Gender Differences in Program Factors Important to Applicants When Evaluating Orthopaedic Surgery Residency Programs

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ABSTRACT

Background Despite specialty-driven efforts to improve diversity in the field, few women apply to orthopaedic residency, and women are unevenly distributed among programs. There is little evidence-based information on factors that may attract female applicants.

Objective This study aims to identify factors important to applicants when evaluating orthopaedic residency programs and to identify gender-specific differences.

Methods All applicants to a single orthopaedic surgery residency program in the 2017 Match were asked to fill out an anonymous survey. Respondents rated the importance of 35 factors when evaluating orthopaedic residency programs. The percentage of highly rated factors was calculated. Statistical analysis was performed for each factor to assess differences by gender.

Results Of 1013 applicants who applied to orthopaedic surgery residency in 2017, 815 (80%) applied to our program, and 218 (27%) completed the survey. The most important factors when evaluating a residency program for both genders were (1) perceptions of current residents; (2) interactions with members of the program; (3) program reputation and fellowship placement; (4) geographic location; and (5) impressions after rotation at a program. Female applicants rated the presence of female and minority residents and faculty and program reputation for gender and racial/ethnic diversity higher than male applicants.

Conclusions When choosing an orthopaedic surgery residency program, women more often reported the presence of female residents and faculty, program reputation for gender diversity, reputation for racial/ethnic diversity, presence of minority residents and faculty, and their personal interactions with members of the program as important factors.

Introduction

In the past 50 years, there has been a steady increase in the number of women accepted into medical school. In 1970, only 9.6% of medical students were women; by 2018, women comprised 51.6% of all medical students.[1,2] Surgical fields, however, have not been able to close the gender gap during this time. It is seen most strikingly in orthopaedic surgery, where only 14% of current residents are women.[2]

Despite the American Academy of Orthopaedic Surgeons' goal of increasing gender parity in the specialty, no substantial gains have been made over the past 10 years.[2,3] Studies have found that women may be dissuaded from considering a career in orthopaedics due to perceptions of what the discipline entails.[4] There is a common perception that orthopaedics is an "old boys club" and involves physical strength, long hours, and poor work-life balance.[4–6] In addition, distribution of the women who match into orthopaedics is not equal among programs. Some programs consistently train female residents, while others lack female residents entirely.[3,4,7] Little is known about what is important to a candidate applying to orthopaedic surgery residency programs and whether different factors are important to women as compared to men.[8]

This study aims to identify factors important to applicants when evaluating programs and to identify differences between genders. Secondary objectives are to identify the resources applicants value to assess programs and to determine applicants' levels of engagement in national organizations aiming to increase diversity in orthopaedics.

Methods

All applicants in the 2017 National Resident Matching Program (NRMP) who applied to the authors' orthopaedic surgery residency program (an ACGME-accredited, 5-year, 25-resident complement program at a Midwestern, urban, academic, tertiary care center) were surveyed to identify factors important to them in residency selection.

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Editor's Note: The online version of this article contains the survey used in the study, more demographic data, and "5 Most Important" factors for all genders.

An 82-question survey with 3 sections was developed by a panel consisting of an orthopaedic surgery residency program director, faculty member, resident, medical student, and a professor of sociology specializing in survey research methods. In the first section of the survey, the respondents were asked to rate (on a 5-point unipolar rating scale from "not at all" to "extremely" important) the importance of 35 factors when evaluating orthopaedic programs. Since respondents were unconstrained in how many factors they could rate as "extremely" important, they were also asked to rank their "5 Most Important" (Top 5). Factors were selected based on a literature review of previous studies examining factors that influence applicants' rank order lists,[8–10] then modified based on input from the panel members. The 35 factors can be viewed in the full survey provided as online supplemental material. The second section asked respondents about their familiarity with national organizations promoting diversity in orthopaedics. The last section consisted of a series of demographic questions, including asking respondents to select their gender as either "male" or "female," or they had the option to leave no response. The 3 sections of the survey were presented in the same order, but the questions within each section were presented in random order to reduce question order effects.[11] The section inquiring about demographics and applicant characteristics was intentionally placed last in order to prevent the introduction of one's gender, race/ethnicity, or other individual characteristics from influencing the responses. Applicants were contacted via e-mail to complete the voluntary and anonymous survey. The survey was administered online through Opinio Survey Software (ObjectPlanet Inc, Oslo, Norway). Respondents were entered into a drawing for a $50 Amazon gift card as an incentive for participation. The study was conducted after the 2017 rank order list submission deadline date and before "Match Day" in order to minimize bias and possible coercion.

For each factor, the percentage of "very" or "extremely" important ratings was calculated to determine the level of importance that we report as an "Importance Score" (IS). The statistical significance of differences by gender for the importance of each of the 35 factors and respondent familiarity with orthopaedic diversity programs were evaluated with chi-square or Fisher's exact test for nominal variables and 2-sample *t* tests for continuous variables. Analyses were performed in SAS 9.4 (SAS Institute Inc, Cary, NC).

The study was approved by the Institutional Review Board of Loyola University Chicago Stritch School of Medicine.

What was known and gap
The rate of women applying to orthopedic residency has not increased over the last decade, despite efforts made by specialty societies. Little is known about what factors attract women to orthopedic residency programs.

What is new
A survey of orthopaedic surgery residency applicants rating the importance of certain factors affecting programs.

Limitations
Survey included only applicants to a single program, limiting generalizability, and lacked validity evidence.

Bottom line
Male and female residents prioritized the same factors, but women placed higher value on the presence of female residents and faculty, as well as program reputation for gender and racial/ethnic diversity.

Results

In 2017, there were 1013 NRMP applicants to orthopaedic surgery residency, and 815 of them (80%) applied to our orthopaedic residency program. Of these applicants, 218 (27%) completed the survey. All but 2 reported their gender, and 23% (50 of 218) of respondents were female. Respondents' demographic data are shown in TABLE 1 and also in the online supplemental material. We defined factors with an IS $\geq$ 80% (ie, more than 80% of applicants rated the factor as "very" or "extremely" important) as having "High Importance" (HI) in evaluating orthopaedic surgery residency programs. Seven factors received ratings of HI and are shown in TABLE 2. In analysis by gender, both women and men rated the same 7 factors as having HI. Ten significant differences in level of importance by gender exist in factors with lesser importance (IS $<$ 80%) and are shown in TABLE 3.

The top "5 Most Important" factors for all genders are shown in the online supplemental material. Program reputation was the most commonly selected Top 5 factor (50%, 109 of 218) and also received the most rankings as the number 1 most important factor (21%, 46 of 218). Gender differences are present in the Top 5 factors and are shown in TABLE 4. In contrast to men, "personal interactions with residents" was the most frequently selected Top 5 factor for women (44% [22 of 50] versus 28% [46 of 166] of men, $P = .030$) and also received the most rankings as the most important factor for women (18%, 9 of 50). Women also were significantly more likely to include "perceptions of residents' camaraderie" in their Top 5 (36% [18 of 50] of women versus 21% [35 of 166] of men, $P = .032$). Although not among the highest ranked for the Top 5, women are more likely to include "presence of female residents" (18% [9 of 50] of women versus 1.2% [2 of 166] of men, $P < .001$);

TABLE 1
Respondent Demographics

Demographic	No Response, n (%)	Applicants, n (% or mean ± SD)
Total sample		218 (100.0)
Age	5 (2.3)	27.8 ± 1.9
Gender	2 (0.9)	
Female		50 (22.9)
Male		166 (76.2)
Ethnicity	6 (2.8)	
White		177 (81.2)
Asian		19 (8.7)
Black/African American		6 (2.8)
Other/Multiracial		10 (4.6)
Hispanic/Latino origin	5 (2.3)	11 (5.1)
Married	2 (0.9)	49 (22.5)
Couples match	3 (1.4)	28 (12.8)

only 4 women and no men indicated that "presence of female faculty" was one of their Top 5 most important factors.

The top 2 sources that respondents value most when evaluating residency programs are faculty/residents in that program (IS 69%) and students/mentors from their own medical school (IS 55%). Applicants place little weight on written sources from the program (IS 24%), online chats/blogs (IS 16%), and *US News & World Report* rankings (IS 12%). We observed no gender differences in the importance placed on the sources used to evaluate residency programs.

Finally, few respondents report being familiar with the Ruth Jackson Orthopaedic Society (RJOS; 33%, 72 of 218), Nth Dimensions (10%, 22 of 218), and The Perry Initiative (16%, 34 of 218), all of which are national organizations that promote gender and racial/ethnic diversity within the orthopaedic field. This low level of familiarity is driven by the gender breakdown of the sample as most respondents were men. Women are significantly more likely to be familiar with these organizations than men. Of women, 88% (44 of 50) are familiar with and 48% (24 of 50) are members of RJOS compared to men (17% [28 of 166] familiar; 0% [0 of 216] member, both $P < .001$). In similar contrast, 52% (26 of 50) of women versus 5% (8 of 166) of men ($P < .001$) are familiar with the Perry Initiative and nearly half of them have participated in a Perry Initiative program.

Discussion

This survey of orthopedic surgery residency applicants to one program in 2017 found that applicants of all genders reported these factors as most important: (1) perceptions of current residents; (2) personal interactions with members of the program; (3) program's reputation and fellowship placement; (4) geographic location; and (5) impressions after a rotation at the program. Women reported "personal interactions with residents" as the single most important factor in contrast to men who most commonly reported "reputation of the program for orthopaedic surgery." Female applicants rated the presence of female residents and faculty, program reputation for gender diversity, program reputation for racial/ethnic diversity, presence of racial/ethnic minority residents and faculty, and program reputation for being LGBTQ-friendly more highly than male applicants.

All but 2 of the most important factors for all genders in our study match those found by Huntington and colleagues in a study of orthopaedic surgery residency applicants in 2013.[8] The presence of female residents is more likely to be ranked in the top "5 Most Important" factors for women and not men, which has not been previously reported. Women are also significantly more likely than men to place importance on the presence of female and racial/

TABLE 2
High Importance Factors (Importance Score ≥ 80%)

Survey Factor	Importance Score[a]			*P* Value
	All Genders (n = 218)	Women (n = 50)	Men (n = 166)	
Perception of the residents' camaraderie	91.3%	96.0%	91.5%	.29
Personal interactions with residents	90.8%	98.0%	90.3%	.13
Impression after your rotation as a student	89.9%	92.0%	90.9%	.99
Perception of the residents' happiness	89.0%	96.0%	89.0%	.17
Program has successful placement in fellowships	88.1%	84.0%	90.4%	.21
Perception of the residents' quality of life	83.5%	92.0%	82.4%	.10
Personal interactions with faculty or program directors	83.5%	90.0%	82.5%	.20

[a] Percentage rated as "very" or "extremely" important.

TABLE 3
Gender Differences in Factors Important to Applicant Evaluation of Orthopaedic Surgery Residency Programs

Survey Factor	Importance Score[a]		*P* Value
	Women (n = 50)	Men (n = 166)	
Presence of female residents	64.0%	9.6%	< .001
Size of the resident cohort in the program	64.0%	44.0%	.013
Geographic location	58.0%	71.7%	.07
Presence of female faculty members	52.0%	9.7%	< .001
Reputation for gender diversity	50.0%	11.5%	< .001
Location is close to family and friends	38.0%	54.2%	.044
Location meets the needs of a significant other	34.0%	66.9%	< .001
Reputation for racial/ethnic diversity	26.0%	10.8%	.007
Presence of racial/ethnic minority faculty members	24.0%	10.2%	.012
Presence of racial/ethnic minority residents	24.0%	9.6%	.008
Reputation for being LGBTQ-friendly	12.0%	3.0%	.021

[a] Percentage rated as "very" or "extremely" important.

ethnic minority faculty in programs. Once successful at recruiting and retaining a female resident or faculty member, a program may be able to expect continued success in training female residents. In order to increase the gender diversity within orthopedic surgery, programs should make an active effort to recruit female and racial/ethnic minority faculty.

While our study finds that women and men appear to place most importance on the same factors, we still see an uneven distribution of women among residency training programs.[3] One explanation may be that many of the important factors are based on subjective perceptions and personal interactions (eg, camaraderie, happiness, interactions with people during rotations or interviews) that may differ between women and men. In fact, similar to Huntington et al,[8] we found that women are significantly more likely to place personal interactions with residents in their Top 5 compared to men. If a residency program has failed to attract female candidates, it may consider how current residents and faculty interact with women, particularly in areas of explicit and implicit gender biases.

Although we found no gender differences in many of the reported most important factors, less important factors may become deciding ones if several programs appear equivalent in the candidate's top factors. Failure to recognize or prioritize program factors that seem less important may explain why orthopaedic surgery has failed to make substantial gains toward gender parity.

We found high rates of familiarity and participation in orthopedic programs (eg, RJOS) among women who apply to orthopaedic residency. Further studies should examine how awareness of and participation

TABLE 4
"5 Most Important" Factors by Gender

"5 Most Important" Factors for Women	Ranked in Top 5 for Women, n (%)	Men, n (%)	*P* Value
Personal interactions with residents	22 (44)	47 (28)	.030
Reputation of the program for orthopaedic surgery	20 (40)	88 (53)	.11
Perception of the residents' camaraderie	18 (36)	35 (21)	.032
Perception of residents' happiness	15 (30)	45 (27)	.63
Program has successful placement in fellowships	15 (30)	70 (42)	.14
Geographic location	15 (30)	68 (41)	.16
"5 Most Important" Factors for Men	**Ranked in Top 5 for Men, n (%)**	**Women, n (%)**	***P* Value**
Reputation of the program for orthopaedic surgery	88 (53)	20 (40)	.11
Program has successful placement in fellowships	70 (42)	15 (30)	.14
Geographic location	68 (41)	15 (30)	.16
Location meets the needs of a significant other	51 (31)	9 (18)	.07
Impression after your rotation as a student	48 (29)	11 (22)	.34

in these programs affect medical student career choices.

Although this study surveyed a high percentage of total applicants in 2017, it was limited by the use of applicants to one program, which may have introduced bias. More importantly, the low response rate precludes firm conclusions. The factors selected for the survey instrument may have omitted key factors considered by applicants. Without prior testing and validity evidence, respondents may not have interpreted the questions as intended, particularly as many of the factors are subjective in nature. With many statistical comparisons and no correction for multiple associations, some of the findings may be spurious.

Given the importance residency applicants place on their perceptions of and personal interactions with members of a residency program, future research should investigate if and why women and men may perceive the same program differently. Specifically, gender differences in how applicants perceive resident camaraderie, happiness, and quality of life might shed more light on how residency programs could improve recruitment of women. Future research should also investigate for possible differences in how residents and faculty interact with female versus male applicants.

Conclusions

Female and male applicants appear to place high importance on the same factors when evaluating orthopaedic surgery residency programs. Women place higher value on the presence of female residents and faculty, program reputation for gender diversity, reputation for racial/ethnic diversity, presence of minority residents and faculty, and their personal interactions with members of the program.

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