaedic Surgery	$2,500	4/17/23	$0	4th	NR	Yes	NR
Mayo Clinic - Rochester	6	University	NR	Orthopaedic Surgery	$3,500	3/31/23	$0	4th	NR	NR	NR
Mayo Clinic - Arizona	7	University	NR	Many	$3,700	4/21/23	$0	3rd	NR	NR	NR
McGaw Medical Center of Northwestern University	2	Community	2	Orthopaedic Surgery	$2,000	NR	$0	4th	NR	Yes	NR
Medical College of Wisconsin Affiliated Hospitals	4	University	NR	Orthopaedic Surgery	$1,000	NR	$0	4th	NR	NR	NR
Medical University of South Carolina	14	University	2	Orthopaedic Surgery	$2,000	6/30/23	$0	4th	NR	Yes	NR
MedStar Health/Georgetown University Hospital	4	University	NR	Orthopaedic Surgery	$2,500	5/15/23	$0	4th	NR	NR	NR
New York University Grossman School of Medicine	6	University	NR	Many	$2,000	3/8/23	$0	3rd	NR	Yes	NR
New York University Langone (Pride Orthopaedics)	8	University	2	Orthopaedic Surgery	$1,500	4/24/23	$0	4th	NR	NR	NR
Ohio State University	8	University	NR	Many	$2,000	NR	$0	4th	NR	NR	NR
Oregon Health & Science University	8	University	NR	Many	$1,000	6/9/23	$0	4th	NR	Yes	NR
Rush Medical College	3	Community-based University Affiliated	NR	Many	$2,500	3/31/23	$0	4th	NR	NR	NR
Rutgers New Jersey Medical School	4	University	NR	Many	$1,500	NR	$0	4th	NR	NR	NR
Spectrum Health	6	University	3	Orthopaedic Surgery	NR	NR	$0	4th	NR	NR	NR
Stanford University	6	University	NR	Many	$1,000 to $2,000	NR	$15	4th	NR	NR	NR
University of Massachusetts Chan Medical School - Baystate	5	University	NR	Many	$500	NR	$0	4th	NR	NR	NR

Program Name	PGY-1 Class Size	University- vs Community-Based	No. of Scholarships	Specialties Offered	Scholarship Amount	Application Deadline	Application Fee	3rd and/or 4th Year Students	Out of State Students Only	Mentor/Advisor Provided	Housing Provided
University of Alabama	5	University	NR	Many	$1,500	5/8/23	$0	4th	NR	Yes	NR
University of Arizona College of Medicine -Tucson	3	University	NR	Orthopaedic Surgery	$2,500	3/1/23	$0	4th	NR	Yes	NR
University of Arkansas for Medical Sciences	5	University	NR	Orthopaedic Surgery	$1,500	4/1/23	$0	4th	NR	NR	NR
University of California Medical Center (San Diego, CA)	4	Community	20	Many	$2,500	NR	$0	4th	NR	NR	NR
University of California Medical Center (San Francisco, CA)	4	Community	NR	Many	$3,000	3/25/23	$0	4th	NR	Yes	NR
University of California Medical Center - Fresno	5	University	NR	Orthopaedic Surgery	$2,000	End of 2/23	$0	4th	NR	Yes	NR
University of California Davis Health	7	University	NR	Many	$2,000	4/23/23	$0	4th	NR	NR	NR
University of Chicago	5	University	NR	Orthopaedic Surgery	$2,200	3/31/23	$0	4th	NR	NR	NR
University of Cincinnati Medical Center/College of Medicine	7	University	NR	Many	$2,000	5/15/23	$0	4th	NR	NR	NR
University of Connecticut School of Medicine	4	Community-based University Affiliated	NR	Orthopaedic Surgery	NR	4/28/23	$0	4th	NR	NR	NR
University of Florida	5	University	NR	Many	$2,500	7/23/23	$0	4th	NR	NR	NR
University of Iowa	8	Community-based University Affiliated	NR	Many	$2,000	7/1/23	$0	4th	NR	NR	NR
University of Miami Miller School of Medicine	8	University	NR	Orthopaedic Surgery	$1,500	4/1/23	$0	4th	NR	NR	NR
University of Michigan	5	Community-based University Affiliated	NR	Orthopaedic Surgery	$1,500	4/1/23	$0	4th	NR	NR	NR
University of Minnesota	4	University	NR	Many	$1,000	NR	$0	4th	NR	NR	NR
University of Mississippi Medical Center	4	University	NR	Orthopaedic Surgery	$2,200	1/1/23	$0	4th	NR	NR	NR
University of Missouri - Kansas	4	University	4	Many	$1,000	NR	$0	4th	NR	NR	NR
University of Missouri-Columbia Program	4	University	3	Orthopaedic Surgery	$1,500	NR	$150	4th	NR	NR	NR
University of North Carolina	4	University	1	Orthopaedic Surgery	$1,500	4/21/23	$0	4th	NR	NR	NR
University of Pennsylvania	7	University	4	Orthopaedic Surgery	$1,500	3/15/23	$0	4th	NR	NR	NR
University of Pittsburgh	5	University	NR	Many	$1,000	NR	$0	4th	NR	NR	NR
University of Rochester Medical Center	5	University	3	Many	$1,500	6/1/23	$0	4th	NR	NR	NR
University of Southern California	13	University	NR	Many	$2,500	3/31/23	$0	4th	NR	NR	NR
University of Utah Health	6	University	4	Orthopaedic Surgery	$1,500	3/31/23	$0	4th	NR	NR	NR
University of Vermont Medical Center	8	University	NR	Orthopaedic Surgery	$1,500	3/3/23	$0	Both	NR	NR	NR
University of Washington	4	University	NR	Orthopaedic Surgery	$1,500	6/5/23	$0	4th	NR	NR	NR
University of Wisconsin Hospitals and Clinics	5	University	NR	Many	$950	3/1/23	$0	Both	NR	Yes	NR
Vanderbilt University Medical Center	8	University	NR	Orthopaedic Surgery	$2,000	NR	$0	4th	NR	NR	NR
Wake Forest University	6	University	NR	Many	$1,500	6/1/23	$0	4th	NR	NR	NR
Washington University School of Medicine	4	Community-based University Affiliated	NR	Many	$2,000	4/30/23	$0	4th	NR	NR	NR
Western Michigan University Homer Stryker MD School of Medicine Program	5	University	5	Orthopaedic Surgery	NR	NR	$0	4th	NR	NR	NR
Yale-New Haven Medical Center	4	University	1	Orthopaedic Surgery	$1,500	NR	$0	4th	NR	NR	NR

Legend: NR, not reported; PGY-1; post graduate year-1; No., number

Table 2. Required Application Documents

Program Name	No. of LoR	No. of Essays	School Dean's Letter Required	CV Required	Transcript Required	Personal Statement Required	USMLE Step 1 score Required	Photo Required
Case Western Reserve University/University Hospitals Cleveland Medical Center	2	3	NR	NR	NR	NR	NR	NR
Albert Einstein College of Medicine Montefiore Medical Center	0	1	Yes	NR	NR	NR	NR	NR
Alliance of Minority Physicians - University of Pennsylvania Health System	NR	NR	NR	NR	NR	NR	NR	NR
Atrium Health	1	1	NR	Yes	NR	Yes	Yes	NR
Baylor University Medical Center	1	2	NR	NR	Yes	Yes	NR	NR
Brown University	NR	3	NR	NR	NR	NR	NR	NR
Cedars-Sinai Medical Center	NR	2	NR	NR	NR	NR	Yes	NR
Cleveland Clinic	2	1	Yes	NR	NR	NR	NR	NR
1. Columbia/New York Orthopedic Hospital 2. Columbia/New York Orthopedic Hospital (Pride Orthopaedics)	NR	NR	NR	NR	Yes	Yes	Yes	NR
Community Memorial Hospital	NR	1	NR	Yes	Yes	NR	Yes	Yes
George Washington University	NR	3	NR	NR	NR	NR	Yes	NR
Henry Ford Health	NR	2	NR	NR	NR	NR	NR	NR
Howard University Hospital	2	2	NR	Yes	NR	Yes	NR	NR
Icahn School of Medicine	NR	2	NR	NR	NR	NR	NR	NR
Indiana University School of Medicine	NR	1	NR	NR	NR	NR	NR	Yes
John Peter Smith Health Network	1	1	NR	Yes	Yes	NR	NR	NR
Lenox Hill Hospital	1	NR	NR	NR	NR	NR	NR	NR
Lewis Katz School of Medicine= LGBTQ & women	1	1	NR	NR	NR	Yes	NR	NR
Louisiana State University School of Medicine	NR	1	NR	NR	NR	NR	NR	NR
Loyola University Medical Center	NR	NR	NR	NR	NR	NR	NR	NR
Mayo Clinic - Rochester	NR	1	NR	NR	NR	NR	NR	NR
Mayo Clinic - Arizona	2	NR	Yes	Yes	Yes	NR	Yes	Yes
McGaw Medical Center of Northwestern University	NR	1	NR	NR	NR	Yes	NR	NR
Medical College of Wisconsin Affiliated Hospitals	1	1	NR	NR	NR	Yes	NR	NR

Program Name	No. of LoR	No. of Essays	School Dean's Letter Required	CV Required	Transcript Required	Personal Statement Required	USMLE Step 1 score Required	Photo Required
Medical University of South Carolina	NR	1	NR	NR	NR	NR	NR	NR
MedStar Health/Georgetown University Hospital	NR	NR	NR	NR	Yes	NR	NR	NR
New York University Grossman School of Medicine	2	3	Yes	Yes	Yes	NR	Yes	Yes
New York University Langone (Pride Orthopaedics)	1	1	NR	NR	Yes	NR	NR	NR
Ohio State University	2	3	NR	Yes	Yes	NR	Yes	NR
Oregon Health & Science University	1	1	NR	Yes	Yes	Yes	Yes	NR
Rush Medical College	NR	NR	NR	NR	NR	NR	NR	NR
Rutgers New Jersey Medical School	1	1	NR	Yes	Yes	NR	NR	NR
Spectrum Health	NR	2	NR	NR	NR	NR	NR	NR
Stanford University	NR	NR	NR	NR	NR	NR	NR	NR
University of Massachusetts Chan Medical School - Baystate	NR	1	NR	NR	NR	NR	NR	NR
University of Alabama	NR	2	NR	NR	NR	NR	NR	NR
University of Arizona College of Medicine -Tucson	NR	1	NR	NR	NR	NR	NR	NR
University of Arkansas for Medical Sciences	NR	1	NR	NR	NR	NR	NR	NR
University of California Medical Center (San Diego, CA)	NR	2	NR	Yes	Yes	Yes	Yes	Yes
University of California Medical Center (San Francisco, CA)	NR	NR	NR	NR	NR	NR	NR	NR
University of California Medical Center (San Francisco, CA) - Fresno	1	1	NR	Yes	NR	Yes	Yes	NR
University of California Davis Health	NR	1	Yes	Yes	Yes	Yes	NR	NR
University of Chicago	1	NR	NR	Yes	NR	Yes	NR	NR
University of Cincinnati Medical Center/College of Medicine	NR	1	NR	NR	NR	NR	NR	NR
University of Connecticut School of Medicine	NR	2	NR	NR	NR	NR	NR	NR
University of Florida	NR	1	NR	NR	NR	NR	NR	NR
University of Iowa	1	2	NR	NR	Yes	NR	NR	NR
University of Miami Miller School of Medicine	NR	1	NR	Yes	NR	Yes	NR	NR
University of Michigan	NR	1	NR	NR	NR	Yes	NR	NR
University of Minnesota	NR	NR	NR	NR	NR	NR	NR	NR

Program Name	No. of LoR	No. of Essays	School Dean's Letter Required	CV Required	Transcript Required	Personal Statement Required	USMLE Step 1 score Required	Photo Required
University of Mississippi Medical Center	2	0	Yes	Yes	Yes	NR	Yes	Yes
University of Missouri - Kansas	NR	1	NR	NR	NR	NR	NR	NR
University of Missouri-Columbia Program	NR	1	NR	Yes	Yes	NR	NR	NR
University of North Carolina	NR	3	NR	Yes	NR	NR	Yes	NR
University of Pennsylvania	1	1	NR	Yes	NR	Yes	Yes	NR
University of Pittsburgh	NR	2	NR	NR	NR	NR	NR	NR
University of Rochester Medical Center	NR	1	NR	NR	NR	NR	NR	NR
University of Southern California	NR	NR	NR	NR	NR	NR	NR	NR
University of Utah Health	2	1	Yes	Yes	Yes	Yes	NR	NR
University of Vermont Medical Center	1	1	NR	Yes	Yes	Yes	NR	NR
University of Washington	NR	1	NR	NR	NR	NR	NR	NR
University of Wisconsin Hospitals and Clinics	NR	1	NR	Yes	NR	NR	NR	NR
Vanderbilt University Medical Center	NR	1	NR	Yes	Yes	NR	Yes	Yes
Wake Forest University	NR	1	NR	NR	NR	NR	NR	NR
Washington University School of Medicine	NR	NR	NR	NR	NR	NR	NR	NR
Western Michigan University Homer Stryker MD School of Medicine Program	NR	1	NR	NR	NR	NR	NR	NR
Yale-New Haven Medical Center	NR	3	NR	NR	NR	NR	NR	NR

Legend: NP, not reported; LoR, letter of recommendation; USMLE, united states medical license exam; CV, curriculum vitae

tory, field of practice, and research, to maximize diversity efforts' impact.

While the AAMC's definition of URiM is based on racial and ethnic groups, many programs have their own, broader definitions for whom they deem are "Underrepresented in Medicine". Of the programs we list, many include women and LGBTQIA+ in their definition, thus these students are eligible to apply regardless of race or ethnicity. Notably, some programs have even gone as far as to include students from a low socioeconomic status as eligible. This is a beneficial adjustment, as we see that across all races the students applying to and matriculating into medical schools are increasingly from the highest socioeconomic classes and that students interested in medicine from low socioeconomic backgrounds are less likely to apply to or be accepted into medical school (Nguyen et al. 2023; Shahriar, Puram, Miller, et al. 2022; Morrison and Cort 2014). By promoting socioeconomic diversity in orthopedics, these scholarships will help negate the effects of the current uniformity of socioeconomic status amongst physicians and medical students. These detrimental effects are illustrated in the negative emotions resident physicians report regarding care for impoverished patients, as well as the dissonance seen amongst resident physicians regarding actual versus self-perceived knowledge on topics relating to underserved populations (Price et al. 1988; Weissman, Betancourt, Campbell, et al. 2005; Wieland et al. 2010). Thus, by targeting scholarships to aid low socioeconomic students and provide attainable avenues of exposure to specialties, these scholarships will help promote socioeconomic diversity in medicine.

Program websites are a primary source of information for interested applicants, therefore they play an important role in promoting diversity and inclusion. One study found that residency applicants considered the accuracy of residency website information an important factor in their decisions to apply to the program, while another study noted how both applicants and orthopedic surgery residency programs could benefit from increasing recruitment content, educational content, and standardization of program websites (Gaeta et al. 2005; Sherman et al. 2020). Specifically, increasing content for topics related to diversity and inclusion is a notable area for improvement, as orthopedic residency programs rarely address these topics on their program websites (Mortman, Gu, Berger, et al. 2022). While the fact that most students utilize program websites when determining which programs to apply to has been established, there is little emphasis on the impact of including diversity and inclusion content in promoting URiM student applicants. Our results suggest that In the face of limited papers commenting on this, we speculate that, based on the existing relationship between website engagement and residency applications, this is yet another avenue for graduate medical education programs to improve diversity recruitment efforts by enhancing the accuracy and availability of diversity initiatives on their websites (Wei, Bernstein, Gu, et al. 2023).

LIMITATIONS

This study has limitations. First, it is imperative that applicants should be aware that additional fees, such as registration and processing fees, exist that were not discussed in this study. While every effort was made to ensure completion, website data may have been inherently missed or information not included in the website would have biased these results. Additionally, in the course of our analysis, we determined that certain data did not significantly impact our overall conclusions, and therefore, we have removed this data from our paper. Lastly, this study was a cross-sectional analysis, and scholarship opportunities will likely change over time. As the field of orthopedic surgery prioritizes diversity and inclusion, it becomes crucial to reassess the growth and effectiveness of these scholarships and their impact over time.

CONCLUSION

This study serves as a comprehensive analysis of URiM students visiting scholarship opportunities for away rotations in orthopedic surgery. While numerous URiM scholarships are available, continued reporting of these opportunities and tracking of their success in enhancing diversity in our field is needed. enhancing their availability is crucial to advance inclusivity in the field. Programs should collectively list their URiM scholarships on the AAMC website to increase awareness and encourage application for these resources which will hopefully positively impact our field of orthopaedic surgery.

Submitted: April 15, 2024 EST, Accepted: August 15, 2024 EST

REFERENCES

Adelani, M. A., M. A. Harrington, and C. O. Montgomery. 2019. "The Distribution of Underrepresented Minorities in U.S. Orthopaedic Surgery Residency Programs." *J Bone Joint Surg Am* 101:e96. https://doi.org/10.2106/JBJS.18.00879.

Andrews, M. A., N. D. Paolino, K. J. DeZee, and B. Hemann. 2016. "Perspective of the Graduating Medical Student: The Ideal Curriculum for the Fourth Year of Undergraduate Medical Education." *Military Medicine* 181:e1455–63. https://doi.org/10.7205/MILMED-D-15-00402.

Baldwin, K., Z. Weidner, J. Ahn, and S. Mehta. 2009. "Are Away Rotations Critical for a Successful Match in Orthopaedic Surgery?" *Clin Orthop Relat Res* 467:3340–45. https://doi.org/10.1007/s11999-009-0920-9.

Bernstein, J., M. R. Dicaprio, and S. Mehta. 2004. "The Relationship between Required Medical School Instruction in Musculoskeletal Medicine and Application Rates to Orthopaedic Surgery Residency Programs." *J Bone Joint Surg Am* 86:2335–38. https://doi.org/10.2106/00004623-200410000-00031.

Brotherton, S. E., and S. I. Etzel. 2019. "Graduate Medical Education, 2018-2019." *Jama* 322:996–1016. https://doi.org/10.1001/jama.2019.10155.

Camp, C. L., P. L. Sousa, A. D. Hanssen, et al. 2016. "The Cost of Getting Into Orthopedic Residency: Analysis of Applicant Demographics, Expenditures, and the Value of Away Rotations." *J Surg Educ* 73:886–91. https://doi.org/10.1016/j.jsurg.2016.04.003.

Cooper, L. A., D. L. Roter, R. L. Johnson, D. E. Ford, D. M. Steinwachs, and N. R. Powe. 2003. "Patient-Centered Communication, Ratings of Care, and Concordance of Patient and Physician Race." *Ann Intern Med* 139:907–15. https://doi.org/10.7326/0003-4819-139-11-200312020-00009.

Cooper-Patrick, L., J. J. Gallo, J. J. Gonzales, et al. 1999. "Race, Gender, and Partnership in the Patient-Physician Relationship." *Jama* 282:583–89. https://doi.org/10.1001/jama.282.6.583.

Day, C. S., D. E. Lage, and C. S. Ahn. 2010. "Diversity Based on Race, Ethnicity, and Sex between Academic Orthopaedic Surgery and Other Specialties: A Comparative Study." *J Bone Joint Surg Am* 92:2328–35. https://doi.org/10.2106/JBJS.I.01482.

Duong, D.K., E.A. Samuels, D. Boatright, and T. Wilson. 2021. "Association Between Emergency Medicine Clerkship Diversity Scholarships and Residency Diversity." *AEM Educ Train* 5:e10547. https://doi.org/10.1002/aet2.10547.

Gaeta, T. J., R. H. Birkhahn, D. Lamont, N. Banga, and J. J. Bove. 2005. "Aspects of Residency Programs' Web Sites Important to Student Applicants." *Acad Emerg Med* 12:89–92. https://doi.org/10.1197/j.aem.2004.08.047.

Heest, A., J. Agel, and J. Samora. 2021. "A 15-Year Report on the Uneven Distribution of Women in Orthopaedic Surgery Residency Training Programs in the United States." *JBJS Open Access*, 6. https://doi.org/10.2106/JBJS.OA.20.00157.

Higgins, E., L. Newman, K. Halligan, M. Miller, S. Schwab, and L. Kosowicz. 2016. "Do Audition Electives Impact Match Success?" *Medical Education Online* 21:31325. https://doi.org/10.3402/meo.v21.31325.

Hill, J. F., A. Yule, D. Zurakowski, and C. S. Day. 2013. "Residents' Perceptions of Sex Diversity in Orthopaedic Surgery." *J Bone Joint Surg Am* 95:e1441-1446. https://doi.org/10.2106/JBJS.L.00666.

Jetty, A., Y. Jabbarpour, J. Pollack, R. Huerto, S. Woo, and S. Petterson. 2022. "Patient-Physician Racial Concordance Associated with Improved Healthcare Use and Lower Healthcare Expenditures in Minority Populations." *J Racial Ethn Health Disparities* 9:68–81. https://doi.org/10.1007/s40615-020-00930-4.

Kundhal, K.K., and P.S. Kundhal. 2003. "Cultural Diversity: An Evolving Challenge to Physician-Patient Communication." *Jama* 289:94. https://doi.org/10.1001/jama.289.1.94.

Morrison, E., and D. Cort. 2014. "An Analysis of the Medical School Pipeline: A High School Aspirant to Applicant and Enrollment View."

Mortman, R. J., A. Gu, P. Berger, et al. 2022. "Do Orthopedic Surgery Residency Program Web Sites Address Diversity and Inclusion?" *Hss j* 18:235–39. https://doi.org/10.1177/15563316211037661.

Nguyen, M., M. M. Desai, T. L. Fancher, S. I. Chaudhry, H. R. C. Mason, and D. Boatright. 2023. "Temporal Trends in Childhood Household Income Among Applicants and Matriculants to Medical School and the Likelihood of Acceptance by Income, 2014-2019." *JAMA*. https://doi.org/10.1001/jama.2023.5654.

O'Donnell, S. W., B. C. Drolet, J. P. Brower, D. LaPorte, and C. P. Eberson. 2017. "Orthopaedic Surgery Residency: Perspectives of Applicants and Program Directors on Medical Student Away Rotations." *J Am Acad Orthop Surg* 25:61–68. https://doi.org/10.5435/JAAOS-D-16-00099.

Okike, K., D. P. Phillips, W. A. Johnson, and M. I. O'Connor. 2020. "Orthopaedic Faculty and Resident Racial/Ethnic Diversity Is Associated With the Orthopaedic Application Rate Among Underrepresented Minority Medical Students." *J Am Acad Orthop Surg* 28:241–47. https://doi.org/10.5435/JAAOS-D-19-00076.

Okike, K., D.P. Phillips, E. Swart, and M.I. O'Connor. 2019. "Orthopaedic Faculty and Resident Sex Diversity Are Associated with the Orthopaedic Residency Application Rate of Female Medical Students." *J Bone Joint Surg Am* 101:e56. https://doi.org/10.2106/JBJS.18.00320.

Poon, S., D. Kiridly, M. Mutawakkil, et al. 2019. "Current Trends in Sex, Race, and Ethnic Diversity in Orthopaedic Surgery Residency." *J Am Acad Orthop Surg* 27:e725–33. https://doi.org/10.5435/JAAOS-D-18-00131.

Poon, S., K. Nellans, A. Rothman, et al. 2019. "Underrepresented Minority Applicants Are Competitive for Orthopaedic Surgery Residency Programs, but Enter Residency at Lower Rates." *J Am Acad Orthop Surg* 27:e957–68. https://doi.org/10.5435/JAAOS-D-17-00811.

Price, J. H., S. M. Desmond, F. F. Snyder, and S. R. Kimmel. 1988. "Perceptions of Family Practice Residents Regarding Health Care and Poor Patients." *J Fam Pract* 27:615–21.

"Program NRM: Results of the 2017 NRMP Applicant Survey by Preferred Specialty and Applicant Type." n.d.

Rahman, R., B. Zhang, C. J. Humbyrd, and D. LaPorte. 2021. "How Do Medical Students Perceive Diversity in Orthopaedic Surgery, and How Do Their Perceptions Change After an Orthopaedic Clinical Rotation?" *Clin Orthop Relat Res* 479:434–44. https://doi.org/10.1097/CORR.0000000000001569.

Ramirez, R. N., and C. C. Franklin. 2019. "Racial Diversity in Orthopedic Surgery." *Orthop Clin North Am* 50:337–44. https://doi.org/10.1016/j.ocl.2019.03.010.

Saha, S., J. J. Arbelaez, and L. A. Cooper. 2003. "Patient-Physician Relationships and Racial Disparities in the Quality of Health Care." *Am J Public Health* 93:1713–19. https://doi.org/10.2105/ajph.93.10.1713.

Scerpella, T. A., A. M. Spiker, C. A. Lee, M. K. Mulcahey, and M. L. Carnes. 2022. "Next Steps: Advocating for Women in Orthopaedic Surgery." *J Am Acad Orthop Surg* 30:377–86. https://doi.org/10.5435/JAAOS-D-21-00932.

Shahriar, A. A., V. V. Puram, J. M. Miller, et al. 2022. "Socioeconomic Diversity of the Matriculating US Medical Student Body by Race, Ethnicity, and Sex, 2017-2019." *JAMA Network Open* 5:e222621–e222621. https://doi.org/10.1001/jamanetworkopen.2022.2621.

Sherman, N., J. Sorenson, A. Khwaja, and G. DeSilva. 2020. "The Content and Accessibility of Orthopaedic Residency Program Websites." *JBJS Open Access* 5:e20.00087-e00020.00087. https://doi.org/10.2106/JBJS.OA.20.00087.

"Underrepresented in Medicine Definition." n.d. Accessed June 10, 2023. https://www.aamc.org/what-we-do/equity-diversity-inclusion/underrepresented-in-medicine.

Wei, C., S. A. Bernstein, A. Gu, et al. 2023. "Evaluating Diversity and Inclusion Content on Graduate Medical Education Websites." *J Gen Intern Med* 38:582–85. https://doi.org/10.1007/s11606-022-07973-9.

Weissman, J. S., J. Betancourt, E. G. Campbell, et al. 2005. "Resident Physicians' Preparedness to Provide Cross-Cultural Care." *Jama* 294:1058–67. https://doi.org/10.1001/jama.294.9.1058.

Wieland, M. L., T. J. Beckman, S. S. Cha, T. J. Beebe, and F. S. McDonald. 2010. "Resident Physicians' Knowledge of Underserved Patients: A Multi-Institutional Survey." *Mayo Clin Proc* 85:728–33. https://doi.org/10.1001/jama.294.9.1058.

Winfrey, S. R., P. Parameswaran, K. M. Gerull, D. LaPorte, and C. A. Cipriano. 2022. "Effective Mentorship of Women and Underrepresented Minorities in Orthopaedic Surgery: A Mixed-Methods Investigation." *JB JS Open Access*, 7. https://doi.org/10.2106/JBJS.OA.22.00053.

Winterton, M., J. Ahn, and J. Bernstein. 2016. "The Prevalence and Cost of Medical Student Visiting Rotations." *BMC Medical Education*, 16. https://doi.org/10.1186/s12909-016-0805-z.