

# Factors affecting orthopedic residency selection: a cross-sectional survey

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Accepted Nov. 11, 2016; Early-released  
Apr. 1, 2017

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DOI: 10.1503/cjs.014915

**Background:** Annually, orthopedic residency programs rank and recruit the best possible candidates. Little evidence exists identifying factors that potential candidates use to select their career paths. Recent literature from nonsurgical programs suggests hospital, social and program-based factors influence program selection. We sought to determine what factors influence the choice of an orthopedic career and a candidate's choice of orthopedic residency program.

**Methods:** We surveyed medical student applicants to orthopedic programs and current Canadian orthopedic surgery residents (postgraduate year [PGY] 1–5). The confidential online survey focused on 3 broad categories of program selection: educational, program cohesion and noneducation factors. Questions were graded on a Likert Scale and tailed for mean scores.

**Results:** In total, 139 residents from 11 of 17 Canadian orthopedic programs (49% response rate) and 23 medical student applicants (88% response rate) completed our survey. Orthopedic electives and mandatory rotations were reported by 71% of participants as somewhat or very important to their career choice. Collegiality among residents ( $4.70 \pm 0.6$ ), program being the “right fit” ( $4.65 \pm 0.53$ ) and current resident satisfaction with their chosen program ( $4.63 \pm 0.66$ ) were ranked with the highest mean scores on a 5-point Likert scale.

**Conclusion:** There are several modifiable factors that residency programs may use to attract applicants, including early availability of clerkship rotations and a strong mentorship environment emphasizing both resident–resident and resident–staff cohesion. Desirable residency programs should develop early access to surgical and operative skills. These must be balanced with a continued emphasis on top-level orthopedic training.

**Contexte :** Chaque année, les programmes de résidence en orthopédie évaluent et recrutent les meilleurs candidats possibles. On dispose de peu de renseignements au sujet des critères sur lesquels les candidats fondent leur choix de parcours professionnel. Selon la littérature récente issue de programmes non chirurgicaux, les critères de sélection des programmes ont à voir avec les hôpitaux, les programmes eux-mêmes et certains facteurs sociaux. Nous avons voulu savoir quels sont les facteurs qui influent sur le choix d'une carrière en orthopédie et le choix d'un programme de résidence en orthopédie par les candidats.

**Méthodes :** Nous avons interrogé les étudiants en médecine candidats aux programmes d'orthopédie et les médecins résidents actuels en chirurgie orthopédique au Canada (année de résidence [R] de 1 à 5). Le questionnaire en ligne confidentiel portait sur 3 grandes catégories de critères de choix d'un programme : facteurs didactiques, facteurs liés à la cohésion des programmes et facteurs non didactiques. Les questions ont été classées sur une échelle de Likert et les scores moyens ont été estimés.

**Résultats :** En tout, 139 candidats et médecins résidents actuels de 11 programmes d'orthopédie sur 17 au Canada ont répondu au questionnaire (taux de réponse 49 %). Soixante et onze pour cent des participants ont qualifié les stages électifs et obligatoires en orthopédie de relativement ou très importants pour leur choix de carrière. La collégialité entre les médecins résidents ( $4,70 \pm 0,6$ ), l'adéquation des programmes ( $4,65 \pm 0,53$ ) et la satisfaction actuelle des médecins résidents à l'endroit du programme choisi ( $4,63 \pm 0,66$ ) ont obtenu les scores moyens les plus élevés sur l'échelle de Likert en 5 points.

**Conclusion :** Les programmes de résidence pourraient utiliser plusieurs facteurs modifiables pour attirer des candidats, y compris une offre de stage hâtive et un solide mentorat, mettant l'accent sur la cohésion résident–résident et résident–personnel. Les programmes de résidence attrayants devraient offrir un accès rapide aux compétences chirurgicales et opératoires. Et ces compétences devraient être en phase avec le maintien d'une formation orthopédique de haut niveau.

Annually, orthopedic residency programs rank and attempt to recruit the best possible candidates, which takes a substantial amount of time and effort. Several factors have been identified as relevant in helping residency programs evaluate and rank applicants.<sup>1,2</sup> Applicants' official transcripts, curriculum vitae, personal letters, references and performance at interviews are key components of the assessment process.<sup>1,2,4,5</sup> Little evidence exists, however, identifying factors medical students and residents use to select their future career paths.<sup>3</sup> Having a better understanding of these factors may help guide residency programs in attracting better candidates by emphasizing their strengths and potentially improving on areas of weakness.

A number of studies have evaluated orthopedic resident applicant selection.<sup>4,5</sup> Recent literature has identified factors used by applicants in selecting emergency medicine residency programs.<sup>6</sup> Factors influencing residency selection included program and staff reputation as well as hospital facilities provided by the institution. Other contributing factors included social and geographic influences. To our knowledge no study has looked specifically at factors that influence medical students and residents in choosing an orthopedic residency program. We feel that in addition to those items deemed important by emergency medicine applicants, orthopedic residency selection may involve items not considered by nonsurgical residency applicants, as surgical training has distinct challenges and requirements.

We surveyed medical student applicants and current Canadian residents from postgraduate year (PGY) 1–5. Survey contents assessed the qualities that make orthopedic residency programs desirable during the selection process and factors that residents find helpful in their current training programs.

The primary goal of our study was to establish the social, economic and program-specific characteristics that influence a candidate's choice of orthopedic residency program. We evaluated similar factors previously identified for emergency medicine applicants.<sup>3,6</sup> We hypothesized that the motivations influencing applicants in ranking an orthopedic residency program would differ from those reported for emergency medicine applicants. Additionally, our secondary goal was to determine if, retrospectively, the same selection factors were pertinent after applicants had matched and started working within an orthopedic residency program.

## METHODS

We designed an online questionnaire using SurveyMonkey addressing 5 broad categories:<sup>1</sup> professional interests, attitudes and goals;<sup>2</sup> training, certification and licensing;<sup>3</sup> professional experience;<sup>4</sup> well-being and leisure activities;<sup>5</sup> and demographic information. Survey

questions were derived from previous similar questionnaires in the literature.<sup>3,6</sup> Along with 2 independent physicians, we reviewed the questionnaire for clarity and bias. Medical students and current orthopedic residents were surveyed using the questionnaire. Current residents were asked an additional question set focused on their experience in residency and whether their program met their educational and personal goals. Finally, we included a comments box to capture elements of the decision process that may not have been captured by the survey questions. The survey was electronically distributed to all 17 orthopedic residency programs in Canada. Participants were asked to complete the online questionnaire at their leisure. We also contacted the offices of each residency program director ahead of time to encourage enrolment and cooperation from residents. Medical students applying to the orthopedic program at our institution were recruited on a voluntary basis by supplying contact information during the application. A random prize draw incentive was offered to encourage voluntary participation.

We obtained informed consent electronically before the start of the online survey, and we obtained IRB ethics approval before initiation of the study.

## Participants

Residents enrolled in a Canadian orthopedic surgery residency program and medical students applying to an orthopedic residency program were eligible to complete the questionnaire from January to June 2013. Residents from other nonsurgical and nonorthopedic programs and residents from foreign programs were not eligible to participate. The study's primary outcomes were social, economic and program-specific characteristics affecting residency selection. Current program satisfaction was a secondary outcome.

## Statistical analysis

A Likert scale was used to stratify responses from the questionnaire.<sup>7</sup> We used descriptive statistical calculations to evaluate the data, establishing the mode measurements for each question and the distribution of responses. Likert scale responses were analyzed and mean scores were calculated for each factor by assigning numeric value to each response to obtain a rank for that factor (1 = not at all important or strongly disagree, 2 = not important or disagree, 3 = neutral or undecided, 4 = important or agree, 5 = very important or strongly agree). We calculated standard deviations for each mean score.

## RESULTS

Of a possible 284 respondents, 139 residents from 11 of the 17 residency programs completed the survey:

104 men (75%) and 35 women (25%) aged 25–34 years (49% response rate for orthopedic residents; Table 1). In addition, 23 of a possible 26 medical students interviewed at our institution participated in the survey (88% response rate). Resident respondents were distributed equally among the residency years (Table 2). Complete demographic data for study participants can be found in Table 1.

### Specialty selection

A greater proportion of applicants decided to pursue a career in orthopedics during medical school (65%), whereas approximately one-third (35%) stated they wished to pursue orthopedics before medical school

acceptance. If the decision to pursue orthopedics was made during medical school, the choice was primarily made during the third and fourth years (clerkship years, 71%). In total, 71% of students stated their mandatory orthopedic rotation was either somewhat or very important to their career choice. Interestingly, only 50% of medical school programs surveyed required a mandatory orthopedic rotation.

Mean scores evaluating relevant factors in selecting a career in orthopedics were ranked according to their importance (Table 2). Patient care aspects of orthopedics, including duration of surgery (exposure to the operating room as a trainee), patient population (diverse age and pathology on presentation), and type of work (surgical nature of the discipline) had the highest ranking (mean  $4.6 \pm 0.54$ ). Considerations of lifestyle, work–life balance and job prestige were of moderate importance, with mean scores of  $3.4 \pm 1.09$ ,  $3.32 \pm 1.14$  and  $3.23 \pm 1.21$ , respectively. Research opportunities had the lowest mean score ( $2.69 \pm 1.31$ ), indicating a below-neutral importance for this factor.

### Residency program selection

Residency program selection variables were divided into 3 categories: educational, program cohesion and non-educational factors. Our analysis of education mean scores demonstrated that sufficient patient exposure and variety, amount of early operative exposure and impression during elective time or summer research were the most important factors ( $4.50 \pm 0.55$ ,  $4.49 \pm 0.64$  and  $4.46 \pm 0.88$ , respectively; Table 3). A competency-based program appeared to be of minimal importance for potential applicants, with a mean score of  $2.43 \pm 1.34$ .

Program cohesion variables, as measured by program collegiality, current resident satisfaction and program support for residents, are shown in Table 3. Resident–resident collegiality received the highest rank (mean  $4.70 \pm 0.60$ ), followed closely by the program being the “right fit” and current resident satisfaction (mean  $4.65 \pm 0.53$  and  $4.63 \pm 0.66$ , respectively). Prospective applicants reported resident–staff interactions to be a highly important selection variable (96%). All program cohesion variables obtained a mean score greater than 4.00, indicating that these factors were deemed important in residency program selection.

Program location and nearby recreational opportunities were felt to be the most relevant factors for extracurricular or noneducational factors, with mean scores of  $4.26 \pm 0.97$  and  $4.00 \pm 1.05$ , respectively (Table 3).

A complete ranking of mean scores is presented in Table 4.

Overall, survey respondents felt the survey addressed the elements they considered important when selecting a residency program. In total, 64% of respondents felt the

**Table 1. Participant demographic characteristics (n = 139)**

Characteristic	No. (%)
Sex	
Female	35 (25.18)
Male	104 (74.82)
Age, yr	
< 18–24	5 (3.60)
25–34	117 (84.17)
35–44	13 (9.35)
≥ 45	0 (0)
Not disclosed	4 (2.87)
Relationship status	
Relationship, not married	50 (35.97)
Married	55 (39.57)
Divorced	2 (1.44)
Single	28 (20.14)
Not disclosed	4 (2.87)
Respondents with children	27 (19.42)
Current level of training	
Medical student	23 (16.55)
Resident	116 (83.45)
Postgraduate year	
1	23 (19.83)
2	20 (17.24)
3	28 (24.14)
4	15 (12.93)
5	19 (16.38)
Not disclosed	11 (9.48)

**Table 2. Mean survey scores of factors relevant to selecting a career in orthopedics**

Factors	Mean ± SD
Patient care	$4.60 \pm 0.54$
Future income	$3.75 \pm 1.03$
Work–life balance	$3.40 \pm 1.09$
Lifestyle	$3.32 \pm 1.14$
Job prestige	$3.23 \pm 1.21$
Opportunities for research	$2.69 \pm 1.31$
SD = standard deviation.	

survey represented selection criteria very well or extremely well, whereas 30% felt the study analyzed these elements moderately well.

**DISCUSSION**

Our study’s aim was to develop an understanding of the social, economic and program-specific characteristics that help shape a candidate’s choice of orthopedic program selection. Our primary goal was to identify factors that attract applicants to their program of choice. Our results show that educational opportunities and program cohesion were most important; program elements such as institution and faculty reputation, early operative exposure and educational variety were of paramount importance (87%, 81%, 88% and 96% of respondents, respectively). Program cohesion, as measured by program

collegiality and current resident satisfaction, was also important. Interestingly, 96% of applicants reported resident–staff interactions to be a highly important selection variable. In addition, 95% of applicants rated a feeling that the program was the “right fit” for them as important in their eventual program choice, followed closely by current resident satisfaction. The most important factor in program selection overall based on mean scores was collegiality among residents.

Cohesion variables all obtained a mean score of greater than 4.00, indicating that these variables were deemed relevant to program selection. No other category of program selection factors demonstrated this trend, suggesting the importance of program collegiality and support in residency program selection.

Noneducational aspects of a residency program received lower overall mean scores, suggesting they may play a less important role in the selection process. Only program location had a substantial number of respondents

**Table 3. Mean educational, noneducational and program cohesion survey scores**

Factor	Mean ± SD
<b>Noneducational components</b>	
Location of the program	4.26 ± 0.97
Recreational opportunities in the area	4.00 ± 1.05
Size of the community	3.92 ± 1.10
Influence on spouse/partner	3.66 ± 1.56
Ties to the community	3.39 ± 1.42
Call frequency	2.79 ± 1.27
Cost of living in the area	2.71 ± 1.28
Access to postcall days	2.59 ± 1.40
Resident salary	2.45 ± 1.17
Supplemental income opportunities	1.91 ± 1.04
<b>Educational components</b>	
Sufficient patient exposure/variety	4.50 ± 0.55
Amount of early operative exposure	4.49 ± 0.64
Impression during elective time or summer research	4.46 ± 0.88
Level of responsibility	4.39 ± 0.54
Reputation of the institution	4.21 ± 0.89
Amount of didactic teaching	4.14 ± 0.78
Faculty supervision	4.14 ± 0.73
Reputation of the staff	4.13 ± 0.82
Impression at the interview	4.03 ± 0.95
Recommendation of the institution by staff	4.01 ± 0.87
Hospital facilities	3.99 ± 0.72
Recruitment by colleagues/residents/staff	3.91 ± 1.05
Research opportunities and facilities	3.33 ± 1.26
Competency-based programs	2.43 ± 1.34
<b>Program cohesion components</b>	
Resident–resident collegiality	4.70 ± 0.60
Program was “the right fit”	4.65 ± 0.53
Current resident satisfaction with their program	4.63 ± 0.66
Resident staff interaction	4.46 ± 0.67
Program support for resident	4.34 ± 0.67

SD = standard deviation.

**Table 4. Rank of mean scores for factors influencing selection of a training program**

Factors	Mean ± SD
Resident–resident collegiality	4.70 ± 0.60
Program was “the right fit”	4.65 ± 0.53
Current resident satisfaction with their program	4.63 ± 0.66
Sufficient patient exposure/variety	4.50 ± 0.55
Amount of early operative exposure	4.49 ± 0.64
Resident–staff interactions	4.46 ± 0.67
Impression during elective or summer research	4.46 ± 0.88
Level of responsibility	4.39 ± 0.54
Program support for residents	4.34 ± 0.67
Location of the program	4.26 ± 0.97
Reputation of the institution	4.21 ± 0.89
Amount of didactic teaching	4.14 ± 0.78
Faculty supervision	4.14 ± 0.73
Reputation of the staff	4.13 ± 0.82
Impression at the interview	4.03 ± 0.95
Recommendation of the institution by staff	4.01 ± 0.87
Recreational opportunities in the area	4.00 ± 1.05
Hospital facilities	3.99 ± 0.72
Size of the community	3.92 ± 1.10
Recruitment by colleagues/residents/staff	3.91 ± 1.05
Influence on spouse/significant other	3.66 ± 1.56
Ties to the community	3.39 ± 1.42
Research opportunities and facilities	3.33 ± 1.26
Proximity to current/previous medical school	2.98 ± 1.60
Call frequency	2.79 ± 1.27
Cost of living in the area	2.71 ± 1.28
Access to postcall days	2.59 ± 1.40
Weather	2.57 ± 1.26
Professional sports in the area	2.48 ± 1.26
Resident salary	2.45 ± 1.17
Competency-based program	2.43 ± 1.34
Supplemental income opportunities	1.91 ± 1.04

SD = standard deviation.

(84%) ranking it important for their choice. Factors such as salary, community size, cost of living and ties to the community were ranked by less than 50% of respondents as important in the selection process. Not surprisingly, a strong first impression during electives or summer research was an influential factor (85% of respondents). Generally, extracurricular and noneducational factors influencing residency program selection were not considered important.

Based on our results, there are several modifiable factors from which orthopedic programs could benefit in attracting new applicants. Early and easily available orthopedic clerkship rotations may help to generate an applicant pool of potential candidates for orthopedic residency. Currently, limited exposure to orthopedic rotations during mandatory medical school rotations may be restricting student interest in and understanding of orthopedic surgery as a career. Less than 50% of the country's medical schools currently include a mandatory orthopedic rotation. The present study demonstrates the benefit of orthopedic rotations in applicants' decision-making process. Programs across the country should incorporate additional, mandatory orthopedic rotations to foster an appreciation for musculoskeletal pathology.

A desirable residency program would be structured to provide a strong mentorship environment emphasizing both resident–resident and resident–staff cohesion. Such a program would focus on early access and development of surgical and operative skills while maintaining a strong program reputation. These factors may help program directors understand what applicants are looking for in the programs to which they choose to apply.

As predicted, our study results appear to demonstrate a difference from selection factors previously identified for the emergency medicine match.<sup>6</sup> Institutional and program department head reputation as well as hospital facilities were of paramount importance to emergency medicine applicants. Although these criteria were important to orthopedic program applicants, they did not achieve the same mean scores as program cohesion variables. Secondly important selection criteria for both emergency medicine and orthopedic applicants were personal factors and program location/recreational opportunities. These subtle distinctions may be associated with specific differences in the training atmosphere of high-demand, mentorship-based educational programs like orthopedic surgery, where program cohesion has a stronger influence on the trainee.

### Limitations

To our knowledge, this study is the first of its kind to review factors guiding selection of an orthopedic residency program. There are a number of limitations to our

study. First, its quantitative nature limits in-depth analysis of a complex decision-making process. Second, the response rate of 49% appeared to be low; however, this rate is quite respectable for an unsolicited survey. Third, the mix of medical student applicants and orthopedic residents from various years of training may have diluted the selection variables, and it is possible that our study did not accurately capture all the elements affecting orthopedic program selection. In addition, the inclusion of only medical students applying to our institution's orthopedic training program inherently introduces selection bias owing to their underlying impetus and motivation to apply to our specific program; however, we could not control for this selection bias with the present study design. The low mean scores reported for the importance of research opportunities and competency-based programming on career choice may reflect our applicant pool or the preconceptions regarding our specific program. This selection bias may limit the widespread applicability of our results. Nonetheless, based on available Canadian Resident Matching Service data, approximately 25% of the overall medical student orthopedic applicant pool in 2013 was included in our study. The recruitment of additional medical students applying to all programs across the country would help reduce potential selection bias. Finally, the possibility of recall bias may have played a role in our results. Survey and questionnaire methodology requires residents to recall the factors that affected their selection of a program, but these factors may have undergone substantial change during the course of training. To control for this potential recall bias, multiple questionnaires over numerous years would be required to study its effect.

### CONCLUSION

We feel this study identifies modifiable factors that orthopedic programs can use to enhance educational satisfaction for candidates. In an effort to optimize trainee and applicant satisfaction with an orthopedic training program, the development of a curriculum that includes team-building events, formalized mentorship programs between residents in different years and staff, and the incorporation of early and safe operative exposure or technique laboratories may help.

We hope to have raised awareness and interest in this topic with the goal of encouraging future research. Awareness of selection factors may help programs and departments develop or highlight these elements to future applicants. We believe that similar factors are likely of importance to all surgical residency applicants beyond orthopedics.

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**Competing interests:** None declared.

**Contributors:** All authors designed the study. J. Strelzow and R. Petretta acquired the data, which J. Strelzow analyzed. J. Strelzow and R. Petretta wrote the article, which all authors reviewed and approved for publication.

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