

The Cost of Applying to Integrated Plastic Surgery Residency

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Background: Integrated plastic surgery remains one of the most competitive specialties within the National Resident Matching Program. Although the burden of applying to surgical residencies has been studied, the literature lacks data specific to integrated plastic surgery applicants. This study reports the current total cost, along with the outcomes of applying to and interviewing for integrated plastic surgery residency.

Methods: A survey was sent to applicants in the 2018–2020 integrated plastic surgery application cycles. Survey questions focused on applicant demographics and home medical school characteristics, application processes, interview attendance, interview cost, and applicant financing. Comparative and regression analyses were performed on survey responses.

Results: The survey was distributed to 493 applicants. An estimated 245 (49.7%) applicants responded. On average, applicants applied to 68.3 ± 16.4 (mean \pm SD) programs, received 17.6 ± 11.4 interview invites, and attended 12.6 ± 5.7 of the interviews they received. On average, each applicant spent a total of $\$6690 \pm \4045 during the interview season, with individual interviews costing $\$531$. Residency programs providing financial assistance supplemented $\$73 \pm \64 per interviewee, corresponding to 13.7% of per-interview cost. To cover costs, 33.8% of applicants sought additional funding, and 30.7% of applicants stated that they had supplemental income, with an average monthly supplemental income of $\$1971 \pm \1558 .

Conclusions: This study quantifies the recent total and per-interview cost of applying to integrated plastic surgery residency. It also identifies the importance of cost to applicants and how the cost burden of residency applications is supported. (*Plast Reconstr Surg Glob Open* 2021;9:e3317; doi: [10.1097/GOX.0000000000003317](https://doi.org/10.1097/GOX.0000000000003317); Published online 22 January 2021.)

INTRODUCTION

Integrated plastic surgery residency remains one of the most competitive specialties within the National Resident Matching Program (NRMP) match. In 2020, there were 1.62 applicants per available position.¹ Although the number has steadily increased over recent years, the match rate for those applying to categorical integrated plastic surgery remains one of the lowest at 61.8%.^{2–4} To maintain a competitive edge, applicants average 9.2 weeks of away

rotations and diligently partake in research throughout their medical school.^{4,5} As a result, plastic surgery applicants have some of the highest numbers of research experiences, publications, and presentations compared with other specialties.⁴

Due to the limited number of residency positions and lack of community-based integrated plastic surgery training programs, applicants often choose to apply to all integrated plastic surgery programs. Further, due to the increasing competitiveness of the Match, many applicants also apply to other specialties. Although the cost burden of applying to surgical residencies has been studied, the literature lacks data specific to integrated plastic surgery applicants.^{6–8} Recent analyses of multiple specialties, however, have suggested that prospective plastic surgery residents may outspend other specialties during the match

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process.^{6,9} Given the financial burden that exists for applicants, we report the current total cost of, and the outcomes associated with, applying to and interviewing for integrated plastic surgery residencies.

METHODS

A survey was constructed through literature review and via discussions with future and former applicants. It was deployed using the online survey platform Qualtrics (Qualtrics International Inc., Seattle, Wash.). The survey questions focused on applicant demographics and home medical school characteristics, application processes, interview attendance, interview cost, and applicant financing. (See Survey, Supplemental Digital Content 1, which shows the survey. <http://links.lww.com/PRSGO/B568>.) After institutional review board approval was obtained, the survey was piloted. Upon the completion of piloting, the Qualtrics software internal validity score (iQ), which uses natural language processing and machine learning algorithms, gave a rating of “Good,” which correlated to 4.5/5.

Applicants and Statistical Analysis

We obtained 2018–2020 integrated plastic surgery applicant emails through databases, from 2 of the senior author’s institutional databases. The applicant lists were combined, and duplicate email addresses were removed. Since it is typical for applicants to apply to most, if not all, integrated plastic surgery programs, the list reflects nearly all applicants for the 2 years studied. The survey was distributed to these email addresses after the 2020 Match on March 20, 2020 and remained live until April 15, 2020. In total, 493 applicants were reached with 3 attempts over a 2-week period. The National Resident Matching Program reported a total of 525 applicants into integrated plastic and reconstructive surgery residency for 2018–2020. Therefore, 93.9% (493/525) of the applicants in these cycles were reached.

Data were exported and descriptive statistics were performed using Microsoft Excel (Microsoft Corp., Redmond, Wash.). Regression analysis was performed individually for each explanatory variable in a univariable model, with match outcome into an integrated plastic surgery residency as the dependent binary variable. The regression analysis was performed using Stata 16 (StataCorp, College Station, Tex.). Figures were generated using Qualtrics in-house data analysis suite (Qualtrics International Inc., Seattle, Wash.).

RESULTS

A total of 245 (of 493) responses were obtained, which represents a response rate of 49.7% for our cohort and a 46.7% response rate for all applicants in the Match. Of the respondents, 76.1% applied during the 2019–2020 cycle, 22.6% during the 2018–2019 cycle, and 1.3% applied during both cycles. 92.3% of applicants attended domestic medical schools and 7.7% of applicants were international medical graduates (IMG). Further, 67.4% of applicants’ home institutions had an integrated plastic surgery residency program. With regard to tuition structure, 50% of applicants attended an in-state public medical school, 7.9% attended an out-of-state public medical school, and

Table 1. Applicant Demographics

Applicant Demographic	Percent of Respondents
Application cycle	
2018–2019	22.6%
2019–2020	76.1%
Both cycles	1.4%
Program characteristics	
Domestic applicants	92.3%
IMG	7.7%
Home integrated PRS program	67.4%
Medical school tuition structure	
In-state public	50.0%
Out-of-state public	7.9%
Private	39.0%
MD/PhD	3.2%

39.0% attended a private medical school. The remaining 3.2% of applicants reported an IMG or MD/PhD tuition structure. These data are summarized in Table 1.

Interview Application Characteristics

On average, applicants applied to (Mean ± SD) 68.3 ± 16.4 programs, with a minimum of 10 programs and a maximum of 82. For the 2018–2019 cycle, applicants on average applied to 83.9% of available programs (65.5 programs per applicant/78 total programs) compared with 84.5% of all integrated programs in 2019–2020 (69.3 programs per applicant/82 total programs). On average, applicants received 17.6 ± 11.4 interview invites and attended 12.6 ± 5.7 of the interviews they received, attending 71.5% of interviews received. Only 32.3% of applicants attended all of the interviews they were invited to. When asked, those who did not attend all of the interviews stated that date conflicts and cost were the 2 most common reasons that an interview invite was declined (Table 2).

A total of 30.3% of the respondents dual applied to another residency, with general surgery being the most common specialty amongst dual applicants at 25.7% (63 general surgery dual applicants/245 total responses). Dual applicants attended 5.8 ± 4.5 interviews in their respective specialties outside integrated plastic surgery.

Interview Cost Characteristics

When asked to estimate the average cost of each integrated plastic surgery interview, 54.6% of respondents stated an average cost between \$250–\$499 per interview, and 26.8% estimated \$500–\$749 per interview. A breakdown of these percentages is shown in Figure 1. Applicants were then asked the total amount spent during the interview season on integrated plastic surgery residency interviews. On average, applicants spent a total of \$6690 ± \$4045

Table 2. Reasons for Not Attending an Interview

Reason	Average Weighted Rank*
Date conflict with another interview	1.52
Cost	2.45
No desire to interview at program	2.46
Unforeseen circumstances	3.86
Other	4.73

*Weighted average (1 = most common, 5 = least common).

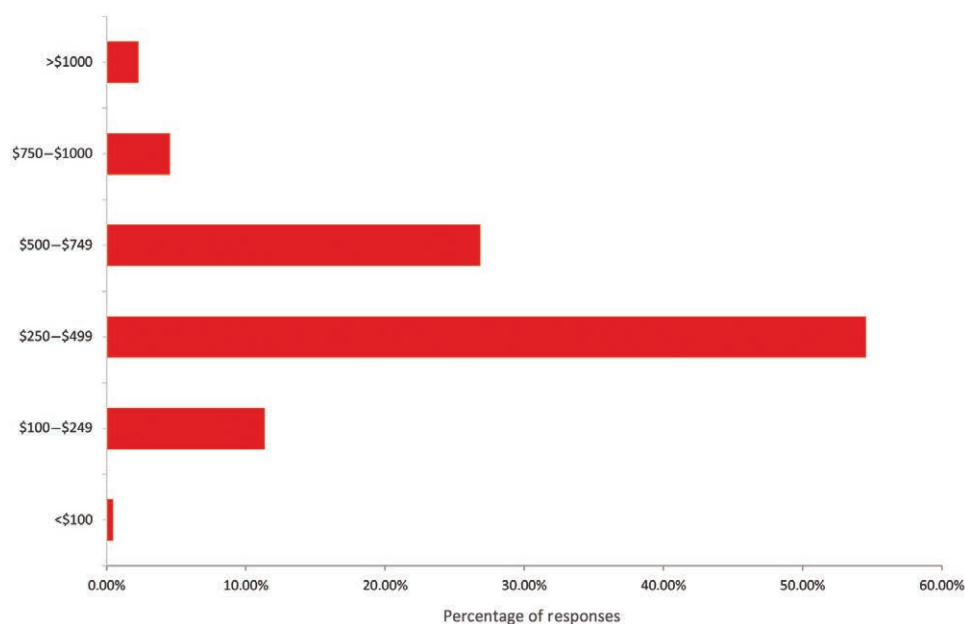


Fig. 1. Estimated cost of each plastic surgery interview.

during the interview season. Total spending did not vary from between the 2018–19 and 2019–20 cycles ($P = 0.84$).

Applicants were also asked about types of financial assistance provided by interviewing programs. In total, 62.3% of the respondents interviewed with at least 1 interview program that provided financial assistance in the form of flights, discounted hotel rates, transportation vouchers, or rideshare credit. Discounted hotel rates accounted for 72.3% financial assistance instances provided, and transportation vouchers accounted for 7.5% of financial assistance (Fig. 2). For each program that provided financial assistance, applicants were asked to provide an estimated dollar amount of the financial assistance provided. We found that these programs provided $\$73 \pm \64 of financial assistance. The average cost of each interview attended was $\$531$, of which $\$73$ of financial assistance corresponds to 13.7%.

Covering Costs

When considering the added financial burden of interview season, 33.8% of applicants sought additional funding. Those who sought additional funding did so in the form of additional loan disbursement (42.4%), family assistance (27.3%), tapping into a saving account(s) (18.2%), or part/full-time employment (9.9%). Figure 3 highlights these forms of additional funding. Those who sought additional funding did not match at a higher rate than those who did not seek additional funding (83.2% versus 83.9%, $P = 0.48$). Applicants were also asked about supplemental income, of which 30.7% of applicants stated that they had supplemental income with an average monthly income of $\$1971 \pm \1558 . Supplemental income came from sources, including partial/full-time employment (34.2%), family (32.9%), partner/spouse (21.1%), and other (11.8%). Applicants receiving supplemental income did not match at a different rate than those who did not receive supplemental income (82.4% versus 83.8%, $P = 0.39$).

A majority of applicants financed medical school through loans (59.4%), and a lesser percentage financed with family assistance (30.4%). The remainder of respondents financed medical school with either scholarships/grants (9.4%), spouse/partner assistance (0.5%), or personal supplemental income (0.5%). On average, 59.5% of a respondent's total cost of medical school was covered by financial aid.

The Importance of Cost in the Interview Process

Applicants were asked about the importance of cost of interviews on a Likert Scale ranging from “extremely important” to “not at all important.” The percentage distribution of these responses is shown in Figure 4. Extremely important was ranked by 11.3% of respondents, very important by 19.9%, moderately important by 32.6%, slightly important by 20.8%, and not at all important by 15.4%.

When asked if financial assistance by programs would increase plastic surgery application rates, 50.5% of respondents said that it would, while 49.6% of respondents said that it would not. An estimated 86.9% of respondents stated that future applicants should consider and plan costs when applying for an integrated plastic surgery residency spot.

With regard to match, 83.6% of the respondents matched into an integrated plastic surgery residency and 16.4% did not. Only 19.7% of the respondents agreed that cost played a role in whether or not the applicant matched. A lesser percentage of applicants (13.4%) believe that cost played a role in where they matched.

Univariate Regression

With regard to applicant demographics, IMG status had a significant inverse relation to matching into an integrated plastic surgery residency (odds ratio, 95% CI, P value) (0.19, 0.06–0.62, $P = 0.006$), whereas having a home integrated plastic surgery residency had a significant positive relation to match outcome (2.16, 1.04–4.53, $P = 0.039$).

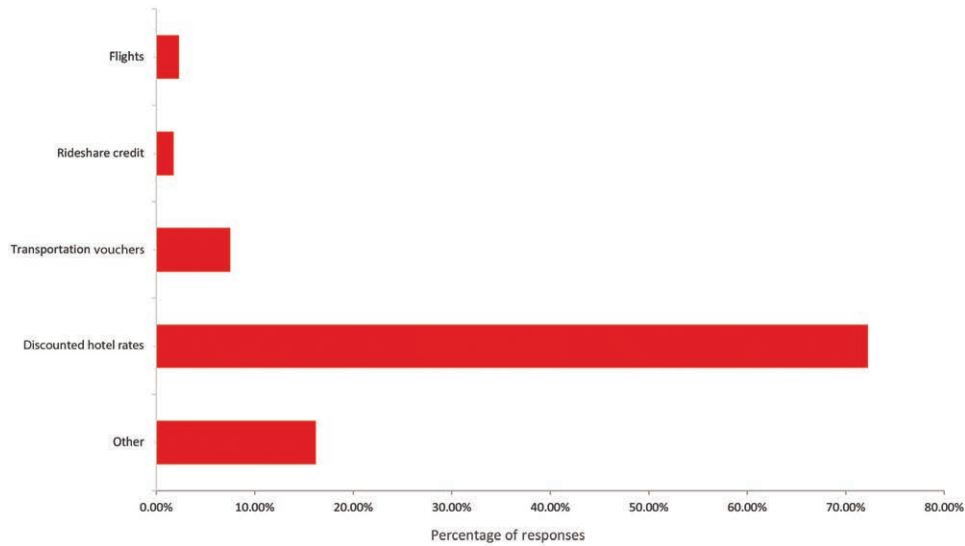


Fig. 2. Forms of financial assistance provided by interviewing program.

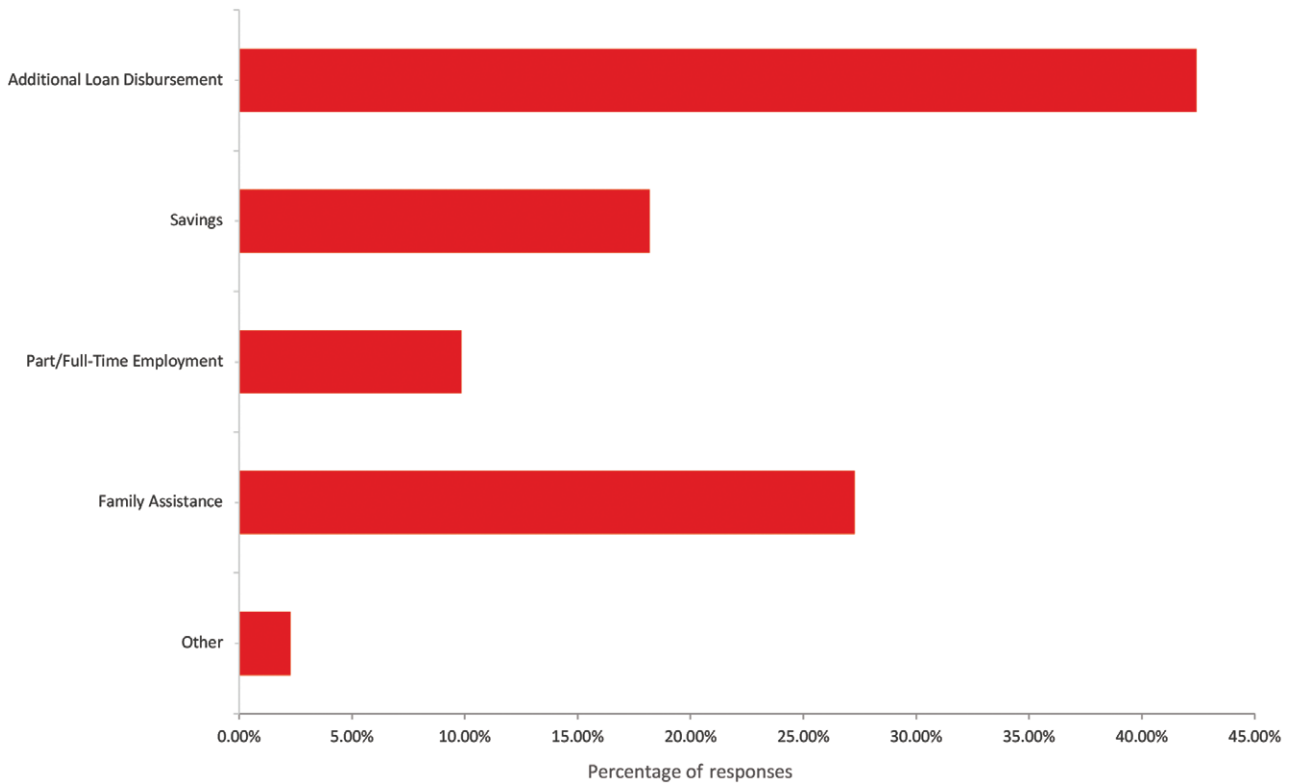


Fig. 3. Sources of additional funding for the interview process.

Both the number of interview invites received (1.32, 1.20–1.46, $P < 0.001$) and the number of interviews attended (1.39, 1.26–1.55, $P < 0.001$) had a significant positive relationship to the dependent match variable. Dual applicant status had an inverse relationship to matching in an integrated plastic surgery residency (0.29, 0.14–0.61, $P = 0.001$).

In terms of interview costs and financing interviews, both the total amount spent on interviews (in thousands

of dollars) and financial aid had significant positive relationships to match outcomes: (1.31, 1.14–1.51, $P < 0.001$) and (2.27, 1.08–4.71, $P = 0.029$), respectively. The outcomes of the univariate analyses can be found in [Table 3](#).

DISCUSSION

This study quantifies the recent cost of applying into an integrated plastic surgery residency. On average,

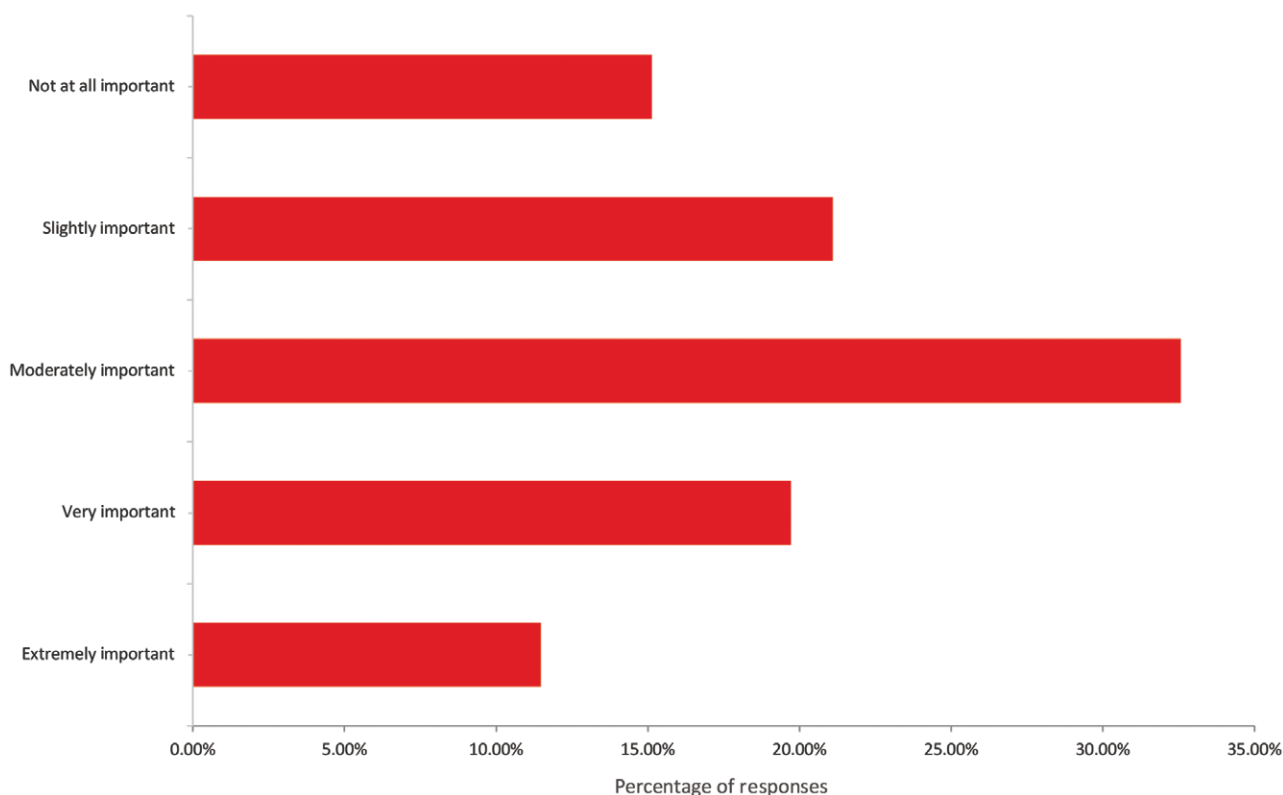


Fig. 4. Importance of cost to applicants in the interview process.

applicants spend \$6690 during the interview season, which includes ERAS application fees, travel, lodging, meals, and miscellaneous items. This figure does not reflect the true cost of applying into an integrated plastic surgery program, as applicants also have costs of away rotations to consider, such as housing and transportation; these costs are not reflected in our analysis. A 2016 study estimated total away rotation costs at \$3591 (\$3816 inflation-adjusted 2019 dollars) per applicant.⁵ These figures combined bring the total cost to > \$10,000.

Applicants attended an average of 12.6 interviews with an average cost per interview of \$531. Of those programs that provided assistance to applicants, the average of \$73 of assistance covers 13.7% of the per-interview cost. Although the assistance provided covers a small portion of

the average interview cost, applicants reflected the importance of these cost offsets—50.5% of respondents believed that application rates would rise with an increased number of programs providing assistance. These data show that even small-cost offsets may provide applicants with incentive to interview.

The importance of cost in the interview process was also reflected in applicants' choices to not interview at a specific program. Table 2 shows that cost was a more common consideration when declining interview invites than a lack of desire to interview at a program, unforeseen circumstances, and other reasons. We believe that the average weighted rank for date conflicts in Table 2 is reflective of the concentrated timeline of integrated plastic surgery interviews.

Table 3. Univariate Regression

Variable	Odds Ratio	95% Confidence Interval		P
		Lower Bound	Upper Bound	
IMC*	0.19	0.06	0.62	0.006
Home integrated PRS residency*	2.16	1.04	4.53	0.039
No. programs applied to	0.97	0.94	1.01	0.104
No. invites received*	1.32	1.20	1.46	<0.001
No. interviews attended*	1.39	1.26	1.55	<0.001
Dual applicant*	0.29	0.14	0.61	0.001
Total amount spent on interviews*	1.31	1.14	1.51	<0.001
Additional funding	0.74	0.45	2.10	0.947
Financial aid*	2.27	1.08	4.71	0.029
Supplemental income	0.90	0.42	1.93	0.795

*Odds ratios for indicated variables are significant at the $P = 0.05$ level, and 95% confidence intervals do not cross an odds ratio of 1.

Figure 4 shows that the importance of interview costs for applicants follows a near-normal distribution, with a majority of applicants stating that cost is a moderately important consideration in the process. Each applicant comes from a different financial stratum and attends a varied number of interviews; therefore, a normal distribution to this Likert Scale question is expected. When asked, however, if future applicants should take cost into consideration, a majority (87.2%) responded “yes.” This shows that the importance of cost is varied across applicants, but most applicants believe that cost should be assessed when applying for an integrated plastic surgery residency position.

Greater than one-third of applicants surveyed (33.8%) sought additional funding during the application process in the forms of additional loan disbursement, familial support, employment, or partner/spousal support. This suggests that in the face of the financial burden of residency applications, applicants are willing to seek funding from other sources to secure a match position. These additional funding sources, however, did not improve an applicant's chance at matching, according to our data. A similar trend is seen with supplemental income, which had no effect on match rates in our cohort. However, the financial burdens associated with applying to plastic surgery residency present a potentially serious concern for equity in the application process, in which applicants from lesser financial means are more significantly burdened by the process.

With regard to factors that significantly affect an applicant's chance to match into an integrated plastic surgery residency, our univariate regression analysis found that having a home program, the number of interviews received and attended, total dollar spent on interviews, and having financial aid all had significant and positive correlations with match outcomes. IMG and dual applicant status had decreased odds of matching. A 2016 study found that the act of dual applying does not lead to poorer match outcomes. However, less-competitive applicants tend to dual apply to hedge their odds of matching into any residency, and competitive integrated plastic surgery applicants do not tend to dual apply.¹⁰

The data collected through our study do not reflect the opportunity cost of the plastic surgery match, which is high for integrated plastic surgery residents. Due to the concentrated nature of the integrated plastic surgery interview season, applicants have to take months off to accommodate their interviews. Further, applicants spend, on average, around 3 months on plastic-surgery-centric rotations, including away rotations. This leads to a loss of educational opportunities during applicants' fourth year of medical school.⁵

When comparing the per-interview cost of applying into integrated plastic surgery residency, our results show that the per-interview cost for a plastic surgery interview is greater than those reported in other specialties. A 2019 study aggregated per-interview costs across all specialties and reported \$282 per interview.¹¹ Orthopedic surgery, a competitive application process similar to plastic surgery, has an average per-interview cost of \$411, with applicants attending 12 interviews on average.⁷ Emergency

medicine, which has a similarly heavy reliance on away rotations, reported an average per-interview cost of \$342.¹² Dermatology was the most similar specialty in terms of per-interview cost, in which applicants spent an average of \$500 per interview.¹³

As a result of the COVID-19 pandemic, plastic surgery integrated residency interviews will take place in a virtual format for the 2020–21 application cycle.¹⁴ Thus, the results of our survey will not be applicable to this year's cycle. How COVID-19 will affect the strategy for applicants is largely unknown; however, a recent study indicates that 60% of students interested in plastic surgery are considering dual applying as a result of the pandemic.¹⁵

This study is not without limitations. It is limited by cognitive and sampling biases present in psychometric research. Although we had a robust response rate of 50%, this does not fully eliminate nonresponse bias; however, it is sufficient to ensure the validity of our comparative statistics. Additionally, those who fared better in the interview process are more likely to respond than those who received fewer interviews; therefore, our data may be skewed to reflect higher-performing applicants. Further, recall bias was reduced by administering the survey as close to the 2020 National Resident Matching Program match. The effect of location of the applicant and/or the interviewing program was not assessed in the survey. As a result, we were unable to analyze whether or not location had an influence on whether or not individuals considered distance traveled when deciding on accepting or declining interviews. Finally, future studies should examine the cost-limitation of the interview process for plastic surgery—Are there applicants to other specialties who perhaps did not apply to plastic surgery due to the increased cost?

CONCLUSIONS

The interview process for the integrated plastic surgery match is unique due to the small number of programs. Applicants find themselves applying to a majority of the accredited programs and attend a high proportion of interviews they receive. The financial burden of the applications and interviews is not offset by financial assistance from the interviewing program. Therefore, applicants rely on additional funding and supplemental income to make ends meet during the end of their medical school career. Compounding the expenses of interviewing with those of away rotations and the opportunity costs of partaking in plastic surgery rotations, the integrated plastic surgery applicant faces burgeoning costs to become a competitive applicant. Further, these financial burdens present a potentially serious concern for equity in the application process, in which applicants from lesser financial means are put at a significant disadvantage. We recommend that applicants be aware of and understand the cost of the application process, especially those undergoing multiple away rotations and applying to other specialties in addition to plastic surgery. Programs may be able to offset the additional disbursement sought out by applicants by providing a greater amount of assistance in the form of airfare, hotels, or rideshare credit.

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