

Effect of Training Backgrounds on Plastic Surgery Leadership: A Logistic Regression Analysis

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Background: Although career choices are often shaped by training and mentors, it is not clear how training backgrounds have influenced whether plastic surgeons pursue leadership positions. Analysis of these training pathways can serve as a key component of career planning for future leaders.

Methods: The American Board of Plastic Surgery's annual *Newsletter to Diplomates* was used to collate surgeons receiving board certification between 2002 and 2013. Online public profiles were used to collect training background data about each surgeon, including fellowship training, board certification year, MBA degree, otolaryngology or maxillofacial surgery training before commencing plastic surgery training, and leadership positions in surgery. A logistic multinomial regression was used to test the effect of training backgrounds on different types of leadership positions.

Results: In total, 2190 plastic surgeons were included in the analysis. Factors increasing the probability of holding any type of position included fellowships in microsurgery, craniofacial, and hand; an international fellowship; multiple fellowships; a fellowship not otherwise specified; and MBA degree. Training background factors affected probabilities differently for each of the studied positions including chair/chief, vice chair/vice chief, program director, plastic surgery medical director, other institutional positions, and national society positions.

Conclusions: Training backgrounds of plastic surgeons in leadership positions are multifaceted, involving a mix of intrinsic and extrinsic factors such as additional educational pursuits, subspecialty training, duration of practice, and practice setting. This analysis can help direct current trainees who aspire to future leadership in plastic surgery. (*Plast Reconstr Surg Glob Open* 2024; 12:e5776; doi: 10.1097/GOX.0000000000005776; Published online 23 May 2024.)

INTRODUCTION

Preparation for leadership positions in plastic surgery is essential to maintain innovation and enthusiasm for the specialty. However, factors influencing or predicting a leadership role remain unclear. Certain factors such as residency training program, completion of fellowship training, bibliometrics, and prior academic

position have shown to play a role in the career trajectory of plastic surgeons.¹⁻³

Because a leader is not restricted to fulfilling the roles of chair/chief or program director (PD), it is crucial to expand the definition of "leadership roles" to include all other institutional and organizational positions that surgeons can pursue. Plastic surgeons choose to advance the field in a variety of ways, and taking on a leadership position serves as a significant way of doing so. However, prior studies have been limited to the major positions in academic settings, such as chair, chief, and PD.^{1,2,4-6} In this study, we analyze the different types of fellowship training and various academic and community-based hospital positions that board-certified plastic surgeons during the study period have held during their career. Understanding how training backgrounds affect leadership positions in one's career might better inform future plastic surgery residents when making decisions as to training pathways that are most likely to facilitate future leadership aspirations.

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METHODS

A retrospective review of the American Board of Plastic Surgery’s annual *Newsletter to Diplomates* was performed to identify new board diplomats between 2002 and 2013.⁷ As prior research demonstrated, it takes approximately 7 years for physicians to be promoted from the assistant to associate level, so we limited the analysis to diplomats who received board certification between 2002 and 2013 to ensure that the included cohort had ample time to progress in their careers and attain leadership position(s).³ Academic and nonacademic plastic surgeons’ personal websites and profiles on institutional/hospital websites were used to identify their fellowship background and institutional positions. Doximity and LinkedIn were also used to complete any missing data. Deceased physicians and physicians that could not be identified using the four sources above were excluded from the study.

Fellowships were organized into eight categories: hand surgery, craniofacial surgery, microsurgery, aesthetic surgery, burn surgery, international fellowships, multiple fellowships, and not otherwise specified fellowships (NOS). An international fellowship was defined as a clinical fellowship completed abroad after residency in any subspecialty, as indicated on surgeon websites. NOS fellowships were designated as those fellowships not commonly pursued by plastic surgeons. Given the overlap with facial plastic surgery and/or craniofacial surgery, it was also recorded if plastic surgeons had previous otolaryngology or oral and maxillofacial surgery (OMFS) training. To account for the impact of advanced degrees in business administration, MBA degrees were also recorded. Additionally, to account for the impact of time spent on independent practice, board certification year was recorded as the following categorical variables: 10–15 years (n = 943), 16–20 years (n = 887), and greater than 20 years (n = 360).

Institutional positions were classified by the six following categories: chief or chair, vice chief or chair, PD, plastic surgery medical director (eg, director of microsurgery, director of aesthetic surgery), and other institutional positions. National leadership positions included those who held chair, president, vice chair, or vice president positions in one or more of the following organizations: American Society of Plastic Surgeons, the Plastic Surgery Foundation, the American Board of Plastic Surgery, the American Council of Educators in Plastic Surgery, the Plastic Surgery Research Council, and the American Association of Plastic Surgeons. All positions for these organizations between 2002 and 2022 were identified and recorded.

Statistical Analysis

Logistic multinomial regression was used to test the significance of training backgrounds (fellowships and

Takeaways

Question: What is the effect of training backgrounds on leadership positions in plastic surgeons’ careers?

Findings: When evaluating the leadership positions studied, the most consistent training characteristics that positively influenced holding these positions included a craniofacial fellowship, international fellowship, an MBA degree, and certain years of experience.

Meaning: Plastic surgeons have their own unique training backgrounds, but certain characteristics correlate and may even influence the potential to assume future leadership positions in one’s career.

MBA degree), with a backward stepwise selection criterion using $\alpha = 0.05$.

The different fellowship programs pursued by plastic surgeons were also examined across the years from 2002 to 2013. Linear regression was done to see whether the percentage of each fellowship pursued was consistent across the years. These tests were also conducted using a significance level of 0.05. Data were analyzed using R (version 2021.09.0).

RESULTS

Linear Regression Analysis

A total of 2190 surgeons who received board certification between 2002 and 2013 were included in this study (Table 1). Forty six percent of surgeons who received board certification completed a fellowship after plastic surgery residency. Five percent of all surgeons completed multiple fellowships. Two percent received additional training in otolaryngology, and 1% received training in oral and maxillofacial surgery before plastic surgery training. Two percent received an MBA degree. The proportion of plastic surgeons who received board certification between 2002 and 2013 who pursued fellowship training significantly increased over time ($R^2 = 0.7019$; $P = 0.0007$; Fig. 1). An increasing proportion of surgeons pursued microsurgery fellowships ($R^2 = 0.5550$; $P = 0.0054$; Fig. 2) or craniofacial fellowships ($R^2 = 0.6639$; $P = 0.0012$; Fig. 3). However, the proportion of surgeons who pursued burn fellowships significantly decreased over time ($R^2 = 0.3827$; $P = 0.03199$; Fig. 4). Proportions of those who completed otolaryngology, OMFS, aesthetic fellowships, international fellowships, head and neck fellowships, hand fellowships, NOS fellowships, or multiple fellowships have remained stable over time.

Table 1. Breakdown of Fellowship Training Pursued by Plastic Surgeons Board Certified between 2002 and 2013

	Aesthetic	Burn	Craniofacial	Hand	International	Microsurgery	NOS	None	Total
Single fellowship	209	32	156	278	20	172	21	1193	2082
Multiple fellowships	49	15	35	54	15	38	11	0	108
Total	258	47	191	333	35	210	28	1193	2190

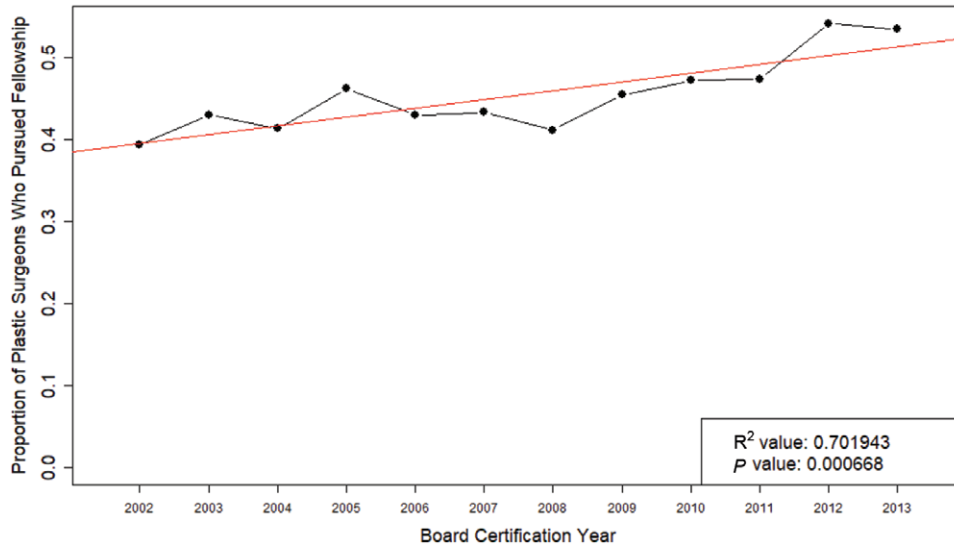


Fig. 1. Proportion of board-certified plastic surgeons who pursued a fellowship over time.

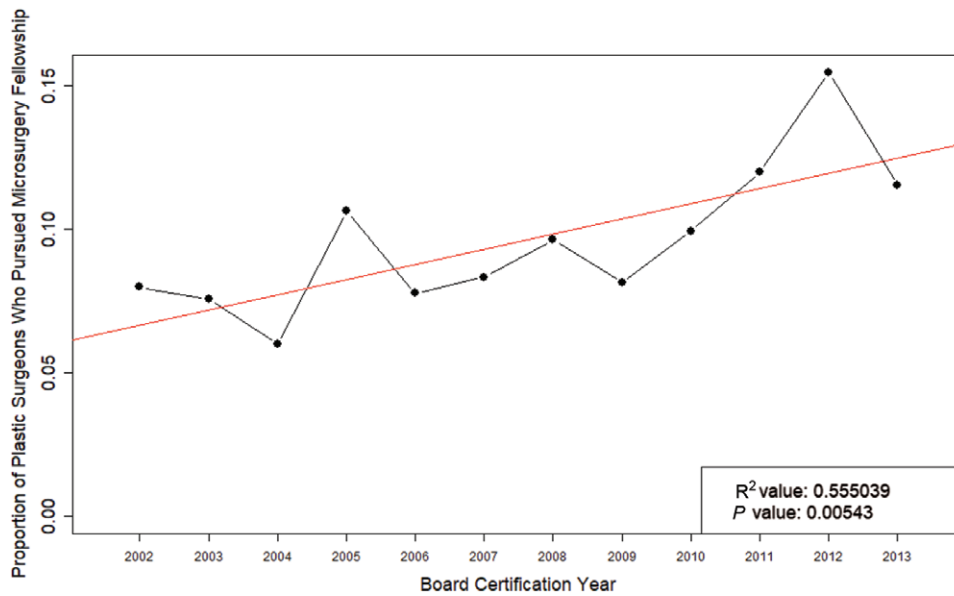


Fig. 2. Proportion of board-certified plastic surgeons who pursued microsurgery fellowship over time.

Logistic Regression Analysis: All Plastic Surgeons

The predictors we used to determine the impact on holding different types of institutional and national leadership positions included type of fellowship training, board certification year, MBA degree, ENT training, and OMFS training. The baseline used as the basis of comparison was plastic surgeons who did not pursue any fellowship and were in independent practice for 10–15 years. The fitted model is described as follows:

$$Probability = \frac{e^{\log \text{ odds}}}{1 + e^{\log \text{ odds}}}$$

OMFS training was not a significant factor influencing leadership positions for any of the studied positions, compared with other factors that are described below.

ALL INSTITUTIONAL AND NATIONAL LEADERSHIP POSITIONS

The model found six significant factors that increased the probability of surgeons holding any leadership position (Table 2) compared with baseline, including an MBA degree (26% increase, $P < 0.0001$), microsurgery fellowship (18% increase, $P < 0.0001$), craniofacial fellowship (29% increase, $P < 0.0001$), international fellowship (22% increase, $P = 0.0067$), hand fellowship (5% increase, $P = 0.0145$), and NOS fellowship (13% increase, $P = 0.0413$).

CHAIR OR CHIEF POSITION

Five significant factors that increased the probability of surgeons holding a chair or chief position (Table 3) in an

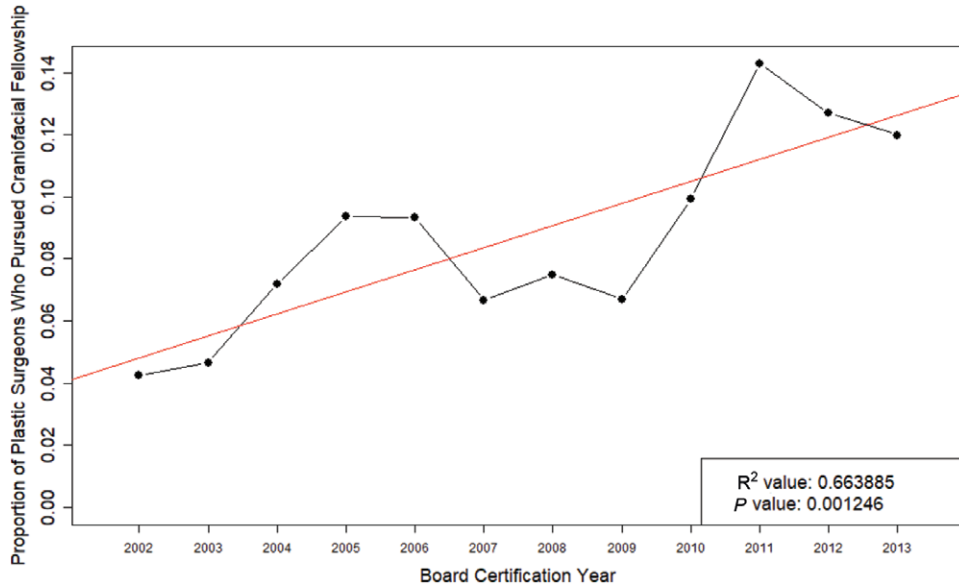


Fig. 3. Proportion of board-certified plastic surgeons who pursued craniofacial fellowship over time.

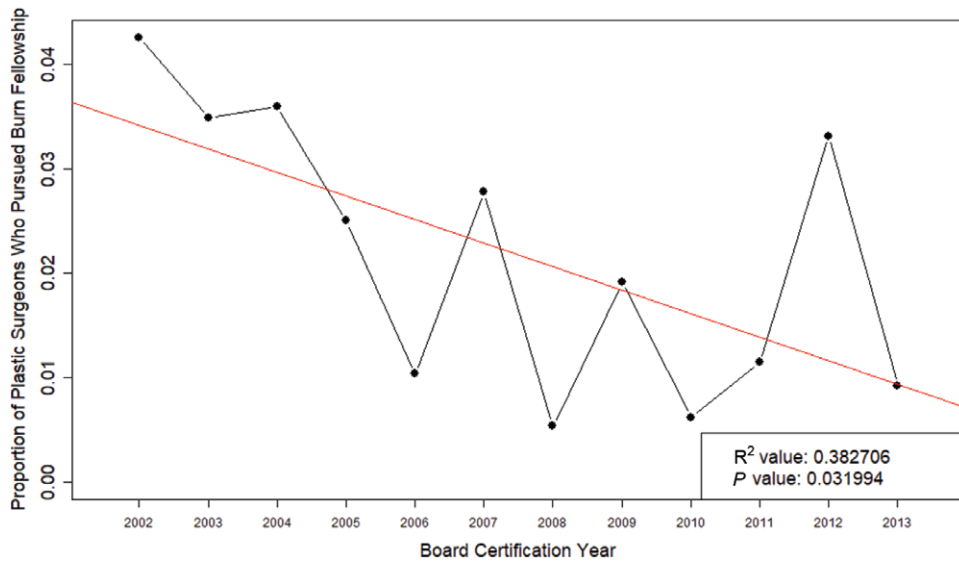


Fig. 4. Proportion of board-certified plastic surgeons who pursued burn fellowship over time.

Table 2. Variables in Probability Equations for All Institutional and National Leadership Positions

Factor	Coefficient	P	Odds Ratio (OR)
MBA	1.44	<0.0001	-0.47
Microsurgery	1.11	<0.0001	-0.8
Craniofacial	1.57	<0.0001	-0.34
International	1.29	0.0067	-0.62
Hand	0.39	0.0145	-1.52
NOS	0.87	0.0413	-1.04

institution compared with baseline included those in independent practice for 15–20 years (3% increase, $P = 0.0217$), those in independent practice for greater than 20 years (4% increase, $P = 0.0284$), an MBA degree (20% increase,

$P < 0.0001$), craniofacial fellowship (10% increase, $P < 0.0001$), and international fellowship (13% increase, $P = 0.0088$).

VICE CHAIR OR VICE CHIEF POSITION

Two significant factors that increased the probability of surgeons holding a vice chair or vice chief position in an institution compared with baseline included an MBA degree (5% increase, $P = 0.0029$) and NOS fellowship (6% increase, $P = 0.0066$).

PD POSITION

Two significant factors that decreased the probability of surgeons holding a PD position in an

Table 3. Variables in Probability Equations for Chair/Chief, Vice Chair/Chief, and PD Positions

Factor	Chair or Chief			Vice Chair or Vice Chief			Program Director		
	Coefficient	P	OR	Coefficient	P	OR	Coefficient	P	OR
MBA	1.39	<0.0001	-0.84	1.9	0.0029	-2.75			
Craniofacial	0.82	<0.0001	-1.41						
International	1.01	0.0088	-1.22						
Practice years (15–20)	0.32	0.0217	-1.91						
Practice years (20+)	0.4	0.0284	-1.83						
NOS				2.09	0.0066	-2.56			
Aesthetic							-0.91	0.0091	-4.48
No fellowship							-1.29	<0.0001	-4.84

Table 4. Variables in Probability Equations for Plastic Surgery Medical Director Positions and Other Institutional Positions

Factor	PRS Medical Director			Other Institutional Position		
	Coefficient	P	OR	Coefficient	P	OR
Microsurgery	0.98	<0.0001	-1.62	1.16	0.0008	-3.14
Craniofacial	1.91	<0.0001	-0.69			
Hand	0.53	0.0064	-2.07			
MBA				2.28	<0.0001	-2.02
Practice years (15–20)				0.59	0.0375	-3.71

institution compared with baseline included an aesthetic fellowship (2% decrease, $P = 0.0091$) and receiving no fellowship training (2% decrease, $P < 0.0001$).

PLASTIC SURGERY MEDICAL DIRECTOR POSITIONS

Three significant factors that increased the probability of surgeons holding plastic surgery medical director positions (Table 4) in an institution compared with baseline included microsurgery fellowship (10% increase, $P < 0.0001$), craniofacial fellowship (26% increase, $P < 0.0001$), and hand fellowship (4% increase, $P = 0.0064$).

OTHER INSTITUTIONAL POSITIONS

Three significant factors that increased the probability of surgeons holding other institutional positions (Table 4) compared with baseline included those in independent practice for 15–20 years (1% increase, $P = 0.0375$), an MBA degree (13% increase, $P < 0.0001$), and microsurgery fellowship (3% increase, $P = 0.0008$).

NATIONAL SOCIETY POSITION

Three significant factors that increased the probability of surgeons holding a plastic surgery national society position (Table 5) compared with baseline included an MBA degree (12% increase, $P < 0.0001$), a microsurgery fellowship (3% increase, $P = 0.0386$), and an international fellowship (10% increase, $P = 0.0043$).

DISCUSSION

Fellowship trends in plastic surgery have been shifting over the years.^{8,9} Our results indicate that an increasing number of plastic surgeons are choosing to pursue a fellowship every year, but not evenly across subspecialties.

Table 5. Variables in Probability Equations for National Society Positions

Factor	Coefficient	P	OR
MBA	2.68	<0.0001	-1.88
Microsurgery	1.47	0.0386	-3.09
International	2.5	0.0043	-2.06

Our findings showing a significant decrease in the number of residents pursuing a burn fellowship align with the results of a survey study about burn care among residents, as reported by Vrouwe et al.¹⁰ In that study, most residents, though interested in burn care, were discouraged due to the nature of burn care and operations, on-call commitment, and comparatively narrow scope of practice.¹⁰ Meanwhile, our results indicate a greater percentage of plastic surgeons pursuing microsurgery and craniofacial fellowships over the years. Microsurgery fellowship was first established in the 1980s, and although the increase in microsurgers may be due to the increase in number of programs, there has also been an overall increase in competitiveness in matching, as shown by Cooper et al, signifying a growing interest among plastic surgeons.^{11–13} Craniofacial programs have increased from 10 programs in 2000 to 29 programs in 2013.¹⁴ The sheer increase in programs can help point to the rising proportion of craniofacial surgeons in practice. However, there are likely other factors at play influencing fellowship choices, given the increase in the number of fellowship programs for all plastic surgery subspecialties since 2002. Interest alone may be a strong motivator, but other factors described in a previous study include work-hours restrictions that limit operative exposure to certain subspecialties during residency. Another thought driving the pursuit of leadership positions includes the ability to subsidize salary lines with administrative roles, especially for those practicing

in academic settings. Fellowship accreditation status is an additional factor as ACGME-accredited fellowships confer benefits, such as certification from the respective board, over nonaccredited programs.⁹ A potential driving factor that may not have been considered by applicants when choosing a subspecialty is whether certain subspecialty training can influence leadership positions later in one's career.

There were many different factors indicated by the logistic regression model that affected the probability of holding different types of leadership positions. Consistent across the different positions studied were holding an MBA degree and completing a craniofacial or international fellowship, which increased this probability. Leadership roles in medicine are often regarded as positions that require a significant dedication toward business-oriented tasks.⁴ An MBA degree is likely the most apt education surgeons can receive to gain exposure to the necessary skills. Given their desire to pursue an MBA degree in the first place, surgeons with an MBA are more likely to pursue leadership roles due to a desire to lead others and take on business-oriented work from prior educational exposure.

A survey study of plastic surgery residents demonstrated a keen interest in international training.¹⁵ International training adds a new dimension to surgical training by creating exposure to different surgical cases and techniques, building cultural competence, and enhancing attention to unique healthcare delivery models in underserved settings.¹⁵ Formal and informal fellowships available to plastic surgeons exist across the world, which instill these teachings to trainees.^{15,16} The Tsao Fellowship is an example of an international fellowship that actively promotes the skills necessary to become leaders in global health and surgery.¹⁵ Indeed, data from this program revealed participants taking on leadership roles within education and research. Although the Tsao Fellowship is relatively new, international fellowships after residency, which the subjects of our study participated in, are equally as valuable, such as the microsurgery fellowship at Chang Gung Memorial Hospital.¹⁶ In a study that surveyed participants of this fellowship, fellows chose the fellowship to enhance their professional and career development, which likely translated to participants' practices after returning to the United States.¹⁶ Exchanging ideas and cultivating a new perspective in an unfamiliar region of the world is an experience that may lend itself to a leader. Plastic surgeons participating in international fellowships can gain new skills and values and apply them to the leadership roles they take on during their careers.

Craniofacial surgeons practice in academic settings more often given that most craniofacial patients present in large academic hospitals.¹⁷ In academic settings, craniofacial surgeons, and to a degree microsurgons, have more resources and opportunities to publish and take on leadership roles within their institution. In a previous study, academic heads were shown to have a greater number of publications compared with other positions.⁶ Training in ACGME-accredited fellowships provides certain benefits that would not otherwise be available in nonaccredited subspecialty programs. Silvestre et al describe these benefits,

including higher perceived reputation and more qualified applicant pools, certification from the respective board of surgery, admission into certain societies, and public recognition.⁹ These reasons have likely also contributed to the increase in the percentage of plastic surgeons pursuing a hand fellowship after residency. Although 95% of hand fellowships are ACGME-accredited, there is a greater diversity of practice settings outside academic medicine, which may have limited access to institutional leadership opportunities and a decrease in academic productivity.¹⁸ This may help explain why surgeons who pursued a hand subspecialty do not consistently have a higher probability of holding leadership positions.

Holding a chair or chief position has been well established as a position earned after much experience and contributions to the field through various means. Confirmed by a previous study, chairs and chiefs practiced on average for 22 years before receiving their position.² The results of the present study show that plastic surgeons receiving board certification 10–15 years or greater than 20 years earlier had a higher probability of holding a chief or chair position. This is further confirmed by Addona et al, as the age at the time of promotion was shown to be 40–50 years.⁴ Our study does not show any preference given to more experienced surgeons for PD roles. This could be due to the fact that the number of new residency and fellowship programs have surged in the past decade. In contrast to chair or chief roles, PD roles may tend to be assigned to early career plastic surgeons. This is beneficial because those who received training more recently may be in a better position to help shape resident education and remain in touch with current updates in resident curricula. Those with an aesthetic fellowship or no fellowship training had lower probabilities of becoming a PD, likely due to many plastic surgeons going into private practice and focusing on aesthetic surgery in nonacademic settings after residency.⁸

Many institutions have large services for craniofacial, microsurgery, and hand subspecialties. Those with fellowship training in these subspecialties would be best equipped to become directors of these service lines. As a result, training in these fellowships increased the probability of holding plastic surgery medical director positions that did not include (vice) chair/chief or PD positions. Similar to craniofacial surgery, microsurgery is another field that is predominantly practiced in academic settings, given the scope of practice.¹⁹ This likely explains why microsurgery increases the probability of holding other institutional positions unrelated to plastic surgery, given the ease of access to opportunities and promotions.

This study analyzed the training backgrounds of board-certified plastic surgeons and whether they have held leadership positions in their careers. However, this study did not analyze every factor that influences leaders in the field. There are intrinsic characteristics that are difficult to analyze, which are undeniably important to this topic. This study deconstructs the training of current and past leaders in the field on a granular level but does not dive deeply into other demographic characteristics such as race, gender, other advanced degrees, and training before fellowship.

Additionally, certain positions were grouped together, comprising different positions in practice (plastic surgery medical directors and other institutional positions). Further investigations may choose to look deeper into some of the training backgrounds studied, including the different international fellowships and NOS fellowships grouped together.

This study is primarily limited by the availability and accuracy of publicly available information. The websites used to evaluate plastic surgeons' training backgrounds may have inaccuracies or inconsistent information regarding leadership roles. Furthermore, individual institutions may have different criteria for what each leadership position entails. As there are numerous plastic surgery organizations from the state to national level, we limited our methodology to include leadership roles in six of the major national plastic surgery organizations. We were primarily limited by the ability to obtain leadership data from organizations themselves or from publicly available sources. Future analysis may include state and regional organizations, as well as leadership in subspecialty and international organizations. Additionally, there are other experiences that help to shape leadership traits, including military experience and master academic degrees. Further study may look to explore the impact of peer reviewed publications, dental training, and other degrees such as PhDs and MHAs. Although we explored MBA degrees, it would be interesting to understand the impact of short-term leadership courses taken by surgeons.

Although we were unable to differentiate between integrated and independent training paths, a future study may explore this training nuance and its impact on leadership. Additionally, the influence of mentorship on leadership pathways is an area for further study that may better inform how different programs are preparing young surgeons for a path to future leadership. Given the wide breadth of these experiences and limited publicly available information on these roles, we focused on the impact that an MBA degree has on attaining leadership positions. A limitation in this study is the inability to determine when an MBA was obtained and its relationship to timing of assuming a leadership position. We caution against assuming that an advanced degree such as an MBA is a prerequisite for a leadership position given this limitation. Finally, it is important to note that attaining leadership positions is not solely due to training in a specific fellowship or having an MBA degree, but a combination of these factors (including multiple fellowships pursued) and intrinsic characteristics. These intrinsic characters include the different personality types and internal motivations held by surgeons, which are significant but difficult to measure.

CONCLUSIONS

As plastic surgeons are becoming more specialized in their training and look to become leaders in the field, they will become more intentional about the skills they seek beyond surgery. This study reveals leaders coming from diverse training backgrounds. Holding an MBA degree, being craniofacial and/or internationally fellowship trained, and having certain years of experience

characterize plastic surgeons in most of the leadership roles described. These factors should be considered when students and trainees are choosing their career path, such as an MBA, which may orient them toward a leadership path, or an international fellowship that can enhance the skills to be a successful leader. Certain backgrounds may carve unique paths toward leadership within plastic surgery, but the interplay of intrinsic and extrinsic characteristics will ultimately shape those hoping to become leaders.

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DISCLOSURE

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

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