

Factors Influencing Career Choices among Graduating Ophthalmology Residents

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Objective: To identify factors influencing graduating ophthalmology residents to pursue subspecialty training or a career in comprehensive ophthalmology.

Design: Cross-sectional study.

Participants: Residents graduating from U.S. ophthalmology residency programs who participated in the ophthalmology match program.

Methods: An anonymous survey was sent to each graduating ophthalmology resident in the United States between February 1, 2003, and February 28, 2003. Demographic data and information relating to medical school and residency training, career goals, and factors influencing career choices were collected from the surveys.

Main Outcome Measure: The decision to pursue or not to pursue fellowship training.

Results: The individual response rate was 50.8% (222/437), and 74.1% (86/116) of residency training programs responded to the survey. After completion of residency training, 64% (142/222) were pursuing subspecialty training and 36% (80/222) planned to practice comprehensive ophthalmology. In a multivariate analysis, factors that predicted subspecialty training included a desire to acquire special skills (odds ratio [OR], 13.81) and a perceived more favorable job market (OR, 3.23) and prestige (OR, 3.20). Anticipated work hours (OR, 0.37) and preferred geographic location (OR, 0.47) were predictors of a career in comprehensive ophthalmology. Residents choosing comprehensive ophthalmology careers were more likely to plan to practice in a group private practice, and those seeking subspecialty training were more likely to intend to practice in a university setting or were undecided in their future practice type (OR, 2.04).

Conclusions: Several factors influenced career choices among graduating ophthalmology residents. A desire to acquire special skills and perceived prestige and job market were major factors influencing ophthalmology residents to seek subspecialty training. Lifestyle considerations were more important to residents choosing a comprehensive ophthalmology career. There were significant differences in practice preferences among residents pursuing or not pursuing subspecialty training. *Ophthalmology* 2005;112:1247-1254 © 2005 by the American Academy of Ophthalmology.



Specialty training in medicine has become an important issue in recent years. A consensus has developed that specialist physicians will be in serious oversupply and that many more primary care physicians will be needed to meet future health care needs in the United States.¹⁻⁸ Several organizations, including the Council on Graduate Medical Education,⁹ the Physician Payment Review Commission,¹⁰

the Association of American Medical Colleges,¹¹ and the American Medical Association,¹² have noted the surplus of specialists and have supported policies that encourage an increase in the number generalists trained. An interest in workforce planning prompted the American Academy of Ophthalmology to commission the RAND Corporation to study the supply of eye care providers and the requirements for eye care in the United States.

The Eye Care Workforce Study by RAND¹³ found that there is an excess of eye care providers relative to current market demand and health care need. Moreover, the study also concluded that there will be a substantial excess in subspecialist ophthalmologists in all subspecialty areas by the year 2010 if the rate of subspecialty training continues at the same rate as in the mid-1990s.¹⁴ There has actually been a steady increase in the proportion of ophthalmology residents seeking subspecialty fellowship training during the past decade (Fig 1), based on data from the National Residency Matching Program for ophthalmology fellowships and the Ophthalmology Fellowship Match Program for all other subspecialty fellowships.

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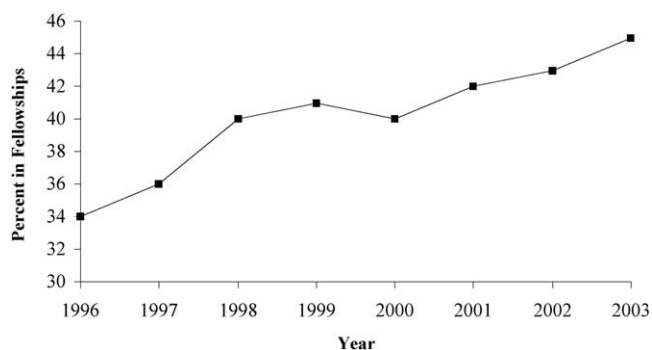


Figure 1. Proportion of ophthalmology residents seeking fellowship training.

Any workforce planning analysis requires not only knowledge of the overall supply and demand for ophthalmology, but also an understanding of the factors influencing ophthalmologists-in-training to pursue various career pathways. Previous studies have evaluated factors influencing the decision to pursue fellowship training in internal medicine and pediatrics.^{15,16} Factors such as gender, marital status, presence of children, level of educational debt, breadth of knowledge used in practice, breadth of clinical problems in practice, and opportunity for continuity of care were important determinants of subspecialty training. The purpose of the present study is to investigate factors that influence graduating ophthalmology residents to pursue subspecialty fellowship training or a career in comprehensive ophthalmology.

Materials and Methods

Anonymous surveys were sent to every ophthalmology residency program in the United States that participated in the ophthalmology match program. Military programs were excluded from the study because graduating residents may not have complete freedom to pursue fellowship training. Surveys were mailed to residency program directors between February 1, 2003, and February 28, 2003, with instructions to distribute them to each graduating ophthalmology resident. Residents were asked to complete the survey, to place it in a sealed envelope, and to return it to their program director. No compensation was provided to residents for completing the survey. Program directors were given a self-addressed stamped envelope to mail the completed surveys by April 30, 2003. If a response was not received by the deadline, program directors were contacted individually by telephone or e-mail and were sent new surveys to be completed by June 30, 2003. Surveys were distributed shortly after the fellowship match, a period when graduating residents are actively considering future career plans.

The survey contained questions regarding demographic information, medical education and residency training, career goals, and factor influencing their career choice. A 5-point Likert scale¹⁷ was used for rating the importance of various factors in decision making. The reliability of the survey was tested by administering it to 21 subjects a second time within 6 months of the original survey. Test-retest intraclass correlation coefficients ranged from 0.60 to 1.00 for yes-or-no questions and 0.61 to 1.00 for multiple choice questions. Intraclass correlation coefficients for Likert scale scores ranged from 0.50 to 0.84 and from 0.46 to 0.99, respectively, for questions requiring a numerical answer.

The principle outcome variable in this study was the dichotomous choice of whether a resident chose to pursue subspecialty training. Explanatory variables examined for their influence on this

Table 1. Demographic Characteristics

	Total Group (n = 222)	Comprehensive (n = 80)	Fellowship (n = 142)	P Value
Gender, n (%)				
Female	83 (37.2)	38 (47.5)	45 (31.7)	0.019*
Male	139 (62.8)	42 (52.5)	97 (68.3)	
Age (yrs)				
Mean \pm SD	31.5 \pm 4.3	31.6 \pm 4.3	31.4 \pm 3.2	0.38 [†]
Range	25–55	25–55	26–45	
Ethnicity, n (%)				
African American	5 (2.3)	3 (3.9)	2 (1.5)	0.24*
Asian American	65 (30.4)	20 (25.6)	45 (33.3)	
Non-Hispanic white	136 (64.0)	54 (69.2)	82 (60.7)	
Hispanic white	7 (3.3)	1 (1.3)	6 (4.4)	
Marital status, n (%)				
Married	133 (59.9)	50 (63.3)	82 (57.8)	0.42*
Not married	89 (40.1)	29 (36.7)	60 (42.2)	
Children, n (%)				
No	153 (68.9)	53 (66.3)	100 (70.4)	0.52*
Yes	69 (31.1)	27 (33.8)	42 (29.6)	
Educational debt, n (%)				
<\$50,000	110 (50.2)	41 (51.9)	69 (49.3)	0.76 [‡]
\$50,00–\$100,000	38 (17.4)	10 (12.7)	28 (20.0)	
>\$100,000	71 (32.4)	28 (35.4)	43 (30.7)	

SD = standard deviation.

*Chi-square test.

[†]Nonpaired Student's *t* test.

[‡]Mann-Whitney *U* test.

choice were classified as interval (e.g., age, number of full-time faculty, number of cases performed), ordinal (e.g., level of educational debt, Likert scale responses), and categorical (e.g., gender, ethnicity). The influence of each type of explanatory variable on outcome was assessed in a univariate fashion using the *t* test for interval variables, the Mann–Whitney *U* test for ordinal variables, and the chi-squared or Fisher exact test for categorical variables. Additionally, a forward stepwise multivariate logistic regression model was constructed to determine which factors were related independently to the choice of whether to pursue subspecialty training. All data were analyzed using Stata.¹⁸ A *P* value of 0.05 or less was considered statistically significant for all analyses.

Results

A total of 222 of 437 surveys were completed and returned, for an individual response rate of 50.8%. Surveys were received from 86 of 116 (74.1%) ophthalmology residency programs. After completion of residency, 142 of 222 (64%) responders were pursuing fellowship training and 80 of 222 (36%) planned to practice comprehensive ophthalmology. Types of fellowships included vitreoretinal (35.6%), cornea and external disease (25.2%), glaucoma (12.6%), oculoplastics (10.4%), pediatric ophthalmology (9.6%), anterior segment and refractive surgery (2.2%), medical retina (1.5%), ophthalmic pathology (1.5%), neuro-ophthalmology (0.7%), and uveitis (0.7%).

Demographic characteristics of the responders are presented in Table 1. Subspecialty training was a more common career choice than comprehensive ophthalmology for both men and women. Women statistically were more likely than men to choose careers in comprehensive ophthalmology, and men were more likely than women to pursue fellowship training according to a univariate analysis (*P* = 0.019). There was no statistically significant difference in the decision to pursue or not to pursue subspecialty training based on age, ethnicity, marital status, presence of children, or level of educational debt.

Table 2 presents information related to the medical education and residency training of responders. Residents who graduated medical school as members of the Alpha Omega Alpha Honor Medical Society statistically were more likely to pursue subspecialty training than comprehensive practice positions in a univariate analysis (*P* = 0.005). The type of degree held did not correlate with the decision to pursue fellowship training or comprehensive ophthalmology as a career choice. The number of full-time subspecialty faculty and the number of ocular procedures performed during residency did not differ significantly between the comprehensive and fellowship groups. Special features of residency training programs, including the presence of a career counseling program, elective time, or time allocated for research, did not seem to impact career choice. Most responders in the comprehensive and fellowship groups made the decision to pursue or not to pursue fellowship training during their ophthalmology residency. In a univariate analysis, residents seeking fellowships statistically were more likely to have made this career decision before beginning ophthalmology residency training than those planning to practice comprehensive ophthalmology.

Practice preferences after completion of training (i.e., after completion of residency training in the comprehensive group and after completion of fellowship training in the fellowship group) are shown in Table 3. Residents seeking fellowship training statistically were more likely to practice in an urban setting, whereas those not entering fellowships were more likely to practice comprehensive ophthalmology in a suburban setting in a univariate analysis (*P* < 0.001). A group private practice was the most popular practice type selected by both responders pursuing fellowship training and those practicing comprehensive ophthalmology. How-

ever, the comprehensive group statistically was more likely to plan to practice in a group private practice and the fellowship group was more likely to intend to practice in a university setting or was undecided in their future practice type in univariate (*P* < 0.001) and multivariate (*P* < 0.003) analyses.

Residents indicated to what degree a variety of factors influenced their decision to pursue or not to pursue fellowship training using a Likert scale, and the results are presented in 2 formats. Table 4 (available at <http://aaojournal.org>) provides the percentage of responses for each factor, and Table 5 shows the mean Likert scale scores. The factors that were rated as very important or moderately important by at least half of the total group of responders included acquisition of special skills, challenging diagnostic problems, role models or mentors, rotation(s) in the subspecialty area, and type of patient problems. Factors that were found to be significantly different between the comprehensive and fellowship groups in univariate analyses included acquisition of special skills, challenging diagnostic problems, earning potential, interest in an academic career, peer interactions, perceived more favorable job market, preferred geographic location, continuity of care, prestige, research experience, role models or mentors, rotation(s) in subspecialty, types of patient problems, working hours, and working with new technology.

Multiple logistic regression analyses of statistically significant risk factors in univariate tests are presented in Table 6. The desire to acquire special skills (odds ratio [OR], 13.81) and a perceived more favorable job market (OR, 3.23) and prestige (OR, 3.20) were significant factors that predicted subspecialty training in a multivariate analysis. Anticipated work hours (OR, 0.37) and preferred geographic location (OR, 0.47) were predictors of a comprehensive ophthalmology career. There were significant differences in practice preferences. Residents choosing comprehensive ophthalmology careers were more likely to plan to practice in a group private practice, and those seeking subspecialty training were more likely to intend to practice in a university setting or were undecided in their future practice type (OR, 2.04).

Discussion

This study provides new insight into factors influencing the decision to pursue subspecialty training or a comprehensive ophthalmology career among graduating ophthalmology residents. In univariate analyses, financial issues (earning potential, perceived more favorable job market, and prestige), preferred practice setting (geographic location and rural versus urban practice location), experiences during residency training (mentoring, research experience, and rotation[s] in subspecialty), academic achievement (Alpha Omega Alpha membership), academic career aspirations (interest in an academic career and university versus non-university practice type), lifestyle issues (working hours), anticipated type of clinical practice (acquisition of special skills, challenging diagnostic problems, continuity of care, peer interactions, types of patient problems, and working with new technology), timing of career decisions (before vs. after onset of ophthalmology residency training), and gender were important in the decision to pursue subspecialty training in ophthalmology. In a multivariate model, however, the significant factors that predicted fellowship training included a desire to acquire special skills (OR, 13.81) and a perceived more favorable job market (OR, 3.23) and prestige (OR, 3.20). Anticipated work hours (OR, 0.37) and

Table 2. Medical Education and Residency Training

	Total Group (n = 222)	Comprehensive (n = 80)	Fellowship (n = 142)	P Value
AOA member, n (%)	86 (39.6)	22 (27.5)	64 (46.7)	0.005*
Degree, n (%)				
MD	217 (97.7)	79 (98.8)	138 (97.2)	0.45*
DO	5 (2.25)	1 (1.25)	4 (2.82)	0.66*
PhD	12 (5.41)	4 (5.00)	8 (5.63)	1.00*
Master's	16 (7.21)	6 (7.50)	10 (7.04)	0.99*
MBA	1 (0.45)	0 (0)	1 (1.25)	1.00*
Timing of decision to pursue/not pursue fellowship training, n (%)				<0.001*
Medical school	38 (17.5)	3 (3.95)	35 (24.8)	
PGY 1	17 (7.83)	3 (3.95)	14 (9.93)	
PGY 2	57 (26.3)	21 (27.6)	36 (25.5)	
PGY 3	65 (30.0)	27 (35.5)	38 (27.0)	
PGY 4	40 (18.4)	22 (28.9)	18 (12.8)	
Number of full-time subspecialty faculty, mean \pm SD	15.3 \pm 8.3	14.4 \pm 7.2	15.9 \pm 8.8	0.23 [†]
Cornea/external disease	2.7 \pm 1.9	2.5 \pm 1.8	2.8 \pm 1.9	
Glaucoma	2.2 \pm 1.6	2.1 \pm 1.4	2.3 \pm 1.7	
Neuro-ophthalmology	1.5 \pm 0.9	1.4 \pm 0.8	1.5 \pm 0.9	
Oculoplastics	1.6 \pm 1.0	1.4 \pm 0.8	1.6 \pm 1.2	
Ophthalmic pathology	0.8 \pm 0.7	0.8 \pm 0.7	0.8 \pm 0.7	
Pediatric ophthalmology	2.1 \pm 1.3	2.1 \pm 1.3	2.0 \pm 1.3	
Retina	3.5 \pm 2.8	3.1 \pm 2.3	3.8 \pm 3.0	
Uveitis	1.0 \pm 1.1	1.2 \pm 1.1	0.9 \pm 1.0	
Number of procedures performed during residency, mean \pm SD	235 \pm 103.7	242.3 \pm 100.8	231.2 \pm 105.6	0.49 [†]
Cataract	91.1 \pm 42.3	100.1 \pm 49.3	85.9 \pm 37.0	
Corneal surgery	6.3 \pm 6.5	4.9 \pm 4.4	7.1 \pm 7.3	
Glaucoma laser	17.5 \pm 15.4	18.0 \pm 14.9	17.2 \pm 15.7	
Glaucoma filtering	7.0 \pm 5.3	6.9 \pm 5.5	7.1 \pm 5.2	
Retina/vitreous	9.2 \pm 12.6	8.5 \pm 15.3	9.6 \pm 10.6	
Other retinal	36.6 \pm 59.3	38.3 \pm 55.5	35.8 \pm 61.3	
Oculoplastics and orbit	32.4 \pm 26.5	29.9 \pm 24.2	33.8 \pm 27.7	
Globe trauma	8.3 \pm 7.4	7.2 \pm 4.9	8.9 \pm 8.5	
Special features of residency, n (%)				
Elective time	48 (21.6)	16 (20)	32 (22.5)	0.66*
Time allocated for research	36 (16.2)	11 (13.8)	25 (17.6)	0.45*
Career counseling program	34 (15.3)	9 (11.3)	25 (17.6)	0.21*

AOA = Alpha Omega Alpha Honor Medical Society; DO = Doctor of Osteopathy; MBA = Master of Business Administration; MD = Doctor of Medicine; PGY = postgraduate year; PhD = Doctor of Philosophy; SD = standard deviation.
*Chi-square test or Fisher exact test.
[†]Nonpaired Student's *t* test.

preferred geographic location (OR, 0.47) were significant negative predictors of fellowship training and were important to residents seeking a comprehensive ophthalmology career. There were also significant differences in practice preferences in the multivariate analysis. Residents seeking subspecialty training were more likely to intend to practice in a university setting or were undecided in their future practice type, and those selecting comprehensive ophthalmology careers were more likely to plan to practice in a group private practice (OR, 2.04).

Fellowship training provides an intense exposure to a subspecialty area of ophthalmology, allowing the focused development of clinical and surgical skills related to that subspecialty area. An interest in acquiring special skills was the most important factor motivating ophthalmology residents to seek fellowship training. It is not surprising that residents interested in academic careers and in practicing in

a university setting were more likely to pursue fellowships. Most full-time faculty members in departments of ophthalmology have obtained subspecialty training. The present study indicated that there is a perception among graduating ophthalmology residents that subspecialty training offers greater prestige and job opportunities than comprehensive ophthalmology, and these are significant factors influencing the decision to pursue fellowship training.

Lifestyle considerations seem to be more important to residents choosing comprehensive ophthalmology as a career. Anticipated work hours and preferred geographic location were rated as significantly more important by responders planning to practice comprehensive ophthalmology than by those seeking subspecialty training. Multiple studies suggest that lifestyle issues also are of primary importance in the decision-making process for medical students when choosing a specialty area.¹⁹⁻²²

Table 3. Practice Preferences

	Total Group (n = 222)	Comprehensive (n = 80)	Fellowship (n = 142)	P Value*
Location, n (%)				<0.001
Rural	17 (7.9)	11 (14.1)	6 (4.4)	
Suburban	75 (34.9)	36 (46.2)	39 (28.5)	
Urban	79 (36.7)	24 (30.8)	55 (40.2)	
Unknown	44 (20.5)	7 (9.0)	37 (27.0)	
Practice type, n (%)				<0.001
Group private practice	117 (54.2)	57 (73.1)	60 (43.5)	
HMO	2 (0.9)	1 (1.3)	1 (0.7)	
Military	2 (0.9)	1 (1.3)	1 (0.7)	
Missionary	2 (0.9)	0 (0)	2 (1.5)	
Solo private practice	11 (5.1)	7 (9.0)	4 (2.9)	
University	52 (24.1)	7 (9.0)	45 (32.6)	
Unknown	30 (13.9)	5 (6.4)	25 (18.1)	

HMO = health maintenance organization.
*Chi-square test.

Factors that were rated as very important or moderately important in the decision to pursue or not to pursue fellowship training by at least half of the responders include acquisition of special skills, challenging diagnostic problems, role models or mentors, rotation(s) in the subspecialty area, and type of patient problems in practice. As previously discussed, acquisition of special skills was of paramount importance to responders seeking fellowship training and therefore was rated highly by the overall group. Both comprehensive and subspecialty practice differ in the types of patient problems and diagnostic problems encountered in clinical practice, and these were important factors in career decision making among the total group of responders. Mentors or role models and rotations also were rated as important factors influencing the decision to pursue or not to pursue fellowship training. Studies have shown that exposure to role models during particular clinical rotations is

strongly associated with medical students' choice of a clinical field for residency training.^{23,24}

Previous studies have evaluated factors influencing the desire to pursue fellowship training in other specialties.^{15,16} In a survey of graduates of an internal medicine residency program, breadth of knowledge used in practice, breadth of clinical problems in practice, and opportunity for continuity of care were factors rated as statistically more important to generalists than specialists in influencing career choice.¹⁵ The present study found that continuity of care and types of patient problems were more important to residents seeking subspecialty training in univariate analyses; however, these factors did not remain statistically significant in a multivariate analysis. A survey of third-year pediatric residents by the American Academy of Pediatrics found that residents who were women, married to nonphysicians, had children, and accrued an educational debt of \$50,000 or more were more likely to report

Table 5. Factors Influencing Decision to Pursue Fellowship Training

	Total Group	Comprehensive	Fellowship	P Value*
Acquisition of special skills	4.3±1.1	3.3±1.3	4.7±0.6	<0.0001
Types of patient problems	3.9±1.0	3.5±1.1	4.1±1.0	<0.0001
Challenging diagnostic problems	3.8±1.1	2.9±1.0	4.2±0.9	<0.0001
Rotation(s) in subspecialty	3.6±1.3	3.0±1.2	4.0±1.2	<0.0001
Role models/mentors	3.6±1.3	2.7±1.1	4.0±1.1	<0.0001
Working with new technology	3.2±1.3	2.5±1.1	3.6±1.2	<0.0001
Perceived more favorable job market	3.2±1.3	2.8±1.2	3.4±1.3	0.002
Peer interactions	3.2±1.3	2.4±1.2	3.5±1.3	<0.0001
Preferred geographic location	3.0±1.4	3.4±1.4	2.8±1.4	.011
Interest in an academic career	2.9±1.5	2.3±1.3	3.2±1.4	<0.0001
Working hours	2.9±1.3	3.2±1.2	2.7±1.3	0.005
Earning potential	2.8±1.4	2.5±1.4	3.0±1.3	0.014
Continuity of care	2.8±1.3	2.5±1.3	2.9±1.3	.050
Prestige	2.5±1.4	1.6±0.9	2.9±1.3	<0.0001
Research experience	2.4±1.4	1.7±0.9	2.8±1.4	<0.0001
Career counseling	2.2±1.2	2.0±1.1	2.3±1.3	0.115
Educational debt	2.0±1.3	2.1±1.4	2.0±1.3	0.611

Values are mean ± standard deviation of Likert scale score (1 = not at all important, 2 = slightly important, 3 = somewhat important, 4 = moderately important, 5 = very important).

*Unpaired Student's *t* test comparing mean Likert scale scores.

Table 6. Multiple Logistic Regression Analysis of Self-Reported Factors Influencing the Decision to Pursue Fellowship Training

	Odds Ratio	95% Confidence Interval	P Value
Acquisition of special skills	13.81	3.50–54.45	<0.0001
Gender	3.58	0.60–21.49	0.16
Perceived more favorable job market	3.23	1.03–10.06	0.043
Prestige	3.20	1.27–8.07	0.014
Working with new technology	2.26	0.90–5.70	0.08
Intended practice type	2.04	1.28–3.23	0.003
Rotation(s) in subspecialty	1.87	0.71–4.91	0.20
Planned practice location	1.75	0.55–5.58	0.35
Challenging diagnostic problems	1.70	0.59–4.95	0.33
Role models/mentors	1.62	0.72–3.64	0.24
Research experience	1.60	0.54–4.79	0.40
Peer interactions	1.50	0.58–3.86	0.40
AOA member	1.41	0.24–8.14	0.39
Types of patient problems	0.69	0.24–1.98	0.49
Continuity of care	0.63	0.25–1.61	0.34
Interest in an academic career	0.58	0.27–1.21	0.15
Earning potential	0.47	0.22–1.03	0.06
Preferred geographic location	0.47	0.22–0.99	0.046
Working hours	0.37	0.14–0.93	0.034

AOA = Alpha Omega Alpha Honor Medical Society.

primary care as their future career goal rather than subspecialization.¹⁶ Women are affected more by family factors when making career choices than men,^{16,25–28} and several studies have found that women are more likely to practice as primary care physicians.^{16,29–31} Although our study found that women were more likely than men to choose comprehensive ophthalmology as a career according to a univariate analysis, this observation did not maintain statistical significance in the multivariate analysis. Although having children and a higher degree of educational debt may have been barriers for pediatric residents to obtain fellowship training, they were not significant factors in the present study.

Career choice is an ongoing process, and residency offers an important window of opportunity to influence the career choices of physicians in training. One study of graduates of an internal medicine residency found that 70% of residency graduates made changes in their career plans regarding general versus subspecialty practice after medical school, and 41% made a final decision during residency.³² In the current study, 82.5% of responders made the decision to pursue or not to pursue a fellowship after graduating from medical school, and 74.7% made this career decision during the time of ophthalmology residency training.

The Eye Care Workforce Study¹⁴ concluded that the supply of subspecialist ophthalmologists, if the rate of fellowship training were not curtailed, would grow faster than the public health need for subspecialty care. However, the RAND study indicated that the relative supply to the demand of ophthalmologists depends heavily on how the eye care system is structured. In a model in which ophthalmologists provide primary eye care, as well as secondary and tertiary eye care, there is no excess of comprehensive or subspecialist ophthalmologists. Alternatively, if optome-

trists provide the bulk of primary eye care, there would be a significant oversupply of both comprehensive and subspecialist ophthalmologists to meet market demand for eye care services. It is clear that the estimated need for subspecialist ophthalmologists depends on assumptions regarding the role of optometrists and ophthalmologists in the provision of eye care, as well as future market needs.

If it is considered to be a valid conclusion of the Eye Care Workforce Study that fewer subspecialists will be needed in the future to produce the best mix of quality and efficiency in the eye care delivery system, then there are several steps that could be considered to accomplish this goal. First, the role of fellowship training should be reexamined, because the number of fellowship positions may depend on factors other than the optimal number needed. Manpower needs for ophthalmology departments and group practices have driven the existence of many fellowship training positions. Second, comprehensive ophthalmology faculty could be expanded and the time allocated to comprehensive rotations could be increased, either at the parent teaching institution or through rotations in group practices in the community. Mentoring and clinical rotations were rated as important factors in career decision making by most responders in the current study. Residency programs may be limiting exposure to comprehensive ophthalmology in favor of subspecialty rotations, particularly because the numbers of comprehensive faculty and part-time members of the staff are few. Increasing the number of full-time comprehensive faculty also would demonstrate that subspecialty training is not necessarily required for an academic career, because an interest in practicing in a university setting influenced the decision to pursue subspecialty training. Third, the culture in ophthalmology should be changed to place greater value on comprehensive ophthalmologists. Perceived greater prestige associated with subspecialization was a major factor motivating graduating residents to seek fellowship training, and increasing the prestige associated with comprehensive ophthalmology may foster interest as a career pursuit. The financial implications of instituting these changes must be considered in any decision-making process, although the full effect may be difficult to predict.

Although measures could be taken to shift the balance between comprehensive and subspecialty ophthalmology, these may not be required. The Eye Care Workforce Study was conducted approximately 1 decade ago and required that multiple assumptions be made about the future eye care delivery system. Health care has changed dramatically during the past decade, and newer studies are needed to corroborate the RAND study. Even if a future oversupply of subspecialists is confirmed, intervention is not necessarily mandated. A free market perspective would suggest that supply naturally will change to meet demand.^{33,34} Perhaps workforce planning is best approached by informing ophthalmologists in training of the projected eye care needs and letting them decide on their own future career pathways. Decision making is best undertaken by those who are most affected, and there are numerous examples of failures that have occurred when decisions are made by an elite group or government.^{35,36}

There are several limitations of this study. First, data were obtained from residents around the time of completion of their residency, and therefore the information is based on career expectations rather than actual experience. Some graduating ophthalmology residents may elect to seek fellowship training later in their careers, whereas others who obtained subspecialty training may choose to practice comprehensive ophthalmology. Second, some of the responders may have wished to pursue fellowship training, but failed to match in a fellowship program. These responders would have been included with the group planning to practice comprehensive ophthalmology, despite the fact that their original career choice was to pursue fellowship training. This subgroup likely represents only a small proportion of the total responders. Ophthalmology fellowship match data indicate that 25% of third-year residents failed to match in fellowships in December 2002. However, some applicants applied to more than one subspecialty fellowship, thereby skewing the data. Third, because only half of graduating residents completed the survey, there may be response bias in favor of residents who are more interested in academic pursuits. Nonresponse, particularly in surveys of this kind, can introduce selection bias.³⁷ Responders who have no interest in research may be less inclined to fill out a survey for research purposes, particularly if no remuneration is involved. Fellowship match statistics show that 43% of graduating ophthalmology residents matched into fellowships in December 2002. In the present study, 64% respondents were pursuing fellowship training, indicating that the study group was not an entirely representative sample. Because the survey was anonymous, there was no way to identify or survey nonresponders by telephone to determine how they differed from responders. Finally, approximately one quarter of residency programs failed to send in any responses. Table 7 (available at <http://aaojournal.org>) reviews the characteristics of the programs that did and did not respond to the survey, and no statistically significant differences were noted. Despite these potential drawbacks, the large number of responders and a majority of programs participating in the study argue for a fairly generalizable sample. The present study achieved a response rate better than that of prior studies surveying ophthalmology residents, which ranged from 18% to 47.8%.³⁸⁻⁴⁰

In summary, this study showed that a desire to acquire special skills, perceived prestige, and a perceived more favorable job market were the primary factors that predicted subspecialty training in a multivariate analysis. Anticipated work hours and geographic preference were major factors influencing a comprehensive ophthalmology career choice. Residents choosing comprehensive ophthalmology careers were more likely to plan to practice in a group private practice, and those seeking subspecialty training were more likely to intend to practice in a university setting or were undecided in their future practice type. This information may prove useful in helping to shape an appropriate physician workforce to meet the future eye care needs in the United States. Future data analysis will focus on determinants of specific subspecialty choices among graduating ophthalmology residents.

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Table 4. Factors Influencing the Decision to Pursue Fellowship Training

	Very Important	Moderately Important	Somewhat Important	Slightly Important	Not at All Important
Acquisition of special skills	57.9%	21.5%	13.1%	2.8%	4.7%
Comprehensive	19.4%	27.8%	31.9%	6.9%	13.9%
Fellowship	77.5%	18.3%	3.5%	0.7%	0%
Types of patient problems	32.7%	37.8%	20.7%	5.1%	3.7%
Comprehensive	17.3%	37.3%	32.0%	6.7%	6.7%
Fellowship	40.9%	38.0%	14.8%	4.2%	2.1%
Challenging diagnostic problems	31.6%	30.7%	25.9%	6.6%	5.2%
Comprehensive	4.2%	21.1%	47.9%	12.7%	14.1%
Fellowship	45.4%	35.5%	14.9%	3.6%	0.7%
Rotation(s) in subspecialty	31.6%	28.4%	22.8%	7.0%	10.2%
Comprehensive	8.2%	24.7%	41.1%	8.2%	17.8%
Fellowship	43.7%	30.3%	13.4%	6.3%	6.3%
Role models/mentors	31.5%	25.5%	22.7%	10.2%	10.2%
Comprehensive	4.1%	21.6%	36.5%	17.6%	20.3%
Fellowship	45.8%	27.5%	15.5%	6.3%	4.9%
Working with new technology	19.0%	28.2%	25.0%	13.4%	14.4%
Comprehensive	2.7%	17.6%	32.4%	23.0%	24.3%
Fellowship	27.5%	33.8%	21.1%	8.5%	9.2%
Perceived more favorable job market	16.1%	28.4%	25.7%	14.7%	15.1%
Comprehensive	6.6%	25.0%	30.3%	17.1%	21.1%
Fellowship	21.1%	30.3%	23.2%	13.4%	12.0%
Peer interactions	18.8%	23.9%	27.7%	12.7%	16.9%
Comprehensive	2.7%	13.7%	35.6%	16.4%	31.5%
Fellowship	27.1%	29.3%	23.6%	10.7%	9.3%
Preferred geographic location	19.6%	23.2%	21.4%	12.3%	23.6%
Comprehensive	29.5%	18.0%	25.6%	12.8%	14.1%
Fellowship	14.1%	26.1%	19.0%	12.0%	28.9%
Interest in an academic career	19.0%	19.0%	19.9%	17.1%	25.0%
Comprehensive	6.8%	14.9%	16.2%	21.6%	40.5%
Fellowship	25.4%	21.1%	21.8%	14.8%	16.9%
Working hours	9.6%	26.2%	28.0%	14.7%	21.6%
Comprehensive	11.8%	38.2%	22.4%	14.5%	13.2%
Fellowship	8.5%	19.7%	31.0%	14.8%	26.1%
Earning potential	13.4%	20.3%	28.1%	13.8%	24.4%
Comprehensive	8.0%	22.7%	20.0%	13.3%	36.0%
Fellowship	16.2%	19.0%	32.4%	14.1%	18.3%
Continuity of care	10.3%	23.4%	27.1%	14.0%	25.2%
Comprehensive	6.9%	17.8%	30.1%	13.7%	31.5%
Fellowship	12.1%	26.2%	25.5%	14.2%	22.0%
Prestige	9.3%	16.2%	23.2%	17.1%	34.3%
Comprehensive	0%	4.1%	14.9%	23.0%	58.1%
Fellowship	14.1%	22.5%	27.5%	14.1%	21.8%
Research experience	12.6%	10.3%	22.4%	16.8%	37.9%
Comprehensive	1.4%	2.7%	15.1%	21.9%	58.9%
Fellowship	18.4%	14.2%	26.2%	14.2%	27.0%
Career counseling	4.3%	12.8%	22.3%	16.1%	44.6%
Comprehensive	2.8%	7.0%	23.9%	16.9%	49.3%
Fellowship	5.0%	15.7%	21.4%	15.7%	42.1%
Educational debt	5.1%	13.4%	14.8%	9.2%	57.6%
Comprehensive	6.6%	17.1%	9.2%	9.2%	57.9%
Fellowship	4.3%	11.4%	17.7%	9.2%	57.5%

Survey question: Indicate to what degree each of the following factors influenced your decision to pursue/not pursue fellowship training.

Table 7. Characteristics of Responding and Nonresponding Ophthalmology Residency Programs*

	Responding Programs (n = 86)	Nonresponding Programs (n = 30)	P Value
Geographic location, n (%)			0.88
Northeast	39 (45.3)	12 (40.0)	
Northwest	5 (5.81)	1 (3.33)	
Southeast	21 (24.4)	8 (26.7)	
Southwest	21 (24.4)	9 (30.0)	
Rating of ophthalmology department, [†] n (%)			0.27 [§]
Top 20 [‡]	16 (18.6)	3 (10.0)	
Not top 20	70 (81.4)	27 (90.0)	
Number of residency positions, n (%)			0.90 [§]
2	20 (23.3)	7 (23.3)	
3	29 (33.7)	10 (33.3)	
4-5	24 (27.9)	10 (33.3)	
6-9	13 (15.1)	3 (10.0)	

*Fisher exact test.

[†]Listed among the top 20 eye hospitals in the 2003 *U.S. News & World Report* survey. (Comarow A. America's Best Hospitals. *U.S. News & World Report* 2003;135:48.)

[‡]One hospital rated among the top 20 eye hospitals no longer has a residency training program.

[§]Mann-Whitney *U* test.