Effective Mentorship of Women and Underrepresented Minorities in Orthopaedic Surgery

A Mixed-Methods Investigation

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**Background:** Orthopaedic surgery is currently the least diverse medical specialty, and there is little research on the mentorship needs for women and underrepresented minorities (URMs) in orthopaedics. The purpose of this study was to examine the roles and functions of mentorship for women and URMs in orthopaedic surgery, to understand mentorship preferences, and to elucidate barriers to mentorship in orthopaedic surgery.

**Methods:** Members of J. Robert Gladden Orthopaedic Society and Ruth Jackson Orthopaedic Society were invited to participate. An email with an anonymous link to the survey was distributed; the survey was open for responses from September 2020 through February 2021. The survey contained free-response and quantitative items about mentorship and its impact on current activities, career path, and ways to improve mentorship. Descriptive statistics, 1-way analysis of variance, frequencies, and Fisher exact test were used to analyze survey data. Qualitative data were deidentified and analyzed using thematic analysis techniques.

**Results:** A total of 155 participants responded to the survey, of those, 151 (98%) met criteria for analysis. Sixty-four percent of participants were women, 15% identified as Black, 4% identified as Hispanic, and 9% identified as multiracial. Eighty-five percent of respondents had a mentor in orthopaedic surgery. Mentorship was often cited as useful for exposure to role models and skills development. Medical students were most likely to consider gender concordance with their mentor important. URM respondents reported greater importance of sharing race/ethnicity with their mentor \( p = 0.005 \). In qualitative responses, participants commented on identity-specific challenges to mentorship, lack of time and institutional support for mentorship, and the disproportionate burden of mentorship on women and URMs.

**Conclusions:** Mentorship was highly valued among women and URMs in orthopaedic surgery across all career stages. Mentorship attracted students to orthopaedic surgery and allowed residents and surgeons to progress in the field. Sharing racial/ethnic identity in mentor-mentee relationships was important to both trainees and practicing surgeons.
Introduction

Orthopaedic surgery is the least diverse specialty in medicine. Representation of racial/ethnic minority residents in orthopaedic surgery averaged 25.6% between 2006 and 2015, and there has been a significant decrease in overall racial/ethnic diversity among orthopaedic surgery residents over the same period. Women are similarly underrepresented in orthopaedics, with women comprising only 7.6% of orthopaedic surgeons in practice. Programs often cite the lack of racial/ethnic minorities applying as a barrier to increasing diversity in orthopaedics. Although other surgical subspecialties have seen improved gender representation, the proportion of women orthopaedic surgery residents has remained fairly stagnant at 13% to 15%. This representation gap persists into faculty appointments, with only 20% women and 8.6% underrepresented racial/ethnic minorities (URMs) among orthopaedic surgery faculty. This suggests that the current approach to diversity and inclusion in orthopaedics is failing women and URMs.

Mentorship is a critical aspect of medical education and professional development across academic medicine. Within orthopaedic surgery, a resident survey in 2015 found that 100% of participants reported having a mentor as important for professional development. Mentorship also has an impact on specialty selection: 84% of residents with a mentor during medical school report that their mentor influenced their decision to pursue orthopaedics. Conversely, a lack of strong mentorship in medical school is a top dissuader for entering orthopaedics. Although the importance of mentorship on specialty selection and career satisfaction is well documented, there remains a perceived lack of mentorship among trainees. A recent study found that only 49% of surgical trainees reported having a mentor, and 90% of those without a mentor desired one. This effect may be even greater for women and URMs in orthopaedic surgery. Limited mentorship opportunities for medical students from diverse backgrounds could perpetuate current disparities in orthopaedics. In addition, program directors most often cite the lack of diversity in academic orthopaedic departments as a barrier to recruiting medical students from underrepresented backgrounds. Limited data exist regarding effective mentorship in orthopaedic surgery for women and URMs. We sought to examine the roles and functions of mentorship for women and URMs, to understand preferences for mentorship based on shared identity, and to identify barriers to mentorship in orthopaedic surgery.

Methods

Study Participants

The study was conducted from September 2020 to February 2021. Participants were members of J. Robert Gladden Orthopaedic Society (JRGOS) and Ruth Jackson Orthopaedic Society (RJOS). JRGOS is a pluralist multicultural organization designed to meet the needs of URM orthopaedic surgeons. The RJOS promotes the professional development of women in orthopaedics. Both groups include medical students, residents, fellows, and practicing surgeons, but the majority of members are practicing surgeons.
Qualitative Analysis
Qualitative data entered in response to free-response questions were analyzed by 2 independent coders (P.P. and S.R.W.). Inductive thematic analysis techniques were used as described by Miles and Huberman. Thematic analysis uses a 6-step approach: familiarizing with data, generating initial codes, searching for themes, reviewing themes, defining and naming themes, and finally producing the report. Quotations presented were selected to be representative examples of study themes. The respondents’ gender, race/ethnicity, and role are noted in parenthesis after each quote.

Ethical Approval and Funding
Washington University in St. Louis School of Medicine approved this study. This study was not funded.

### Results

#### Participant Characteristics
A total of 155 individuals from JRGOS and RJOS responded to the survey, with 151 meeting criteria for analysis (>20% of the survey questions answered). For surveys in which >20% but <100% of questions were answered, data from completed sections were included: 121 responses were analyzed on characterizing mentoring relationships, 138 on characteristics of effective mentorship, 115 on the importance of sharing characteristics with mentors, and 140 on mentorship barriers.

Of the respondents, there were 29 (19.2%) medical students, 20 (13.2%) residents, 60 (39.7%) academic surgeons, and 42 (27.8%) community/private practice surgeons. Most participants (n=97, 64.2%) were women; 15% (n=22) of participants identified as Black, 4% (n=6) identified as Hispanic, and 9% (n=14) identified as multiracial (Table I).

| TABLE I Demographic Data of All Electronic Survey Respondents (n = 151), 2021 |
|---------------------------------|----------------|----------------|----------------|----------------|----------------|
|                                | All Respondents (n = 151) | Medical Students (n = 29) | Residents (n = 20) | Academic Surgeons (n = 60) | Community/Private Practice Surgeons (n = 42) |
| Age, mean (SD)                 | 41.9 (13.8)             | 26.7 (2.4)            | 30.9 (2.1)         | 47.0 (12.4)         | 50.6 (11.7)         |
| Gender, n (%)                  |                           |                        |                    |                    |                  |
| Male                           | 38 (25.2)                | 7 (24.1)               | 3 (15.0)           | 19 (31.7)          | 9 (21.4)           |
| Female                         | 97 (64.2)                | 19 (65.5)              | 14 (70.0)          | 36 (60.0)          | 28 (66.7)          |
| Gender binary nonconforming    | 1 (0.7)                  | 1 (3.4)                | 3 (15.0)           | 5 (8.3)            | 5 (11.9)           |
| Missing                        | 15 (9.9)                 | 2 (6.9)                |                    |                    |                  |
| Identify as LGBTQIA? n (%)     |                           |                        |                    |                    |                  |
| No                             | 129 (85.4)               | 26 (89.7)              | 16 (80.0)          | 52 (86.7)          | 35 (83.3)          |
| Yes                            | 6 (4.0)                  | 1 (3.4)                | 0 (0)              | 3 (5.0)            | 2 (4.8)            |
| Prefer not to say              | 1 (0.7)                  | 0 (0)                  | 1 (5.0)            | 5 (8.3)            | 5 (11.9)           |
| Missing                        | 15 (9.9)                 | 2 (6.9)                | 3 (15.0)           |                    |                  |
| Race/ethnicity, n (%)          |                           |                        |                    |                    |                  |
| White                          | 81 (53.6)                | 11 (37.9)              | 10 (50.0)          | 41 (68.3)          | 19 (45.2)          |
| Black                          | 22 (14.6)                | 5 (17.2)               | 3 (15.0)           | 4 (6.7)            | 10 (23.8)          |
| Hispanic                       | 6 (4.0)                  | 2 (6.9)                | 1 (5.0)            | 2 (3.3)            | 1 (2.4)            |
| Asian                          | 7 (4.6)                  | 2 (6.9)                | 1 (5.0)            | 3 (5.0)            | 1 (2.4)            |
| American Indian/Alaskan Native | 1 (0.7)                  | 0 (0)                  | 0 (0)              | 0 (0)              | 1 (2.4)            |
| Others                         | 4 (2.6)                  | 0 (0)                  | 1 (5.0)            | 1 (1.7)            | 2 (4.8)            |
| Multiracial                    | 14 (9.3)                 | 7 (24.1)               | 1 (5.0)            | 4 (6.7)            | 2 (4.8)            |
| Missing                        | 15 (9.9)                 | 2 (6.9)                | 3 (15.0)           | 5 (8.3)            | 5 (11.9)           |
| Childhood annual household income, n (%) |                  |                        |                    |                    |                  |
| <$40,000                       | 17 (11.3)                | 4 (13.8)               | 2 (10.0)           | 3 (5.0)            | 8 (19.0)           |
| $40,001-$80,000                | 30 (19.9)                | 8 (27.6)               | 4 (20.0)           | 6 (10.0)           | 12 (28.6)          |
| $80,001-$120,000               | 23 (15.2)                | 3 (10.3)               | 3 (15.0)           | 15 (25.0)          | 2 (4.8)            |
| $120,001-$160,000              | 9 (6.0)                  | 4 (13.8)               | 2 (10.0)           | 2 (3.3)            | 1 (2.4)            |
| $160,001-$200,000              | 10 (6.6)                 | 2 (6.9)                | 3 (15.0)           | 2 (3.3)            | 3 (7.1)            |
| >$200,000                      | 33 (21.9)                | 5 (17.2)               | 2 (10.0)           | 19 (31.7)          | 7 (16.7)           |
| Not sure/prefer not to say     | 14 (9.3)                 | 1 (3.4)                | 1 (5.0)            | 8 (13.3)           | 4 (9.5)            |
| Missing                        | 15 (9.9)                 | 2 (6.9)                | 3 (15.0)           | 5 (8.3)            | 5 (11.9)           |

LGBTQIA = lesbian, gay, bisexual, transgender, queer, (questioning), intersex, asexual, and (agender).
**Characterizing Mentorship Relationships**

Of 151 respondents, 128 (85%) indicated that they currently have at least 1 mentor in orthopaedics. Medical students were most often introduced to mentors through research, whereas residents and practicing surgeons formed relationships through clinical education (Table II). There were no significant differences between gender nor race/ethnicity and channel of introduction to mentor ($p = 0.48, p = 0.57$).

Academic surgeons and residents were most likely to have 4 or more mentors, while medical students most often had 1 or 2 mentors (Fig. 1). There was a statistically significant difference between role and number of mentors ($p = 0.03$). There were no significant differences between participants’ gender nor race/ethnicity and number of mentors ($p = 0.91, p = 0.15$). However, many respondents reported that the depth of their mentorship relationships was restricted by a limited understanding of identity-specific challenges: “Few mentors... understood the challenges that I faced as a woman in orthopedics... I had very little advice nor meaningful direction in dealing with those challenges” [Woman, White, Community Surgeon]. Another respondent reported feeling that their quality of mentorship was stymied by lack of diverse faculty: “I have very few, if any, physicians at my institution with whom I have [race/ethnicity] in common. This does not mean I [cannot] have mentors, but I have found that my quality of mentorship is not the same as students at institutions with more diverse faculty” [Medical student; no other demographics reported].

**Characteristics of Effective Mentorship**

Mentorship was identified as important across all respondent roles; however, the functions of mentorship varied based on roles (Table III). Medical students most frequently cited “exposure to orthopaedic role models” and “participation in research” as an extremely or very important function of mentorship; residents most frequently cited “clinical skills development,” academic surgeons cited “exposure to career role models,” and community surgeons cited “morale and confidence building” and “exposure to career role models.” Participants also referred to mentoring functions in open-ended responses (Table IV).

Most respondents (75.8%, 97/128) strongly agreed or agreed that their expectations of mentorships are currently being met. There were no statistically significant differences between respondent role nor gender nor race/ethnicity and

| TABLE II Descriptive Statistics of Mentorship Relationships by Survey Respondent Current Role (n = 128), 2021 |
|---------------------------------------------------------------|---------------------------------------------------------------|---------------------------------------------------------------|---------------------------------------------------------------|
| When was mentorship established? n (%) |
| Before medical school | 3 (12.5) | 1 (6.2) | 1 (1.9) | 1 (3.8) |
| During medical school | 21 (87.5) | 6 (37.5) | 5 (9.4) | 5 (19.2) |
| Residency | 9 (56.3) | 25 (47.2) | 10 (38.5) |
| Fellowship | 8 (15.1) | 3 (11.5) |
| Clinical practice | 13 (24.5) | 5 (19.2) |
| Other | 0 (0) | 1 (1.9) | 2 (7.7) |

| Channel of introduction to mentor, n (%) |
| Family/friend | 2 (8.3) | 1 (6.2) | 0 (0) | 1 (3.7) |
| Clinical education | 1 (4.2) | 7 (43.7) | 28 (52.8) | 11 (40.7) |
| Research experience | 9 (37.5) | 4 (25) | 3 (5.7) | 2 (7.4) |
| Conference/meeting connection | 2 (8.3) | 1 (6.2) | 6 (11.3) | 5 (18.5) |
| Formal mentoring program | 8 (33.3) | 2 (12.5) | 7 (13.2) | 3 (11.1) |
| Other | 2 (8.3) | 1 (6.2) | 9 (17.0) | 5 (18.5) |

| Length of mentorship relationship, n (%) |
| <1 yr | 7 (29.2) | 3 (18.7) | 0 (0) | 2 (7.4) |
| 1-2 yr | 10 (41.7) | 4 (25) | 5 (9.4) | 3 (11.1) |
| 3-4 yr | 5 (20.8) | 4 (25) | 6 (11.3) | 1 (3.7) |
| 5+ yr | 2 (8.3) | 5 (31.3) | 42 (79.2) | 21 (77.8) |

| Frequency of contact with mentor, n (%) |
| Weekly | 3 (12.5) | 4 (25) | 9 (17.0) | 8 (29.6) |
| Monthly | 15 (62.5) | 7 (43.8) | 13 (24.5) | 7 (25.9) |
| Every 6 mo | 6 (25) | 5 (31.2) | 20 (37.7) | 7 (25.9) |
| Annually | 0 (0) | 0 (0) | 6 (11.3) | 2 (7.4) |
| We are not currently in contact | 0 (0) | 0 (0) | 5 (9.4) | 3 (11.1) |
meeting expectations ($p = 0.35, p = 0.45, p > 0.99$) (Fig. 2). When asked about current gaps in mentorship, participants cited that they wanted mentors to help them “think through decision/situations” and “connect them with people and opportunities” more frequently.

### Importance of Sharing Characteristics with Mentors

When asked about the importance of sharing characteristics with mentors, shared professional interests were the factor most identified across roles as very or extremely important (62% of medical students [$n = 15$], 53% of residents [$n = 15$], and 74% of surgeons [$n = 56$]). Medical students frequently considered shared life experiences (23%) to be extremely important for effective mentorship. Eleven percent ($n = 13$) of all respondents (14% [$n = 13$] of women) cited gender concordance as extremely or very important, and 15% ($n = 17$) of all respondents (27% [$n = 12$] of URM) cited race/ethnicity concordance as extremely or very important. Although women overall did not indicate greater importance of gender concordance than male respondents ($p = 0.096$) (Fig. 3), this varied based on a respondent role ($p = 0.047$), with trainees most likely to consider gender concordance important. URM respondents reported greater importance of sharing race/ethnicity with their mentor ($p = 0.01$), regardless of current role ($p = 0.26$) (25/45 URM respondents and 23/69 non-URM respondents identified race/ethnicity concordance as important). Overall, trainees have a stronger preference for gender concordance, whereas practicing surgeons prioritized shared life experiences.

### Identifying Barriers to Effective Mentorship

The most frequently cited barriers for mentorship were lack of time and institutional support for mentorship. These feelings were summed up by a respondent, who wrote: “Many orthopaedic surgeons are extremely busy—tough to find a mentor that will participate in an active mentorship relationship” [Gender binary nonconforming, White, Medical Student]. A similar sentiment was expressed by a practicing surgeon: “The drive to clinical production and the administrative burdens suck time away from mentorship. If something is really important, it is important enough to do during regular daytime hours—not always on nights and weekends” [Male, White, Academic Surgeon].

Responses to open-ended questions revealed gender-specific barriers to effective mentorship, and a disproportionate burden of mentorship on women and underrepresented orthopaedic surgeons (Table V). One respondent stated: “Because there are so few female attendings, they do their best to be available for students but tend to be frequently sought out by students and residents of all genders” [Woman, White, Resident]. This was emphasized by another respondent, who wrote: “Many male mentors are available to mentor students of both genders. Few female and minority mentors are available, and it’s not fair to expect them to advocate for every female/minority student” [Woman, White, Resident].

### Discussion

Orthopaedic surgery has persistent disparities in representation across all career stages. Mentorship can be an
important factor in increasing diversity in orthopaedics; through understanding the roles and functions of mentorship and the importance of shared identity in mentorship, we can better support women and URMs in orthopaedics. To our knowledge, this is the first study that investigates mentorship because it relates to women and racial/ethnic minorities in orthopaedics.

### Characteristics of Effective Mentorship

This study found that mentorship is highly desired and important to respondents. Positive relationships with mentors attracts students to orthopaedic surgery and helps residents and surgeons advance in the field. Our findings are consistent with previous studies that report mentorship is critical to professional development\(^8\). In a survey of orthopaedic surgery
residents, 84% of respondents stated that having a mentor was essential in their decision to pursue orthopaedics. Other data confirm that mentorship has a marked impact on medical students’ specialty selection. Promoting more effective mentorship for women and URM trainees could increase diversity within orthopaedic surgery.

Although many respondents viewed their current mentoring relationships as meeting expectations, respondents often said that they would like their mentor to connect them with more people and opportunities. This suggests that individuals have a desire for mentorship to evolve into sponsorship, which is defined as mentors leveraging their influence to advocate for the mentee outside of their mentorship relationship to aid in career advancement. Women have historically been under-sponsored compared with their male counterparts, and effective relationships can begin to bridge this gap.

| Role                              | Representative Quotes                                                                 |
|-----------------------------------|----------------------------------------------------------------------------------------|
| Medical student                   | “[Mentorship is] an active relationship culminating in the professional development of a medical student. It is characterized by guidance from a more experienced attending physician” [Male, Other] |
| Resident                          | “My ideal mentor is someone I can look up to and envision being like in the future. The best mentors give real life advice not just about surgery but about balancing life and family outside of medicine. They help you anticipate and plan for the struggles and successes you will face in the future.” [No demographics reported] |
| Academic and community surgeons   | “[Outstanding mentorship is] having a close relationship with someone who can answer questions without judgement, give you advice, and in some cases help you advance in your career.” [Woman, White] |
|                                   | “Medicine is a tough pathway, particularly for those coming from outside without a surgeon in the family… it can be incredibly beneficial to have someone in your corner cheering you on, helping guide you, or even offering someone to talk to for support and reassurance.” [Woman, White] |

Fig. 2

“Are expectations for mentorship met?” by survey respondent current role, 2021.
TABLE V Identity-Specific Barriers to Mentorship, Qualitative Quotations by Survey Respondent Current Role, 2021

| Identity-Specific Barriers to Mentorship | Representative Quotes                                                                 |
|-----------------------------------------|----------------------------------------------------------------------------------------|
| Decreased opportunities for women mentees | “As a female trainee it is difficult to be mentored by a male for a large variety of reasons, not least of which being less access to those mentors. [There are] fewer opportunities to have casual or social contact that seems to lead to mentoring relationships for male colleagues” [Woman, White, Academic Surgeon] |
| Lack of women mentors                   | “[There are] no senior women ... in leadership roles. I am the ‘senior’ trying to drive mentorship” [Woman, White, Academic Surgeon] |
|                                          | “Hopefully [it is] different from my training 30 years ago, but there was a lack of women as role models and no active mentoring connections.” [Woman, White, Community Surgeon] |
| Undue burden of mentorship              | “I always think that finding people who look like you or have similar backgrounds to you help to improve the mentor-mentee relationship. However, I also feel that women and underrepresented minorities can have mentorship burn out where they are always assigned to others who look like them or may relate to them more easily.” [Woman, White, Resident] |
Importance of Sharing Characteristics with Mentors

We found that URM respondents were more likely than non-URM respondents to consider mentor-mentee race/ethnicity concordance important. Similarly, women trainees, especially medical students, valued gender concordance with their mentors. Gender-related concerns may be more relevant at earlier stages of training because there are too few women in more senior positions to mentor practicing surgeons. This finding is particularly relevant because it relates to women and URM faculty at the time they are choosing to enter the field, suggesting the mentorship from women and URM faculty may help increase diversity in orthopaedics. In spite of this, we found that the majority of women and URM respondents did not consider demographic concordance to be critical to effective mentoring relationships. Rather, shared professional interests were the factor most commonly cited as extremely important, especially for practicing surgeons. As such, members of the majority group are not only effective, but essential, to recruiting, retaining, and promoting orthopaedic surgeons from underrepresented groups. This is important to recognize because the responsibility of diversifying orthopaedics should not be placed solely on the few women and URMs already in the field.

Identifying Barriers to Effective Mentorship

Finally, respondents felt that scarcity of time and institutional support were the greatest barriers to mentorship. Time constraints have been well documented as a barrier to mentorship across surgical specialties. Studies emphasized the importance of institutional support and protected/incentivized time for mentorship. Surgeons with higher levels of institutional support for mentorship are more likely to engage in mentoring activities. This is especially important because physicians face increasing demands for clinical productivity as reimbursement structures evolve and the burden of administrative work increases. Owing to the current lack of diversity within orthopaedics, there is an increased burden of mentoring on women and URM faculty; therefore, mentorship should be a shared value and responsibility among faculty regardless of demographics. Many studies have shown that individuals have a variety of mentors that serve different functions throughout their careers. Although a study of cardiologists indicates that sex and race/ethnicity concordance in mentoring relationships is associated with positive mentoring outcomes, sharing identity is not necessary for a successful mentoring relationships. Similarly, a study on mentorship among Black men in medicine reported that having a mentor in one’s specific area of interest may be as important as the mentor’s race. Thus, although increased diversity within orthopaedics is important to meet the mentoring needs of URM and women trainees, mentoring across genders and races/ethnicities remains critical.

Limitations

Survey-based studies are inherently subject to sampling bias, and our most significant limitation was the low overall response rate. Medical students and residents were less likely to complete more than half of the survey, so we stratified many analyses by role accordingly. In addition, because the membership of RJOS and JRGOS is more heavily comprised of practicing surgeons, the low proportion of trainees surveyed limited the statistical power of the analyses. However, our number of respondents by role is approximately proportional to the overall society membership. We had very few respondents who identified as a gender minority; more research is needed to better understand mentorship among these subgroups of students and surgeons. Finally, some of our survey items had not previously been validated, but we used previously reported items and scales whenever possible.

Conclusion

Mentorship is widely acknowledged as pivotal to one’s career; however, mentorship among women and URMs within orthopaedics has not previously been studied. Our findings suggest that sharing race/ethnicity in mentor-mentee relationships is important to trainees and surgeons who are underrepresented in orthopaedics. Furthermore, medical students are more likely to value gender concordance in their mentoring relationships. Mentorship should be highly valued given its importance in increasing belonging and career advancement, as well as attracting diverse applicants to the field of orthopaedics. Specifically, adequate time, compensation, and institutional resources for mentorship efforts are needed to support underrepresented students without overburdening mentors from these groups.

Appendix

Supporting material provided by the authors is posted with the online version of this article as a data supplement at jbjs.org (http://links.lww.com/JBJSOA/A434). This content was not copyedited or verified by JBJS.

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