Factors Associated With the Career Choices of Hematology and Medical Oncology Fellows Trained at Academic Institutions in the United States

Leora Horn, Elizabeth Koehler, Jill Gilbert, and David H. Johnson

ABSTRACT

Purpose

Factors that influence hematology-oncology fellows' choice of academic medicine as a career are not well defined. We undertook a survey of hematology-oncology fellows training at cancer centers designated by the National Cancer Institute (NCI) and the National Comprehensive Cancer Network (NCCN) to understand the factors fellows consider when making career decisions.

Methods

Program directors at all NCI and NCCN cancer centers were invited to participate in the study. For the purpose of analysis, fellows were grouped into three groups on the basis of interest in an academic career. Demographic data were tested with the Kruskal-Wallis test and χ^2 test, and nondemographic data were tested by using the multiscale bootstrap method.

Results

Twenty-eight of 56 eligible fellowship programs participated, and 236 fellows at participating institutions responded (62% response rate). Approximately 60% of fellows graduating from academic programs in the last 5 years chose academic career paths. Forty-nine percent of current fellows ranked an academic career as extremely important. Fellows choosing an academic career were more likely to have presented and published their research. Additional factors associated with choosing an academic career included factors related to mentorship, intellect, and practice type. Fellows selecting nonacademic careers prioritized lifestyle in their career decision.

Conclusion

Recruitment into academic medicine is essential for continued progress in the field. Our data suggest that fewer than half the current fellows training at academic centers believe a career in academic medicine is important. Efforts to improve retention in academics should include focusing on mentorship, research, and career development during fellowship training and improving the image of academic physicians.

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INTRODUCTION

In the United States, there has been an increase in the number of hematology-oncology fellows trained at academic institutions—cancer centers designated by the National Cancer Institute (NCI) and the National Comprehensive Cancer Network (NCCN)—who complete their training and pursue nonacademic careers. This trend is not unique to North America¹ or to medical oncology.² Research to date has focused on the factors that influence the career decisions of medical students and residents, and it indicates that sex, mentorship, experience, the intellectual content of the domain, and the perceived fit with personality are important factors to be considered when making career decisions.³⁻¹⁷ Financial considerations such

as escalating debt and lower future income potential have also been identified as reasons why medical school graduates do not consider academic careers.¹⁸⁻²¹ Graduates also appear to be placing greater emphasis on lifestyle and control over their work hours when making career decisions.^{9,16,22-25}

Studies that focus on particular subspecialties are slowly emerging and are likely propelled forward by fellowship programs that are struggling to find strategies to improve their recruitment success. One such study²⁶ looked specifically at residents' reasons for choosing or rejecting gastroenterology and found that a poor job market, less intellectual interest, and limited research opportunities were the most important dissuading factors. The American College of Obstetricians and Gynecologists found that lack of clear objectives and adequate feedback in

Leora Horn, Elizabeth Koehler, and Jill Gilbert, Vanderbilt Ingram Cancer Center, Nashville, TN; and David H. Johnson, University of Texas Southwestern, Dallas, TX.

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Corresponding author: Leora Horn, MD, 777 Preston Research Building, 2220 Pierce Ave, Nashville, TN, 37232; e-mail: leora.horn@vanderbilt.edu.

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clerkship, sex biases, lack of early exposure in medical school, lifestyle, and liability were contributing to the declining popularity of the specialty among medical students.²⁷ A study of rheumatology fellows²⁸ identified clinical experience, mentorship, and early exposure to the field as influencing career choices.

As the number of applicants to internal medicine declines, the proportion of applicants to hematology-oncology programs may also decline.²⁹ However, the number of internal medicine residents applying to hematology-oncology remains high, with approximately 700 applicants per year.³⁰ The percentage of trainees entering academic careers is not known. In addition to their contribution to innovations in medical knowledge and patient care, academic physicians play a major role in the education of medical students, residents, and fellows and, thus, are responsible for shaping our future physicians. Given the important role academic physicians play in advancing the field of medicine, there is a need to ensure continued interest in academic careers. Currently, there are no published data regarding the proportion of hematology-oncology fellows entering academic versus non-academic practice or the factors that fellows consider important when choosing between academic and nonacademic careers. If we can identify the variables that influence the career choices of hematology-oncology fellows, medical educators and policymakers could use this information to determine what barriers must be addressed to increase the interest and retention of those fellows in careers in academic medicine.

The objectives of this study were to examine the trends in the number of United States hematology-oncology fellows choosing academic versus nonacademic careers and to identify the factors that influence their career choices.

METHODS

Study Design

The study used a survey previously described by Horn et al.¹⁶ The research team—three medical oncologists, a division director, a program director, and a subspecialty fellow—made limited modifications to the survey instruments' demographic data to include questions pertaining to prior opportunities to participate in, present, and publish research. In addition, all fellows were asked to rank, on a scale of 1 to 5, the importance of a future academic career with 1 being "extremely unimportant" to 5 being "extremely important." There were a total of 20 demographic and 43 nondemographic variables. Before administering the survey, it was pilot-tested on a random sample of five junior faculty in hematology-oncology to ensure that the instrument was coherent. Before survey distribution, this study was approved by the Vanderbilt University institutional review board.

All hematology-oncology program directors at NCI- and/or NCCN-designated cancer centers were contacted via e-mail and invited to collaborate. Program directors were asked to provide data on the number of fellows completing their fellowship program in the last 5 years and the number of fellows pursuing academic, nonacademic, and industry employment per year. Surveys for fellows were mailed directly to the offices of program directors and mailed back to the investigators on completion. The surveys were completed anonymously. Data were entered into an Excel spreadsheet by investigators and imported into SPSS (SPSS, Chicago, IL).

Statistical Analysis

For purposes of analysis, fellows were grouped into three groups: group 1, low interest in academic career (ranked importance of academic career as "extremely unimportant" or "unimportant"); group 2, moderate interest in an academic career (ranked importance of academic career as "important"); and group 3, high interest in an academic career (ranked importance of an academic career as "very important" or "extremely important"). For demo-

Table 1. Trends in Fellows Graduating and Entering Practice

Year	Percent of Fellows Entering Practice		
	Academic	Nonacademic	Industry
2008	59	38	3
2007	59	40	1
2006	52	47	1
2005	51	45	4
2004	54	44	2

graphic characteristics, age differences were tested with the Kruskal-Wallis test; all other differences were tested with the χ^2 test.

To assist in finding similarities between the 43 career questions, questions were sorted into hierarchical clusters which were then tested by using a multiscale bootstrap method with 5,000 bootstrap resamples.^{31,32} The statistically determined clusters were compared with the scientifically derived clusters to determine whether the clustering technique had found meaningful clusters.

Next, each question was added as two indicator variables to a proportional odds model with academic career interest as the ordered three-category outcome. The proportional odds model also adjusted for age, sex, fellowship year, current educational debt, and whether the respondent had published research. The *P* values from a likelihood ratio test that compared the model with two indicator variables for response to the career question with the model that had no variables for response to the career question were recorded. These 43 *P* values were then adjusted by using the Benjamini-Yekutieli adjustment for multiple comparisons with a cutoff of 0.2 to determine which of the 43 career questions were related to career choice after adjusting for the demographic variables already listed.³³ Because some categories had few respondents, all summaries and analyses, except for the clustering step, were done on collapsed responses to questions. The 43 questions were ranked within the three groups of respondents by average importance, and the top 10 in each group are reported. All summaries and analyses were produced by using R version 2.8 software (<http://www.r-project.org>).

RESULTS

Twenty-eight of 56 eligible fellowship programs agreed to participate, and 236 fellows at participating institutions responded (62% response rate). Approximately 40% of fellows graduating from academic institutions in the last 5 years have entered nonacademic career paths (Table 1). Of fellows surveyed, 30% ranked an academic career as "unimportant" or "extremely unimportant," 21% ranked an academic career as "important," and 49% ranked an academic career as "very important" or "extremely important."

The median age of fellows was 32 years (Table 2), 37% had more than \$100,000 in debt, and 27% had a second postgraduate degree. Ninety-eight percent had participated in a research project: 50% in clinical research, 17% basic science research, 29% in both clinical and basic science research, and 3% in other research. Although not significant, respondents with a low interest in an academic career were more likely to be training at NCCN-designated cancer centers than at NCI-designated cancer centers. There was no difference between groups with regard to year of fellowship or current level of debt. Fellows with high interest in academic careers were more likely to be female (69% v 56%; *P* = .095), to have an additional graduate degree (84% v 64%; *P* = .015), and to have participated in basic research (23% v 11%; *P* = .051). Fellows with high interest in academic careers were also more likely to have presented research at a scientific meeting (78% v 53%;

Table 2. Demographic Characteristics

Characteristic	Overall (N = 236)		Low Importance (group 1) (n = 70)		Important (group 2) (n = 50)		High Importance (group 3) (n = 116)		P
	No.	%	No.	%	No.	%	No.	%	
Age, years									.250
Median	32		32		32		32		
Range	28-44		28-41		28-40		28-44		
Sex									.095
Male	58	138	69	48	50	25	56	65	
Female	42	98	31	22	50	25	44	51	
Marital status									.638
Married/engaged	74	174	78	54	78	39	70	81	
Single	25	60	21	15	22	11	29	34	
Divorced	1	2	1	1	0	0	1	1	
Postgraduate year of fellowship									.191
3	1	2	0	0	0	0	2	2	
4	33	77	26	18	39	19	34	40	
5	31	74	41	29	27	13	28	32	
6	29	69	30	21	33	16	28	32	
7	6	13	3	2	2	1	9	10	
Current level of debt, \$									.217
≤ 50,000	47	110	44	31	46	23	48	56	
50, 001-100,000	16	38	24	17	16	8	11	13	
> 100,000	37	88	31	22	38	19	41	47	
Additional postgraduate degrees									.015
Master's	11	26	10	7	6	3	14	16	
Doctor of Philosophy	11	27	1	1	10	5	18	21	
Other	5	11	4	3	6	3	4	5	
None	73	172	84	59	78	39	64	74	
Participated in research									.051
Basic science	17	40	11	8	10	5	23	27	
Clinical	50	117	61	43	54	27	41	47	
Both	29	69	20	14	34	17	33	38	
Other	3	6	3	2	2	1	3	3	
None	2	4	4	3	0	0	1	1	
Research during									
Undergraduate school	25	58	24	17	20	10	27	31	.652
Medical school	32	76	20	14	36	18	38	44	.033
Graduate school	18	43	10	7	12	6	26	30	.011
Residency	51	121	43	30	58	29	53	62	.211
Fellowship	56	132	54	38	56	28	57	66	.941
Research was									
Published	64	150	41	29	62		78		< .001
Presented	67	158	53	37	62		78		.002
No. of publications									< .001
0			41		24		6		
1-3			47		56		56		
4-9			10		16		30		
> 10			1		4		8		

$P = .002$) or to have published their research (78% v 41%; $P < .001$) than those with low interest. Similarly, fellows with more publications were more likely to have a high interest in an academic career ($P < .001$).

The relationships between interest in an academic career and the influence the survey questions had on career selection are shown in Figure 1. The questions are grouped according to the hierarchical clustering results. Note that questions within a cluster have similar relationships to an interest in an academic career. For example, the eight questions pertaining to lifestyle—anticipated salary, on-call and work hours, time for leisure, satisfaction at training, satisfaction of

colleagues, predictable work hours, stress where training, and stress at intended job—tend to be influential to respondents, regardless of their interest in an academic career. In contrast, threat of malpractice, current loan burden, additional years of training required, and number of additional degrees tend to be not influential for respondents, regardless of interest in an academic career.

The cluster at the top of Figure 1 appears different from the others; this cluster contains questions that tend to discriminate between respondents who indicated a career in academics was not important and those who thought it was very important. For example,

Fig 1. (A, B) Relationship between career and survey questions. The relationship between the response to each survey question and to “How important is an academic career to you?” are summarized in the table (C). The percents in each row sum to 100%. For example, of the respondents who indicated that an academic career was not important, 74.3% also responded that basic science research was not influential to them, 22.9% responded it was influential, and 2.8% responded it was very influential. The top line of the table (C) is represented in the top line of the smaller graph (B). Looking down the columns of the large graph (A), we see the trend that the more important an academic career is to someone, the more likely that person is to respond that basic science research is very important. This trend is visible in the graphic as a stair-step pattern. Had the percentages in each column been the same, there would not be a relationship between the response to the survey question and the question “How important is an academic career to you.” The graphic for a table with no relationship would not have this stair-step pattern but would still indicate how important each survey question is, regardless of interest in an academic career. The large graph (A) represents 35 of these tables; (*) indicates survey questions that were statistically related (in a proportional odds model) to interest in an academic career after accounting for differences in age, sex, fellowship year, current educational debt, and whether the respondent had published research.

“Influence of a mentor in the same field,” located at the top of Figure 1, displays a stair-step pattern indicating that respondents who were very interested in an academic career were more likely to respond that a mentor in the same field was very influential to their career decision. After adjusting for age, sex, fellowship year, current educational debt, and whether the respondent had published research in a proportional

odds model, the “Influence of a mentor in the same field” was still significantly related to interest in an academic career. Additional factors associated with high interest in an academic career—desire to have an academic position, desire to teach, perceived status of an academic position, opportunity to participate in clinical trials, basic research being conducted in the field, clinical trials being conducted in

Table 3. Top 10 Reasons Associated With Career Choice

Group 1: Low interest in academic career	
1.	Intellectual stimulation
2.	Job satisfaction among staff where I intend to practice
3.	Job security
4.	Consistent with my personality
5.	On call and work hours as a staff physician
6.	Intellectual environment where I intend to practice
7.	Independence when practicing
8.	Time for leisure activities as staff
9.	Experience with patients during training
10.	Satisfaction among faculty/staff where I am training
Group 2: Moderate interest in academic career	
1.	Job satisfaction among staff where I intend to practice
2.	Intellectual stimulation
3.	On call and work hours as a staff physician
4.	City in which institution is located
5.	Opportunity to participate in clinical trials
6.	Satisfaction among faculty/staff where I am training
7.	Time for leisure activities as staff
8.	Experience with patients during training
9.	Intellectual environment where I intend to practice
10.	Consistent with my personality
Group 3: High interest in academic career	
1.	Job satisfaction among staff where I intend to practice
2.	Intellectual environment where I intend to practice
3.	Desire to have academic position
4.	Opportunity to participate in clinical trials
5.	Perceived support for my research agenda
6.	Influence of faculty members during fellowship
7.	Consistent with my personality
8.	Influence of mentor within the same field
9.	Desire to teach
10.	Experiences with patients during training

the field, influence of a faculty member during fellowship, opportunity to be affiliated with a particular hospital or university, perceived support of their research agenda, intellectual stimulation, and influence of a mentor of the same sex—all influenced career decisions (significant factors are indicated with an asterisk in Fig 1).

Regardless of future career preferences (Table 3), fellows ranked future job satisfaction, experience with patients during training, consistency with personality, and intellectual environment in which they intend to practice among the top 10 reasons for choosing their future practice setting. Fellows with low or moderate interest in academic careers listed on-call and work hours as staff, satisfaction among faculty where they are training, and perceived time for leisure activities as staff among the top 10 factors influencing their career decisions. Fellows with moderate and high interest in academic careers included opportunity to participate in clinical trials among their top 10 reasons for choosing a practice type. Fellows with low interest in academic careers listed job security and practice independence to round off their top 10 reasons, and those with moderate interest listed city in which institution is located. Fellows with high interest in academic careers included desire to have an academic position, desire to teach, perceived support for research agenda, influence of a faculty member or members during fellowship, and influence of mentor within the same field among their top 10 reasons for considering an academic career.

DISCUSSION

Recruitment into academic medicine is a problem faced by all medical specialties. Our data suggest that approximately 40% of fellows training at academic institutions are choosing nonacademic careers. This value is likely higher for fellows training at nonacademic institutions, given that we chose to interview fellows at NCI- and/or NCCN-designated institutions—programs that are more likely to attract fellows seeking an academic appointment. It appears from our study that fewer than half the fellows currently training at academic centers believe a career in academic medicine is “very important” or “extremely important.” These results suggest that the number of fellows entering academic practice after training may decline in the next 5 years.

Approximately 90% of fellows with high interest in an academic career identified mentorship as an important positive influence on career decision, and faculty members or mentors within hematology-oncology programs is among their top 10 reasons for their career decision. By contrast, only 65% of fellows with “low” or “moderate interest” reported that faculty members or mentors within hematology-oncology programs influenced their decision. Mentorship has been found to have an impact on both choice of career and development and productivity in residents and medical students.^{16,34-37} This finding suggests that training programs need to continuously evaluate mentoring activities and consider a more formal structure for assessing mentorship for trainees. Our data also indicate that trainees who either publish or present their data in a formal manner are more likely to pursue an academic career. Possibly the personal recognition that comes with a published paper or a presentation at a research meeting may inspire an individual to pursue academics where such activity is more commonplace. Similar trends were observed in a study of plastic surgery subspecialty fellows who were followed after graduation; those with publications, active participation in medical societies, and participation on editorial boards were more likely to remain in academic practice.³⁸

Previously, level of debt has been shown to increase residents' stress and the likelihood of residents considering income potential when choosing a specialty.³⁹ Somewhat paradoxically perhaps, in our survey, a higher percentage of fellows with a high interest in an academic career had existing debt loads of more than \$100,000, suggesting that the perceived disparity in remuneration between academic and nonacademic physicians is not a major factor in decision making for hematology-oncology fellows. This may be partly due to the competitive loan repayment plans offered to physicians practicing within academic institutions. This is contradictory to a recent survey of gastroenterology fellows that found fellows choosing nonacademic careers were doing so because they believed such practice would be more likely to meet their perceived financial needs.⁴⁰ Contrary to findings of other studies,³⁹ our findings show that fellows likely to pursue an academic career are also more likely to be female and single. It is conceivable that such individuals may not be considering the future financial burdens that would occur with family obligations when making their career decisions.

Regardless of career choice, all fellows list “job satisfaction” and “consistency with personality” among the most important factors influencing their career choice. Job satisfaction for those choosing academic careers appears to be related to ability to teach, participate in

research, and secure research support; those with low or moderate interest in academic careers prioritize lifestyle factors, including on-call and work hours, time for leisure activities, and independence while practicing. Interestingly, these same fellows identified satisfaction among faculty where they are training as influencing their decision not to pursue academic careers, which indicates the potential negative perceptions fellows may have of the lifestyle of role models practicing at academic centers.

To the best of our knowledge, this study is the first to review the factors that have an impact on the career choices of hematology-oncology fellows training at academic institutions. Our data indicate a general decline in the number of hematology-oncology trainees who intend to pursue an academic career over the next few years. Given the anticipated workforce shortage,²⁹ a decline in the number of trainees entering academic positions could further exacerbate this problem because there would be fewer individuals training future hematologists and oncologists. Efforts to address these factors need to be considered, including strategies to increase and improve the mentoring experience for current and future trainees, development of studies designed to better understand the current plight of the academic physician vis-à-vis work environment and lifestyle. Erikson et al²⁹ surveyed hematology-oncology fellows in 2005 and found that 60% were concerned with balance between work and home life. Our data strongly suggest that fellows are greatly influenced by their perceptions of the professional lives of their trainers. Those who train in an environment that fosters good mentorship and provides excellent role models are much more likely to pursue employment in a similar work environment. By contrast, fellows who train in an environment of dissatisfaction, lack good mentorship, and lack research opportunities be they laboratory-based or otherwise are much less likely to seek employment in an academic setting. Other factors that may be at play include the blurring of the traditional line that separates an academic practice from a traditional community-based practice versus employment in industry or government. Less than a decade ago, there were sharp differences between university-based practices and private practices in terms of research opportunities and patient care opportunities. In recent years, these differences have become less pronounced. Life-

style also has become an increasingly important factor when making a career choice. Academics was once viewed as a more leisurely albeit less financially rewarding work environment, whereas private practice was viewed as the exact opposite. These differences simply no longer exist. Thus, it is not enough to entice trainees into academic careers with the promise of discovery and lifestyle benefits. It will require an evidence-based approach that appeals to the individual's personality. It is also interesting that academia was once considered the domain of men, but our data suggest it is fast becoming the province of the single woman. What this means for the future of academic and community practice is unknown but it warrants continuous assessment.

AUTHORS' DISCLOSURES OF POTENTIAL CONFLICTS OF INTEREST

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Data analysis and interpretation: All authors
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