

SPECIAL TOPIC Education

The Influence of Training Pathway, Institution Type, Gender, and a Global Pandemic on Post Graduation Career Plans in Plastic Surgery

Muntazim Mukit, MD* Leigh Sumner, BS* Robert C. O'Brien, PhD† Eldrin L. Bhanat, MD, MPH‡ Marc E. Walker, MD, MBA*

Background: Anecdotal statements are often made about what percentage of residents go into fellowship versus private practice versus academia after graduation. However, few objective studies have been completed on this topic. This project is designed to shed light on the career choices of plastic surgery residents immediately after graduation from 2018 to 2022. A secondary objective was to determine whether the COVID-19 pandemic had any measurable impact on postgraduation plans.

Methods: After obtaining institutional review board approval, publicly available data were obtained from institution websites or via program queries. Comparison between pre-COVID-19 and post-COVID-19 (2018–2019 versus 2020–2022), integrated versus independent, and private versus public cohorts were analyzed using Fisher exact test. A two-sided *P* value less than 0.01 was considered statistically significant.

Results: Data were collected for 690 graduates across 64 plastic surgery training programs. Responses were obtained from 60 of 88 (68%) integrated and 30 of 47 (64%) independent programs. Most graduates pursued fellowship training (61%), followed by private practice (28%), academic practice (5%), or military post (1%). Independent residents were more likely to pursue private practice (40% versus 26%, P= 0.001), whereas integrated residents were more likely to pursue fellowship (49% versus 70%, P < 0.0001). Public institution graduates were more likely to go into private practice (37% versus 23%, P= 0.0002), whereas private institution residents were more likely to pursue fellowship (55% versus 72%, P < 0.0001). Public institutions were more likely to graduate women (45% versus 35%, P= 0.009). The COVID-19 pandemic (P= 0.31) had no impact on postgraduation plans.

Conclusions: This study demonstrates that training pathway and institution type have a significant impact on postgraduation plans, whereas a global pandemic does not. This information can be used by educators, residents, and medical students as they plan for the future. (*Plast Reconstr Surg Glob Open 2023; 11:e5292; doi: 10.1097/GOX.00000000005292; Published online 25 September 2023.*)

INTRODUCTION

Generalized statements are often made about the postgraduation plans of plastic surgery trainees. Institutions,

From *Division of Plastic and Reconstructive Surgery, University of Mississippi Medical Center, Jackson, Miss.; †Department of Data Science, University of Mississippi Medical Center, Jackson, Miss.; and ‡Department of General Surgery, University of Mississippi Medical Center, Jackson, Miss.

Received for publication April 10, 2023; accepted June 20, 2023. Presented at the ACAPS Winter Meeting 2023, Best Papers session. Copyright © 2023 The Authors. Published by Wolters Kluwer Health, Inc. on behalf of The American Society of Plastic Surgeons. This is an open-access article distributed under the terms of the Creative Commons Attribution-Non Commercial-No Derivatives License 4.0 (CCBY-NC-ND), where it is permissible to download and share the work provided it is properly cited. The work cannot be changed in any way or used commercially without permission from the journal. DOI: 10.1097/GOX.00000000005292 when interviewing medical students, will often discuss the proportion of their graduates who pursued fellowship versus private practice versus academia. Programs aim to demonstrate that they prepare their graduates for whatever career path they choose, whether that be further training or private practice.

Studies have been done on the careers of plastic surgery residency graduates, such as one by Herrera et al looking at graduation plans of residents from 2005 to 2010, and one by Imahara et al surveying senior plastic surgery residents at the 2009 American Society of Plastic Surgeons Senior Residents Conference.^{1,2} Another study was done by Hashmi et al looking at 2013 graduates.³ Other studies, such as a review article by Matthew et al, synthesized the literature and found that most plastic surgeons ultimately

Disclosure statements are at the end of this article, following the correspondence information.

pursue private practice; there are fewer plastic hand surgeons, too many plastic craniofacial surgeons and fewer reconstructive procedures being performed.⁴ Meanwhile, other studies have investigated career development, career evaluation, factors influencing career trajectory, the effect of research productivity on career development, and geographic practice patterns.^{5–8}

However, few objective studies have recently looked at immediate postgraduation career plans of plastic surgery trainees. Additionally, although studies have been done on the effect of the COVID-19 pandemic on plastic surgery trainees, few, (if any) have looked at the impact of a global pandemic on career choices of plastic surgery residents.^{9–16}

The goal of this study was to investigate immediate postgraduation career choices of plastic surgery residents from 2018 to 2022 and to see if factors such as training pathway, institution type (public versus private), or institution rank had any impact on postgraduation plans. A secondary goal was to determine if the COVID-19 pandemic had any measurable impact on postgraduation career plans, dividing trainees into pre-COVID-19 (2018–2019) and post-COVID-19 (2020–2022) cohorts.

METHODS

A cross-sectional survey study was done. The target population was integrated and independent plastic surgery residency graduates from 2018 to 2022, and the goal sample size was data for graduates from all 88 integrated and 47 independent programs.^{17,18} Institutional review board approval was obtained from our institution. A standard phone script and email script was used to contact programs. Programs were queried by phone and email at least two times. An excel call log was used to schedule calls and track program response, with follow-up depending on program response to initial contact. Data was collected through program queries, publicly available data on program websites and social media, and professional websites and public personal social media. Professional sites queried included practice websites of graduated integrated and independent plastic surgery residents and LinkedIn profiles of said residents, when available. Data collected included graduation year and immediate postgraduation plans: that is, fellowship (and which kind) versus private practice versus academia versus military appointment. Demographic data were also collected, including gender, marital status, age at graduation, number of dependents, training pathway (integrated versus independent), primary residency type (for independent residents), and total length of training time. Residents graduating from 2018 to 2019 were defined as the pre-COVID-19 cohort and those graduating from 2020 to 2022 were defined as the post-COVID-19 cohort. Statistical analysis was done using Fisher exact test to compare pre-COVID-19 and post-COVID-19, integrated versus independent and private versus public institution cohorts. Statistical analysis was also done using the Kruskal-Wallis test to see if there was any association between program rank (as defined by Doximity) and the type of postgraduation plan pursued.¹⁹ Pvalues were two-sided, and a Pvalue less than 0.01 was set

Takeaways

Question: What are the immediate postgraduate plans of plastic surgery residents, and has the COVID-19 pandemic had any effect on these plans?

Findings: All independent and integrated plastic surgery residency programs were queried. Integrated residents and private institution graduates more often pursued fellowship, but independent residents and public institution graduates more often pursued private practice. Public institutions graduated more women; the COVID-19 pandemic had no effect on graduation plans.

Meaning: Training pathway and institution type have had effects on plastic surgery residents' postgraduation plans, the COVID-19 pandemic has not, and there is a disparity between private and public institutions in terms of graduating female residents.

as statistically significant. Statistical analysis was performed using SAS, version 9.4 (SAS Institute, Cary, N.C.) and R version 4.2.1. Data analysis was done by a statistician.

RESULTS

Data were collected from a total of 64 programs, 60 of 88 (68%) integrated programs, and 30 of 47 (64%)

Table 1. Demographics of Graduates of Independent and
Integrated Plastic Surgery Residents from 2018 to 2022

$\overline{\text{Gender (n = 686)}}$	Male: 416 (61%)
	Female: 270 (39%)
Type of training $(n = 670)$	Independent: 181 (27%)
	Integrated: 489 (73%)
Marital status ($n = 215$)	Married: 168 (78%)
	Single: 47 (22%)
Institution type $(n = 689)$	Public: 326 (47%)
	Private: 363 (53%)
Age at graduation $(n = 61)$	Average: 34
No. dependents $(n = 180)$	0:73 (41%)
1	1:50 (28%)
	2:45 (25%)
	3:9 (5%)
	4:1(0.6%)
	5:2 (1%)
Total PGY years $(n = 669)$	PGY6: 391 (58%)
,,	PGY7: 75 (11%)
	PGY8: 94 (14%)
	PGY9: 49 (7%)
	PGY10: 29 (4%)
	PGY11: 12 (2%)
	PGY12: 7 (1%)
	PGY13: 5 (1%)
	PGY14: 4 (0.6%)
	PGY15: 1 (0.1%)
	PGY18: 1 (0.1%)
	PGY21:1 (0.1%)
Primary residency (n = 169)	General surgery: 168
	(99.4%)
	OMFS: 1 (0.6%)
Graduation year $(n = 690)$	2022: 148 (21%)
· · · ·	2021: 145 (21%)
	2020: 141 (20%)
	2019: 135 (20%)
	2018: 121 (18%)

independent programs.^{17,18} Several programs had both independent and integrated graduates, whereas others had one or the other. Of note, some integrated programs closed in recent years and others were only accredited this year; so they have no graduates.²⁰ The latter programs were not included in our study. Overall demographic data are listed in Table 1. Most graduates were men (61%), and most were married (78%). Approximately 47% of graduates trained at public institutions, and 53%, at private institutions. Most graduates (41%) had no dependents, and most (58%) graduated at the PGY6 level. We had nearly equivalent response rates for all graduate years from 2018 to 2022. Among independent residents, 99.4% completed prior training in general surgery, and 0.6% completed training in oral and maxillofacial surgery.

When comparing demographics between integrated and independent residents, independent residents were older (average age 36 versus 33 for integrated) and graduated at higher PGY levels (PGY8 or above; Table 2). Independent residents were also more likely to have two or three children versus one or no children for integrated residents. When comparing demographics between public and private institutions, public institutions were also more likely to graduate women (45% female at public institutions versus 35% female at private institutions, P = 0.008; Table 3). Public institution graduates were older (age 35 versus 33 for private institution graduates). When comparing demographics between pre- and post-COVID-19 cohorts, there were no statistically significant differences (P < 0.01), but type of training and marital status approached statistical significance (Table 4).

In terms of immediate postgraduation plans, most graduates pursued fellowship training (61%), followed by private practice (28%), academics (5%), and a military post (1%); Fig. 1). Data were missing for 5% of graduates. Among those who pursued a fellowship, 21% pursued aesthetics, 30% pursued microsurgery, 30% pursued hand surgery, 16% pursued craniofacial surgery, 1% pursued gender affirming surgery, and 1% pursued other fellowships (Fig. 2). Independent pathway residents were significantly more likely to pursue private practice (40% versus 26%, P = 0.001), whereas integrated pathway residents were much more likely to pursue fellowship training (49% versus 70%, P < 0.0001; Fig. 3). Public institution graduates were more likely to go into private practice (37% versus 23%, P = 0.0002), whereas private institution residents were more likely to pursue fellowship (55% versus 72%, P < 0.0001; Fig. 4). There were no statistically significant differences between the pre-COVID-19 and post-COVID-19 cohorts in terms of postgraduation plans (Fig. 5). There was no association between program rank and type of postgraduation plan (P=0.11).²⁰

DISCUSSION

Prior studies have evaluated plastic surgery resident career plans. Some studies, such as one by Glener et al,

	Integrated	Independent	
Gender (n = 669)	Masculine: 293 (60%)	Masculine: 115 (64%)	P=0.33
	Feminine: 196 (40%)	Feminine: 65 (36%)	
Marital status ($n = 213$)	Married: 118 (79%)	Married: 50 (78%)	P = 0.754
	Single: 31 (21%)	Single: 14 (22%)	
Institute type $(n = 670)$	Public: 221 (45%)	Public: 100 (55%)	P = 0.012
	Private: 268 (55%)	Private: 81 (45%)	
Age at graduation $(n = 61)$	Average: 33 (n = 40)	Average: 36 (n = 21)	P < 0.001
No. dependents (n = 180); mean 1 for both	0:56 (44%)	0:17 (31%)	P = 0.002
groups	1:43 (34%)	1:7 (13%)	
0 1	2:23 (18%)	2:22 (41%)	
	3: 2 (2%)	3:7 (13%)	
	4:1(1%)	4:0(0%)	
	5:1 (1%)	5:1 (2%)	
Total PGY years $(n = 669)$	PGY6: 391 (79%)	PGY6: 0 (0%)	P = <0.001
	PGY7: 73 (15%)	PGY7: 2 (1%)	
	PGY8: 11 (2%)	PGY8: 83 (47%)	
	PGY9: 2 (0.4%)	PGY9: 47 (27%)	
	PGY10: 4 (1%)	PGY10: 25 (14%)	
	PGY11: 4 (1%)	PGY11: 8 (5%)	
	PGY12: 1 (0.2%)	PGY12: 6 (3%)	
	PGY13: 2 (0.4%)	PGY13: 3 (2%)	
	PGY14: 3. (0.6%)	PGY14: 1 (0.6%)	
	PGY15: 0 (0%)	PGY15: 1 (0.6%)	
	PGY18: 0 (0%)	PGY18: 1 (0.6%	
	PGY21: 1 (0.2%)	PGY21: 0 (0%)	
Primary residency (n = 168)	General surgery: 0 (0%)	General surgery: 167 (99.4%)	P=1.000
	OMFS: 0 (0%)	OMFS: 1 (0.6%)	
Graduation year (n = 676)	2022: 113 (23%)	2022: 37 (17%)	P=0.023
	2021: 106 (22%)	2021: 36 (20%)	
	2020: 105 (22%)	2020: 34 (19%)	
	2019: 87 (18%)	2019: 39 (22%)	
	2018: 78 (15%)	2018: 41 (24%)	

Table 2. Demographic Characteristics of Plastic Surgery Residency Graduates from 2018 to 2022, Stratified by Training Type (Integrated versus Independent)

	Public	Private	
Gender (n = 686)	Masculine: 180 (55 %)	Masculine: 236 (65%)	<i>P</i> =0.008
	Feminine: 145 (45%)	Feminine: 125 (35%)	
Type of training $(n = 670)$	Independent: 100 (31%)	Independent: 81 (23%)	P = 0.024
	Integrated: 221 (69%)	Integrated: 268 (77%)	
Marital status ($n = 215$)	Married: 101 (77%)	Married: 69 (82%)	P = 0.396
	Single: 30 (23%)	Single: 15 (18%)	
Age at graduation $(n = 61)$	Average: $35 (n = 45)$	Average: 33 (n = 16)	P = 0.003
No. dependents (n = 180)	0:53 (44%)	0:20 (33%)	P = 0.463
1	1:33 (28%)	1:17 (28%)	
	2:26 (22%)	2: 19 (32%)	
	3:6 (5%)	3: 3 (5%)	
	4:0(0%)	4:1(2%)	
	5:2 (2%)	5:0(0%)	
Total PGY years ($n = 670$); mean 7 years for both groups	PGY6: 196 (57%)	PGY6: 195 (56%)	P = 0.761
	PGY7: 15 (4%)	PGY7: 60 (17%)	
	PGY8: 59 (17%)	PGY8: 35 (10%)	
	PGY9: 29 (8%)	PGY9: 20 (6%)	
	PGY10: 10 (3%)	PGY10: 20 (6%)	
	PGY11: 6 (2%)	PGY11: 6 (2%)	
	PGY12: 3 (1%)	PGY12: 4 (1%)	
	PGY13: 1 (0.3%)	PGY13: 4 (1%)	
	PGY14: 3 (1%)	PGY14: 1 (0.3%)	
	PGY15: 1 (0.3%)	PGY15: 0 (0%)	
	PGY18: 0 (0%)	PGY18: 1 (0.3%)	
	PGY21: 1 (0.3%)	PGY21:0 (0%)	
Primary residency $(n = 169)$	General surgery: 92 (99%)	General surgery: 76 (100%)	P = 1.000
	OMFS: 1 (1%)	OMFS: 0 (0%)	
Graduation year (n = 689)	2022: 71 (22%)	2022: 76 (21%)	P = 0.975
	2021: 66 (20%)	2021: 79 (22%)	
	2020: 65 (20%)	2020: 76 (21%)	
	2019: 66 (20%)	2019: 69 (19%)	
	2018: 58 (18%)	2018: 63 (17%)	

Table 3. Demographic Characteristics of Plastic Surgery Residency Graduates from 2018 to 2022, Stratified by Institution Type (Public versus Private)

note the influence of training pathways on a career in academia by examining public data about faculty members at integrated/independent plastic surgery programs and then noting any trends, such as the fact that most faculty will have completed either medical school or some training at their current place of employment.²¹ However, it has been several years since a study on career plans was done, and none, to our knowledge, has examined the impact of the COVID-19 pandemic on trainees' graduation plans.¹⁻⁴

Regarding demographic differences between cohorts, some differences are logical. Independent residents are older and graduate at higher PGY levels because they have to complete another residency before completing a plastic surgery residency, a difference also found by other authors.^{1,2} Independent residents are also likely to have more dependents, which makes sense, since as they are older, they have time to have more children; Imahara et al found that trainees with dependents were usually older.² Public institution graduates may be older on average because they graduate more independent residents; however, this trend has not been explored in the literature.

Herrera et al examined career trends for residents graduating from 2005 to 2010.¹ Compared with their findings, fewer graduates pursue private practice (28% now versus 48% then), more pursue fellowship (61% now versus 41% then), fewer pursue an academic position (5% now versus 8% then), and fewer have military commitments (1% now versus 3% then).¹ In terms of fellowship

plans, more residents pursue hand fellowship (30% now versus 24% then), more pursue microsurgery fellowship (30% now versus 27% then), more pursue craniofacial fellowship (16% now versus 10% then) and more pursue aesthetic fellowship (21% now versus 10% then).¹ Our study was able to capture a greater percentage of programs (68% integrated and 64% independent, versus a response rate of 49%). Some of these trends may be because there are now fewer independent residents and more integrated residents, with the former more often entering into private practice and the latter more often doing fellowship.²²

Similar to prior studies, independent residents were more likely to forego additional training and enter private practice, whereas integrated residents were more likely to pursue fellowship.^{1,2} This may be because independent residents have been training so long that they do not wish to undergo further training. They also have, on average, more dependents, as found in our study, hence the need to enter into practice. Indeed, Imahara et al found that trainees with dependents were more likely to enter private practice.³ Interestingly, the literature has varied results when it comes to the impact of educational debt; some say debt has no impact, whereas others state that residents with greater debt were more likely to enter private practice.^{2,3}

Residents from public institutions were more likely to go into practice and those from private institutions were more likely to go into fellowship. This finding may

	Pre-COVID-19	Post-COVID-19	
Gender (n = 686)	Masculine: 159 (62.6%)	Masculine: 257 (59.5%)	P = 0.466
	Feminine: 95 (37.4%)	Feminine: 175 (40.5%)	
Type of training (n = 670)	Independent: 80 (32.7%)	Independent: 101 (23.8%)	P = 0.015
	Integrated: 165 (67.3%)	Integrated: 324 (76.2%)	
Marital status (n = 215)	Married: 45 (68.2%)	Married: 125 (83.9%)	P = 0.011
	Single: 21 (31.8%)	Single: 24 (16.1%)	
Institution type $(n = 689)$	Public: 124 (48%)	Public: 202 (47%)	P = 0.693
	Private: 132 (52%)	Private: 231 (53%)	
Age at graduation $(n = 61)$	Average: 35 (n = 24)	Average: $34 (n = 37)$	P=0.130
No. dependents (n = 180); mean 1 for both groups	0:29 (51%)	0: 44 (36%)	P = 0.509
	1:12 (21%)	1:38 (31%)	
	2:11 (19%)	2:34 (28%)	
	3: 3 (5%)	3:6 (5%)	
	4:0(0%)	4:1 (1%)	
	5:2 (4%)	5:0 (0%)	
Total PGY years $(n = 664)$	PGY6: 135 (56%)	PGY6: 254 (60%)	P = 0.524
	PGY7: 25 (10%)	PGY7: 48 (11%)	
	PGY8: 43 (18%)	PGY8: 50 (12%)	
	PGY9: 18 (7%)	PGY9: 32 (7%)	
	PGY10: 10 (4%)	PGY10: 19 (4%)	
	PGY11: 6 (2.5%)	PGY11:5 (1%)	
	PGY12: 2 (1%)	PGY12: 5 (1%)	
	PGY13: 1 (0.4%)	PGY13: 4 (1%)	
	PGY14: 2 (1%)	PGY14: 2 (0.5%)	
	PGY15: 0 (0%)	PGY15: 1 (0.2%)	
	PGY18: 0 (0%)	PGY18: 1 (0.2%)	
	PGY21: 1 (0.4%)	PGY21: 0 (0%)	
Primary residency (n = 169)	General surgery: 75 (100%)	General surgery: 93 (99%)	P=1.000
	OMFS: 0 (0%)	OMFS: 1 (1%)	

Table 4. Demographic Characteristics of Plastic Surgery Residency Graduates from 2018 to 2022, Stratified by Pre-COVID-19 (2018–2019) versus Post-COVID-19 (2020–2022)

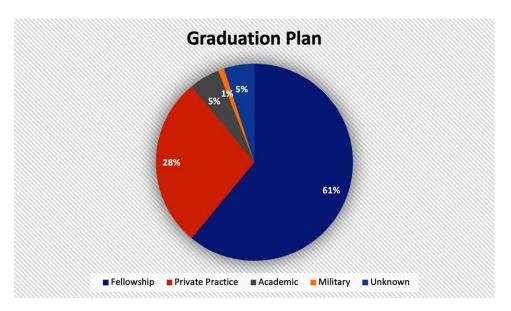


Fig. 1. A pie chart demonstrating the breakdown of trainees' immediate postgraduation plans.

be because private institutions tend to be more academic and have greater academic productivity, so their trainees may be more likely to pursue fellowship and careers in academia. Indeed, 39% of all academic plastic surgeons trained at the same 11 programs, programs that are known to be academically productive.^{23,24} Meanwhile, public institution graduates may feel better trained to pursue practice immediately postgraduation, although there is not much objective data to support this assumption.

Of note, public institutions graduated more female residents. Herrera et al and Imahara et al either did not find this association or did not examine this factor.^{1,2} Meanwhile, Hashmi et al found that there were no differences in career plans or goals between men and women,

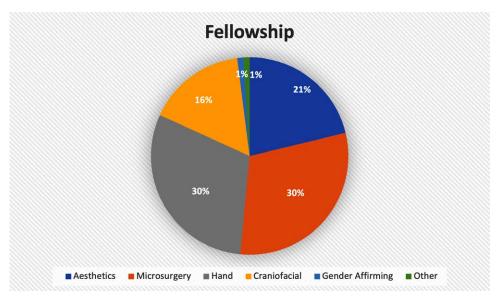


Fig. 2. A pie chart demonstrating what proportion of graduates go into which fellowships, among those who pursued fellowships.

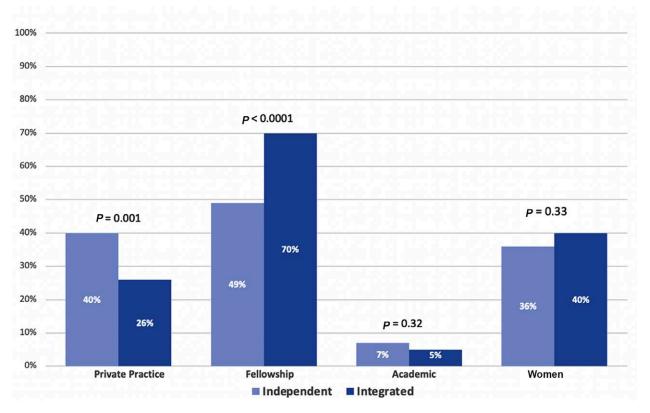


Fig. 3. Bar graph showing differences in postgraduation career plans between independent and integrated plastic surgery residents.

but they did not see if there were differences in the proportion of women graduating from public versus private institutions.³ There are more women in integrated plastic surgery programs; they represented 14% of residents in 1990 but 40% in 2015.²⁵ There has also been growth in the percentage of women in both independent and integrated plastic surgery residencies from 21.84% to 37.31%, and

the female representation in plastic surgery has increased even from 2019 to 2021.^{26,27} However, none of these studies looked at or found a difference between public and private institutions in terms of female graduates.

It is not clear why this discrepancy exists, either from the literature or as a result of this study. As our study did not contain subjective data consisting of queries to

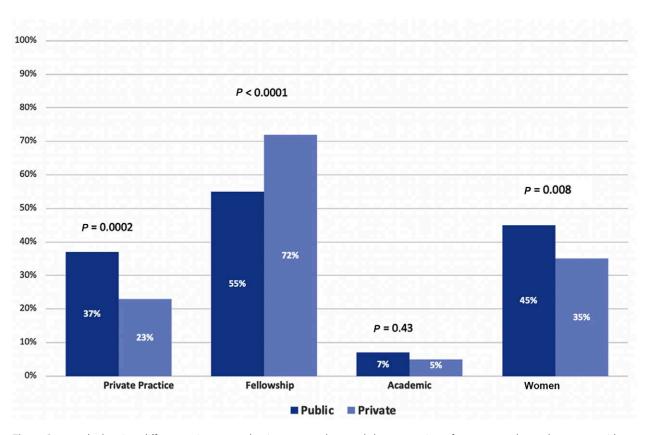


Fig. 4. Bar graph showing differences in postgraduation career plans and the proportion of women graduates between residents graduating from public and private institutions.

program directors or plastic surgery residency graduates, we can note this trend, but we cannot definitively ascertain why this trend exists, which is a limitation of this study. There are fewer female plastic surgeons in academia, in ASPS and in leadership than men; perhaps public institutions have more female role models/attendings, more female residents, or a culture friendlier/more appealing to female medical students.²⁸⁻³¹ Further studies need to be conducted to confirm why this difference exists or if this difference is due to sampling bias. While our response rates of 68% and 64% are substantial for integrated and independent programs, respectively, it was not 100%.

Ideally, such a gender disparity should not exist. Female plastic surgeons are still underrepresented in leadership roles and tend to hold lower academic ranks.^{28–31} Women plastic surgeons were more likely to be unmarried, have fewer children, earn less, and experience sexism or bias, and were less likely to be recognized.^{32,33} Academic contributions by female plastic surgeons are increasing, and the gender inequalities are decreasing; however, more work must be done at all levels to eliminate these disparities.^{34–36}

Interestingly, the COVID-19 pandemic had no impact on trainees' career plans. Previous studies have examined the effects of the pandemic on plastic surgery trainees' education; programs have had to shift to virtual learning, and residents performed fewer cases during the initial part of the pandemic.^{9–11,15} The pandemic also affected resident wellness negatively.^{12–16} However, despite the shutdown of elective and limitation of semielective cases, one study found that graduating independent residents in 2020 did not have significantly different case numbers than residents graduating before or after.¹² And despite Jabori et al reporting that 9% of trainees (among their 69 respondents) changed their postgraduation plans, this article shows that long-term overall trends did not change post-COVID-19.¹² Our findings are also consistent with those of Crowe et al, who found that surveyed residents did not anticipate career changes despite the pandemic.¹³ Thus, although the pandemic has had numerous short- and long-term effects on society and education, it did not ultimately affect residents' immediate graduation plans.

There are several limitations to this study. We were not able to capture graduation plans for all programs and residents; having these additional data may have an effect on the results. Additionally, because data were collected from both program queries and publicly available information, data points such as age at graduation, marital status, or number of dependents were not captured for all graduates. Furthermore, this article only looks at immediate postgraduation plans; it is too soon, especially for 2022 graduates, to see the type of career (academic versus private practice) these graduates ultimately pursue.

Despite these limitations, these findings have important implications for the field and future of plastic surgery. Although more trainees are entering fellowship, few are entering directly into academia. Residents entering fellowship may eventually pursue an academic

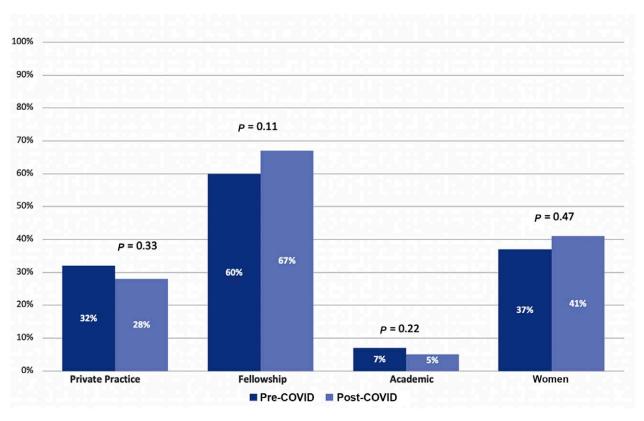


Fig. 5. Bar graph showing differences in postgraduation career plans between the pre-COVID-19 and post-COVID-19 cohorts.

career-as one study found that fellowship training, among other factors such as number of publications, was associated with a career in academics-but this particular study did not capture that data.^{5,37} Despite the many years that have passed, independent residents are still more likely to enter into practice, and integrated residents, into fellowship. There is a concern that there will be fewer academic plastic surgeons; hence, it is important to figure out ways to encourage sufficient graduates to enter into academia, both among independent and integrated residents.⁴ Indeed, the training and experience of independent graduates are an asset to academic plastic surgery; it would be unfortunate to have an imbalance between graduates pursuing private practice versus used positions versus academia. Additionally, although it is encouraging to see more residents completing hand fellowship-given an anticipated decrease in the number of plastic hand surgeons-it may be concerning that many still pursue a craniofacial fellowship given limited job opportunities.4,38-40

Based on these findings, further studies need to be done, elucidating why these trends are occurring. Future studies would involve surveying graduates and program directors, assistant program directors, and other leadership staff. Based on those results, appropriate advice can be given. For example, if private institution and integrated residents feel less comfortable entering into private practice directly, then steps can be taken to ensure that they feel ready to pursue practice or fellowship postgraduation if they desire. Likewise, if public institutions are graduating more women, then perhaps steps should be taken to encourage private institutions to match more graduating female medical students. Identifying these trends is step one; determining the reasons why is the next step, and implementing changes would be the final step.

CONCLUSIONS

We hope that the findings of this study will serve as a valuable resource for program directors, residents, and medical students. This article provides insight into immediate graduation plans of plastic surgery residents, and the findings therein may aid program directors/ academic faculty in guiding their residents' careers. It may help residents and medical students interested in plastic surgery in planning for the future. Additionally, this article demonstrates that, although the COVID-19 pandemic may have had numerous immediate effects, it ultimately had no lasting effect on trainee's postgraduation plans.

> Marc E. Walker, MD, MDA 2500 N State St. UMMC Plastic Surgery Clinical Sciences Building Jackson, MS 39216 E-mail: mwalker6@umc.edu

DISCLOSURE

The authors have no financial interest to declare in relation to the content of this article.

REFERENCES

- Herrera FA, Chang EI, Suliman A, et al. Recent trends in resident career choices after plastic surgery training. *Annals Plast Surg.* 2013;70:694–697.
- Imahara S, Scott J, Neligan P. Career plans of graduating plastic surgery trainees in 2009: the impact of an uncertain economic climate. *Plast Reconstr Surg.* 2009;124:2173–2178.
- Hashmi A, Khan FA, Herman F, et al. A survey of current state of training of plastic surgery residents. *BMC Res Notes*. 2017;10:234.
- 4. Matthew D, Bryan L, Samuel C, et al. Employment as a plastic surgeon: a review of trends and demand across the field. *Annals Plast Surg*. 2021;87:377–383.
- DeLong M, Hughes D, Tandon V, et al. Factors influencing fellowship selection, career trajectory, and academic productivity among plastic surgeons. *Plast Reconstr Surg*. 2014;133:730–736.
- Carbullido M, Hornacek M, Reid C, et al. Career development in plastic surgery. *Plast Reconstr Surg*. 2021;147:1441–1449.
- 7. Sultan D, Clappier M, Perrott J, et al. Plastic surgery trainees practicing in your backyard? An analysis of career patterns for fellowship and residency graduates. *Surg Pract Sci.* 2022;10:100082.
- Steven D, Clemens W. Career evaluation and the decision process for plastic surgery graduates. *Plastr Recons Surg*. 2011;128:559–565.
- 9. Jahromi AH, Arnautovic A, Konofaos P. Impact of the COVID-19 pandemic on education of plastic surgery trainees in the United States. *JMIR Medical Education*. 2020;6:e22045.
- Cho D, Yu J, Um G, et al. The early effects of COVID-19 on plastic surgery residency training: the university of Washington experience. *Plast Reconstr Surg*. 2020;146:447–454.
- Loughran A, McMackin K, Besher T, et al. COVID-19 elective surgery shutdown and operative experience for graduating plastic surgery independent residents. *Annals Plast Surg.* 2022;90:S689–S692.
- Jabori SK, Epstein A, Luccie M, et al. Plastic surgery training during coronavirus disease 2019 pandemic: a quantitative study on trainees wellness and education. *J Craniofacial Surg.* 2022;33:1679–1683.
- Crowe C, Lopez J, Morrison S, et al. The effects of the COVID-19 pandemic on resident education and wellness: a national survey of plastic surgery residents. *Plast Reconstr Surg.* 2021;148:462–474.
- Wong CR, Moltaji S, Cross K, et al. Impact of the COVID-19 pandemic on the wellness of Canadian plastic surgery residents. *Plast Reconstr Surg Global Open*. 2022;10:e4259.
- Dharini SK, More A, Harikar M. The impact of COVID-19 and lockdown on plastic surgery training and practice in India. *Indian J Plast Surg*. 2020;53:273–279.
- Zingaretti N, Negrini FC, Tel A, et al. The impact of the COVID-19 on plastic surgery residency training. *Aesthetic Plast Surg.* 2020;44:1381–1385.
- American Council of Academic Plastic Surgeons. Plastic surgery—integrated programs. Available at https://acaplasticsurgeons.org/multimedia/files/ACGME/Integrated-Plastic-Surgery-Programs.pdf. Accessed January 20, 2023.
- American Council of Academic Plastic Surgeons. Plastic surgery programs. Available at https://acaplasticsurgeons.org/multimedia/files/ACGME/Independent-Residency-Programs.pdf. Accessed January 20, 2023.
- Doximity Residency Navigator. Plastic surgery (integrated). Available at https://www.doximity.com/ residency/programs?specialtyKey=2807bb9a-8f20-4502-8879-139c0023bbb2-plastic-surgery-integrated&sortByKey=reputation ®ionKeys&stateKeys&programCharacteristicsKeys. Accessed January 17, 2023.

- Hu M. Sudden closure of residency programs creates chaosand opportunity. December 1, 2022. Available at https://www. plasticsurgery.org/for-medical-professionals/publications/ plastic-surgery-resident/news/sudden-closure-of-residency-programs-creates-chaos-and-opportunity, Accessed January 17, 2023.
- Glener AD, Glener SR, Shammas RL, et al. Implications of training pathways on future academic plastic surgeon employment. *Ann Plast Surg.* 2020;85:668–671.
- Bhadkamkar MA, Luu BC, Davis MJ, et al. Comparing independent and integrated plastic surgery residency models: a review of the literature. *Plast Reconstr Surg Globabl Open*. 2022;8:e2897.
- Gast K, Kuzon W, Adelman E, et al. Influence of training institution on academic affiliation and productivity among plastic surgery faculty in the United States. *Plast Reconstr Surg*. 2014;134:570–578.
- Roy E, Egro F, Zalewski A, et al. Influence of residency training on research productivity and plastic surgery career. *Annals Plast Surg.* 2020;85:672–676.
- 25. Plana NM, Khouri KS, Motosko CC, et al. The evolving presence of women in academic plastic surgery: a study of the past 40 years. *Plastr Reconstr Surg.* 2018;141:1304–1310.
- 26. Chen K, Ha G, Schultz D, et al. Abstract 75: gender diversity in organized plastic surgery: evaluation of leadership in societies and editorial boards. *Plast Reconstr Surg Global Open*. 2019;7:53–54.
- Physician specialty date report. Available at https://www.aamc.org/ data-reports/workforce/report/physician-specialty-data-report. Published 2022. Accessed May 18, 2023.
- Moak TN, Cress PE, Tenebaum M, et al. The leaky pipeline of women in plastic surgery: embracing diversity to close the gender disparity gap. *Aesthet Surg J.* 2020;40:1241–1248.
- Keane AM, Larson EL, Santosa KB, et al. Women in leadership and their influence on the gender diversity of academic plastic surgery programs. *Plast Reconstr Surg.* 2021;147:516–526.
- Chen W, Baron M, Bourne D, et al. A report on the representation of women in academic plastic surgery leadership. *Plast Reconstr Surg.* 2020;145:844–852.
- Bucknor A, Kamali P, Phillips N, et al. Gender inequality for women in plastic surgery: a systematic scoping review. *Plastr Reconstr Surg.* 2018;141:1561–1577.
- Halperin TJ, Werler MM, Mulliken JB. Gender differences in the professional and private lives of plastic surgeons. *Annals Plast Surg.* 2010;64:775–779.
- Furnas HJ, Garza RM, Li AY, et al. Gender differences in the professional and personal lives of plastic surgeons. *Plast Reconstr* Surg. 2018;142:252–264.
- Brandon S, Francesco E, Murphy C, et al. Change is happening: an evaluation of gender disparities in academic plastic surgery. *Plast Reconstr Surg.* 2019;144:1001–1009.
- 35. Ngaage LM, Ngadimin C, Harris C, et al. The glass ceiling in plastic surgery: a propensity matched analysis of the gender gap in career advancement. *Plast Reconstr Surg.* 2020;146:690–697.
- Maisner RS, Cadwell JB, Mansukhani PA, et al. Trends in female plastic surgery resident authorship – signs of changing times? J Surg Educ. 2022;79:543–550.
- Grewal NS, Spoon D, Kawamoto HK, et al. Predictive factors in identifying subspecialty fellowship applicants who will have academic practices. *Plast Reconstr Surg.* 2008;122:1264–1271.
- Mehta K, Pierce P, Chiu D, et al. The effect of residency and fellowship type on hand surgery clinical practice patterns. *Plast Reconstr Surg.* 2015;135:179–186.
- Higgins JP. The diminishing presence of plastic surgeons in hand surgery: a critical analysis. *Plast Reconstr Surg.* 2010;125:248–260.
- Silvestre J, Runyan C, Taylor J. Analysis of practice settings for craniofacial surgery fellowship graduates in North America. *J Surg Educ.* 2017;74:181–186.