



# Timing and Stability of Fellowship Choices during Pediatric Residency: A Longitudinal Survey

Michelle L. Macy, MD, MS<sup>1,2</sup>, Laurel K. Leslie, MD, MPH<sup>3</sup>, Debra Boyer, MD, MHPE<sup>4</sup>, Keaton D. Van, MA<sup>1</sup>, and Gary L. Freed, MD, MPH<sup>1,5,6</sup>

**Objectives** To determine, among pediatric residents, the timing and stability of decisions to pursue fellowship training and select a specific subspecialty, which can be used to inform strategies to better match the distribution of pediatric subspecialist with the needs of children.

**Study design** A longitudinal survey administered with the General Pediatrics In-training Exam to pediatric residents in the US and Canada, 2010-2014. The study included residents who responded in each of their first 3 years of residency and indicated plans to enter fellowship or matriculated, 2013-2016, into 1 of the 14 medical subspecialty fellowships for which the American Board of Pediatrics grants a certificate. Descriptive and  $\chi^2$  statistics were calculated.

**Results** Of the 7580 residents who completed 3 annual surveys (response rate 99%) 4963 (65.5%) indicated plans to pursue fellowship training and 2843 (37.5%) matriculated into fellowship. Residents who did not enter fellowship were in smaller residency programs and programs with less interest in fellowship among interns. Most residents who matriculated into fellowship (68.4%) planned to do so as interns and maintained that plan throughout residency. In contrast, 22.7% had selected a specific subspecialty as interns. Fellowship decisions were made later in residency by female residents, American Medical Graduates, and residents in programs where <50% of interns planned to pursue fellowship training. Timing and stability of decisions varied across subspecialty fields.

**Conclusions** Understanding the timing of pediatric medical subspecialty fellowship decisions could be used to shape medical education and, ultimately, the pediatric workforce. (*J Pediatr* 2018;198:294-300).

Although the number of children in the US has remained stable over time, the number of children surviving with complex chronic conditions has increased,<sup>1-3</sup> and the pediatric medical subspecialist workforce may not be sufficient to address the needs of all children.<sup>4-8</sup> Concerns about the pediatric subspecialist workforce persist despite more pediatric residents expressing interest in, pursuing, and completing fellowship training over the past 20 years.<sup>9-11</sup> Although the total number of subspecialty fellowship trained pediatricians obtaining initial board certification doubled between 2000/2001 and 2014/2015, the number of pediatricians trained within each of the medical subspecialties varies widely.<sup>12</sup> The relative paucity of pediatric subspecialists in certain areas may reflect that some subspecialty disciplines face difficulty recruiting residents into their field and that existing fellowship training positions go unfilled.<sup>6</sup>

Previous research has explored factors associated with the decision to pursue subspecialty training.<sup>9,10,13-18</sup> However, little is known about the timing and stability of career decisions among residents who ultimately enter pediatric medical subspecialty fellowships. Understanding when pediatric residents make their career decisions to pursue such training will provide clarity to medical educators and policy makers who seek to impact the distribution of subspecialists across disciplines to better address the needs of the child population.

In this study, we sought to address this information gap by comparing demographic and residency program characteristics among residents who expressed the intention during residency to pursue fellowship training and did or did not actually enter fellowship training in an American Board of Pediatrics (ABP)-certified medical specialty. In addition, our data allow us to prospectively determine when residents selected a specific subspecialty and whether they changed career plans during residency training. We hypothesized that there would be variation in timing of these decisions across different subspecialties and potentially between respondents based on demographic and residency program characteristics.

ABP	American Board of Pediatrics
AMG	American Medical Graduate
IMG	International Medical Graduate
ITE	General Pediatrics In-training Exam

From the <sup>1</sup>Child Health Evaluation and Research (CHEAR) Center; <sup>2</sup>Division of Pediatric Emergency Medicine, Department of Emergency Medicine, University of Michigan, Ann Arbor, MI; <sup>3</sup>The American Board of Pediatric Foundation, Chapel Hill, NC; <sup>4</sup>Division of Respiratory Diseases, Boston Children's Hospital, Boston, MA; <sup>5</sup>Division of General Pediatrics, Department of Pediatrics and Communicable Diseases; and <sup>6</sup>Department of Health Management and Policy, School of Public Health, University of Michigan, Ann Arbor, MI

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## Study Design

Our sample was composed of all individuals who responded to the ABP General Pediatrics In-training Exam (ITE) Survey questions administered in July of each of their first 3 years of residency training between 2010 and 2014 and indicated plans to enter fellowship training in at least 1 of the ITE Surveys or matriculated into pediatric medical subspecialty fellowship training between 2013 and 2016 in 1 of the 14 programs for which ABP grants a certificate. Residents who took time off from training before starting a fellowship between 2013 and 2016 were included. Fellowship training information was available only for those who entered a subspecialty that is certified by the ABP. Therefore, individuals who entered fellowship in subspecialties certified by other Boards (eg, allergy and immunology, which is certified by the American Board of Internal Medicine) or that did not grant a certificate during the study timeframe (eg, hospitalist medicine) could not be identified.

**Survey.** Since 2007, the ABP has conducted an annual survey of all pediatric resident physicians (including categorical and combined program trainees) in the US and Canada.<sup>10,14</sup> The structured questionnaires contained fixed-choice, single-response items designed to be completed in 10 minutes or less. Questionnaires are administered in July at the beginning of each residency training year as an optional addendum to the ITE, a required component of residency training. Questions are primarily designed to inform ABP operations. The same questions are asked each year. In this study, we focused on questions related to the decision to pursue subspecialty fellowship training and the choice of a specific subspecialty (**Table 1**; available at [www.jpeds.com](http://www.jpeds.com)). This study was approved by the institutional review board at the University of Michigan Medical School.

**Variables.** A limited set of demographic characteristics are available in the dataset and include sex, age at the start of residency training, and American medical graduate (AMG) or international medical graduate (IMG) designation. We determined residency program size by calculating the average number of residents who completed the ITE per year from 2010 to 2014. On average, small residency programs were designated as those with  $\leq 30$  residents, medium programs had 31-60 residents, and large programs  $> 60$  residents who completed the ITE each year. We further characterized residency programs based on the proportion of interns ( $< 50\%$  vs  $\geq 50\%$ ) who responded that they intended to pursue fellowship training as a measure of peer norms for career decisions.

We identified the subspecialty field entered by each individual who matriculated into an ABP-certified fellowship training program. There were 21 individuals who entered a combined adult/pediatric fellowship program. We analyzed their responses within the respective pediatric subspecialty group (eg, adult/pediatric endocrinology were analyzed with pediatric endocrinology). There were 6 individuals who arranged individualized multisubspecialty combined fellowship training. For analyses, we grouped these individuals with the most prevalent of the fellowship programs that they entered

(eg, combined critical care medicine/infectious disease was grouped with critical care medicine).

**Timing and Stability of Decisions.** We first categorized those residents who at any time indicated a plan to pursue fellowship training as having matriculated into ABP-certified fellowship training programs or not. We then categorized those who matriculated into fellowship training programs according to when they first indicated a stable decision (ie, never changed their mind on subsequent surveys) to pursue fellowship training (first, second, or third year of residency). We also identified 2 additional groups of residents: those who never indicated plans to pursue fellowship training in any survey and those who had indicated they changed plans about fellowship training during the course of residency. Residents were considered to have changed plans if they indicated a career path other than fellowship training after selecting fellowship training in a previous year or if they subsequently responded affirmatively to the question "Have you changed your mind in the last 12 months regarding what you plan to do after residency?" Thus, there were a total of 5 groups of residents for analysis. We took a similar approach to categorize respondents according to the timing of their selection of a specific subspecialty (ie, July of their first, second, or third year of residency; never; changed plans).

## Statistical Analyses

Descriptive statistics were calculated for demographic and residency characteristics of respondents who did not matriculate into fellowship, those who indicated plans and did matriculate into fellowship, and those who did not indicate plans and did matriculate into fellowship. Statistical comparisons were not made due to the small sample size ( $n = 62$ ) of individuals who never indicated plans to pursue fellowship but did matriculate into fellowship. We used  $\chi^2$  statistics to compare demographic and residency characteristics of respondents across the 5 groups (first year, second year, third year, never indicated, and changed plans) used to categorize the timing and stability of decision to pursue fellowship training and selection of a specific subspecialty. We then calculated the percentage of individuals across the 5 groups within each subspecialty. Analyses were completed with SAS 9.4 (SAS Institute Inc, Cary, North Carolina). *P* values  $< .05$  were considered statistically significant.

## Results

From 2010 to 2014, there were 7580 residents who completed 3 surveys in July of their first, second, and third years of residency (99% response rate). Of these, 4963 (65.5%) indicated a plan to pursue fellowship training in at least 1 year. There were 2843 residents who entered 1 of the 14 ABP-certified pediatric medical subspecialty fellowship training programs in 2013-2016. Including 2781 residents who entered fellowship after indicating plans to pursue fellowship training and 62 who entered fellowship without indicating plans to pursue fellowship training in any of the surveys.

**Table II.** Demographic characteristics of sample overall and by resident's indication of plans to pursue fellowship training on the surveys administered with the general pediatrics in-training examination

Respondent characteristics	Overall sample		Residents who indicated plans for fellowship training in any survey but did not enter fellowship		Residents who indicated plans for fellowship training in any survey and entered fellowship		Residents who never indicated plans for fellowship training but entered fellowship	
	%	(n = 4963)	%	(n = 2120)	%	(n = 2781)	%	(n = 62)
Sex								
Female	68.6	3406	69.5	1473	67.7	1883	80.6	50
Male	31.4	1557	30.5	647	32.3	898	19.4	12
Age, y*								
20-29	76.4	3793	72.5	1538	79.2	2202	85.5	53
30-39	16.9	840	17.2	364	17.0	472	6.5	4
40 or older	2.1	102	4.1	87	0.5	15	0	0
Unknown	4.6	228	6.2	131	3.3	92	8.1	5
Medical school								
AMG	74.4	3693	74.9	1587	73.7	2050	90.3	56
IMG	25.6	1270	25.1	533	26.3	731	9.7	6
Residency program characteristics								
Program size†								
Small (≤30 residents)	13.7	1301	14.7	312	12.1	332	11.3	34
Medium (31-60 residents)	39.0	1925	41.2	873	37.5	1031	33.9	21
Large (>60 residents)	47.2	1706	44.1	935	50.4	1387	54.8	7
Percent of interns who planned to pursue fellowship								
<50%	41.9	2262	45.7	969	39.1	1088	59.7	23
≥50%	58.1	2428	54.3	1151	60.9	1695	40.3	37

\*Age at start of residency training.

†Excluding responses from the 31 individuals who changed residency program to a residency program of a different size.

Demographic characteristics of the study sample are presented in **Table II**. Greater proportions of residents who entered fellowship came from larger residency programs or residency programs where >50% of the interns planned to pursue fellowship. The majority of individuals who entered fellowship were women (n = 1933, 68.0%), 20-29 years old (n = 2255, 79.3%), and AMGs (n = 2106, 74.1%). Neonatology, hematology–oncology, critical care medicine, emergency medicine, and cardiology were the subspecialties with the most fellows (**Table III**; available at [www.jpeds.com](http://www.jpeds.com)).

### Timing and Stability of Fellowship Career Decisions

Most individuals who ultimately entered fellowship training first reported plans to do so in July of their intern year (68.4%; n = 1944), and few changed plans about pursuing fellowship training (n = 176, 6.2%) (**Table IV**). Only 2.2% (n = 62) entered fellowship having never indicated plans to do so on any of the surveys during the course of their residency training. Male residents indicated plans for fellowship training earlier than female residents, as did IMGs compared with AMGs. Although residency size was not associated with the timing or stability of fellowship decisions, residents in programs where at least one-half of interns planned to pursue fellowship training decided to do so earlier than those in programs where fewer than one-half of interns planned to pursue fellowship training.

The most common point in time for residents to indicate the selection of a specific subspecialty on the surveys was July of their second year of residency (n = 785, 27.6%) (**Table V**). Nearly one-fifth of residents who entered fellowship indicated

changing their choice of a specific subspecialty during residency (n = 547, 19.2%). Male residents indicated selection of a specific subspecialty earlier than female residents, and IMGs were more likely than AMGs both to decide earlier and change their mind. There were no significant differences in the timing for selection of a specific subspecialty based on program size, but training in a residency program where at least one-half of interns planned to pursue fellowship training was associated with earlier selection of a specific subspecialty.

### Variation in Fellowship Decision-Making by Subspecialty

There was variation regarding when respondents indicated plans for fellowship training by their eventual subspecialty (**Figure, A**). More than 75% of residents who entered pediatric cardiology or hematology–oncology fellowships and less than 50% of residents who entered developmental–behavioral pediatrics, child abuse, or adolescent medicine fellowships reported plans to pursue any fellowship training in their first year of residency. There was also variation in the selection of a specific subspecialty (**Figure, B**). More than 25% of residents who entered pediatric hematology–oncology, cardiology, or gastroenterology fellowships and less than 10% of residents who entered pediatric rheumatology fellowships had selected a specific subspecialty by July of their first year of residency.

## Discussion

More than one-half of pediatric residents who indicated plans to pursue fellowship training entered an ABP-certified medical

**Table IV.** Timing and stability of overall plans to pursue fellowship training by demographic and residency program characteristics

Respondent characteristics	Timing of decision*										P value
	First year of residency		Second year of residency		Third year of residency		Never indicated		Changed plans		
	%	n	%	n	%	n	%	n	%	n	
Overall	68.4	1944	14.4	409	8.9	252	2.2	62	6.2	176	
Sex											
Male	79.1	720	9.8	89	5.4	49	4.4	40	1.3	12	<.001
Female	63.3	1224	16.6	320	10.5	203	7.0	136	2.6	50	
Age, y <sup>†</sup>											
20-29	67.5	1522	14.7	332	9.1	206	6.3	142	2.4	53	n/a <sup>‡</sup>
30-39	76.5	364	11.1	53	5.9	28	5.7	27	0.8	4	
40 or older	93.3	14	6.7	1	0	0	0	0	0	0	
Unknown	45.4	44	23.7	23	18.6	18	7.2	7	5.2	5	
Medical school											
AMG	65.0	1368	15.4	325	10.5	222	6.4	135	2.7	56	<.001
IMG	78.2	576	11.4	84	4.1	30	5.6	41	0.8	6	
Residency program size											
Small	65.3	239	18.3	67	9.3	34	5.2	19	1.9	7	.193
Medium	66.5	700	15.0	158	9.6	101	6.8	72	2.0	21	
Large	70.3	980	13.0	181	8.3	116	6.0	83	2.4	34	
Percent of interns who planned to pursue fellowship											
<50%	59.8	664	19.4	215	11.4	127	6.1	68	3.3	37	<.001
≥50%	73.9	1280	11.2	194	7.2	125	6.2	108	1.4	25	

n/a, not available.

\*Responses were collected during surveys administered with the ITEs in July of each year of residency.

†Age at the start of residency training.

‡ $\chi^2$  testing not performed due to small sample size for some cells.

subspecialty fellowship program. The majority of pediatricians who matriculated into fellowship first expressed intention to do so in July of their intern year and did not report a change in their plans throughout their residency. However, their

selection of a specific subspecialty occurred later in residency training (ie, at some point after the survey administered in July of their first year) and was more likely to change during the course of residency than the decision to pursue

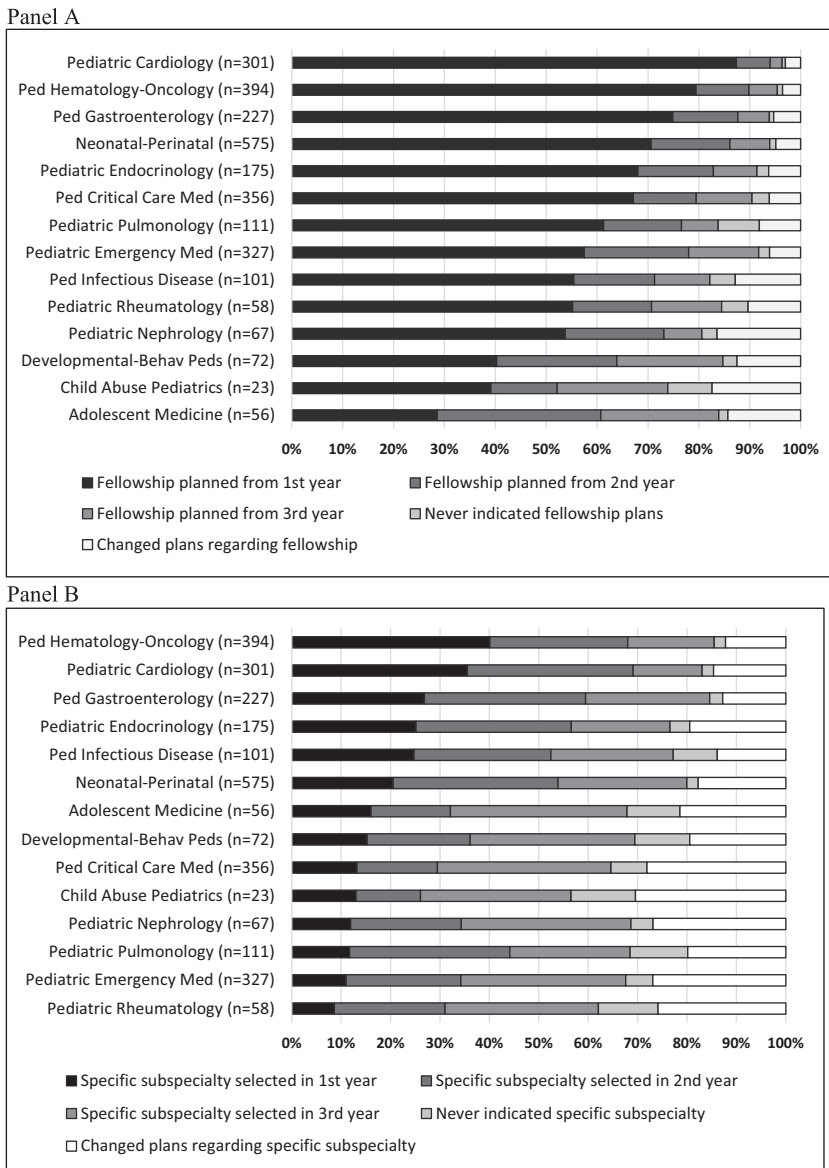
**Table V.** Timing and stability of the selection of a specific subspecialty by demographic and residency program characteristics

Respondent characteristics	Timing of decision*										P value
	First year of residency		Second year of residency		Third year of residency		Never indicated		Changed plans		
	%	n	%	n	%	n	%	n	%	n	
Overall	22.7	645	27.6	785	25.7	731	4.7	135	19.2	547	
Sex											
Male	26.6	242	28.4	258	20.7	188	3.8	35	20.5	187	<.0001
Female	20.8	403	27.3	527	28.1	543	5.2	100	18.6	360	
Age, y <sup>†</sup>											
20-29	21.6	486	28.5	642	26.6	600	5.1	114	18.3	413	n/a <sup>‡</sup>
30-39	29.8	142	24.6	117	20.2	96	2.1	10	23.3	111	
40 or older	40.0	6	13.3	2	.0	0	.0	0	46.7	7	
Unknown	11.3	11	24.7	24	36.1	35	11.3	11	16.5	16	
Medical school											
AMG	21.1	445	26.9	567	29.1	613	5.6	118	17.2	363	<.001
IMG	27.1	200	29.6	218	16.0	118	2.3	17	25.0	184	
Residency program size											
Small	20.5	75	30.6	112	22.1	81	4.4	16	22.4	82	.086
Medium	23.1	243	26.3	277	25.6	269	4.2	44	20.8	219	
Large	22.6	325	27.8	388	27.0	377	5.4	75	17.1	239	
Percent of interns who planned to pursue fellowship											
<50%	19.4	216	27.9	310	27.5	305	6.3	70	18.9	210	<.001
≥50%	24.8	429	27.4	475	24.6	426	3.8	65	19.5	337	

\*Responses were collected during surveys administered with the ITEs in July of each year of residency.

†Age at the start of residency training.

‡ $\chi^2$  testing not performed due to small sample size for some cells.



**Figure. A,** Timing of plans to pursue fellowship during residency among residents who matriculated into pediatric subspecialty fellowship training. **B,** Timing of specific subspecialty selection during residency training among residents who matriculated into pediatric subspecialty fellowship training. *Ped,* pediatric.

fellowship training in general. The timing of both decisions varied across subspecialties. The 3 disciplines with the greatest proportions of individuals who selected a specific subspecialty as interns entered programs which used a “spring match” during the study period (hematology–oncology, cardiology, and gastroenterology).<sup>19</sup> The timing of the “spring match” required interviews and program selection during the second year of residency training, which may have resulted in residents who pursued these fields to declare a specific subspecialty earlier than other fields. Since the time of this study, all pediatric medical subspecialty fellowship programs certified by the ABP have now transitioned to a match during the fall of the third year of residency. Monitoring for changes in both the timing

of selection of subspecialty training and specific subspecialty choices will be important following this change.

Our approach allowed us to uniquely determine the timing and stability of these decisions prospectively with annual surveys conducted each July during residency training in comparison with previous retrospective surveys of fellows.<sup>13,20</sup> Our findings, derived from a more comprehensive national sample of pediatric trainees, are similar to the results of a mailed survey of a random sample of subspecialists conducted in 2009, where 36% recalled making the decision on subspecialty training before starting residency, 19% during their first year and 27% during their second year of residency.<sup>13</sup> In addition, our results extend findings from a 2010 study of first- and third-year



residents using the ABP's surveys,<sup>14</sup> which showed 72% of all pediatric interns who planned to pursue fellowship training maintained that plan 2 years later. Our current study demonstrates that plans to pursue fellowship training at the start of residency are stable among individuals who matriculated into an ABP-certified medical subspecialty fellowship training program.

We found demographic characteristics to be associated with both the timing of plans to pursue fellowship training and the selection of a specific subspecialty. More men decided on fellowship training in general by July of their first year of residency than women. Although most men in our survey indicated the selection of a specific subspecialty field by July of the first or second year of residency, women were more likely to indicate selection in the second or third year. Lifestyle factors and interest in flexible work hours have been identified as more important to career decision-making for women than men.<sup>10,16</sup> It follows that women may seek to gain exposure to different fields and lifestyles before committing to a particular subspecialty. Women, who make up the majority of the pediatric subspecialty workforce, may benefit most from the additional time for career decision-making that will come from the shift to fall matches for all pediatric medical subspecialty fellowship programs that are certified by the ABP.

IMGs were more likely than AMGs to decide on a specific pediatric subspecialty earlier in training. It is possible that some individuals who are citizens of another country come to the US with goals for fellowship training to address specific needs within their country of origin or with previous clinical experience as a subspecialist. It is also possible that US citizens who obtain training in international medical schools (also classified as IMGs) develop an earlier interest in pediatric subspecialties due to exposure to different health systems or different patient populations. The ABP data currently do not capture citizenship, but in our study IMGs made up one-quarter of the individuals who entered fellowship training. Others have noted that IMGs contribute a large proportion of the pediatric workforce in some subspecialties.<sup>6</sup> Recent discourse around US immigration policy suggests the potential for changes that may decrease the flow of IMG pediatric residents into the US, which may have substantial impact on the pediatric subspecialty workforce locally and globally. These policy discussions should be closely monitored.

### Implications for Medical School and Residency Training

In our prospective study, we found decisions to pursue pediatric subspecialty fellowship training occur earlier than retrospective studies previously have suggested.<sup>13</sup> Based on the timing of the surveys, it may be inferred that residents who planned to pursue fellowship training as interns had made their career decision during medical school. Therefore, exposure to pediatrics and pediatric subspecialties during medical school may have a strong influence on the composition of the pediatric subspecialty workforce. Those involved in undergraduate medical curricula specific to pediatrics should assess what actions might be taken to increase exposure to pediatric

subspecialty disciplines that are currently undersubscribed if that is desirable from a workforce perspective.

We also found that the selection of a specific subspecialty field occurs later in residency training and is subject to more change. Therefore, residency programs likely have greater influence on resident selection of a specific subspecialty than the decision to pursue fellowship training in general. Interest in a specific disease or organ system and exposure to the field have been shown to be important influences on subspecialty selection.<sup>13,20,21</sup> Other factors that may influence resident selection of specific subspecialties include individualized curricula,<sup>22-24</sup> mentorship,<sup>17,25</sup> formal research training,<sup>26,27</sup> timing of residency rotations, and exposure to subspecialty societies. In general, subspecialties with smaller numbers of trainees had the lowest proportions of fellows who decided to pursue fellowship before entering residency. These are also the fields that have been identified by primary care physicians as areas of greater concern for limited supply of providers.<sup>4</sup> If national leaders determine that specific subspecialties are in workforce shortage situations, targeted early exposure of residents to these arenas may have an impact on the proportion selecting those disciplines for fellowship training.

We found earlier decision-making among fellows who trained in residency programs where at least one-half of the interns planned to pursue fellowship training. The dominant forces influencing the career decision-making among trainees may vary within residency programs based on a variety of factors, including self-selection into residency programs based on interest in fellowship training, peer influences, the existence of local subspecialty fellowship programs, perceptions of workforce shortages, and service needs in surrounding communities. Some medical subspecialties engage in efforts to influence residents to enter their field. The North American Society for Pediatric Gastroenterology, Hepatology, and Nutrition provides one example of a recruitment program with the goal of attracting pediatric residents to the field by providing an opportunity to participate in the society's annual meeting. The first 4 years of this program had a modest conversion rate for those who were initially uncertain about a career in pediatric gastroenterology.<sup>28</sup> Similar programs may be a worthwhile approach to increase interest in the pediatric medical subspecialty fields in greatest need of providers.

The primary limitation of this study is the timing of the survey, conducted annually with the ITE in July. This timing does not allow for capture of information about career decisions that occur during the final 11 months of residency training, nor does it capture information about the exact timing of decisions within a given year. The annual nature of the survey also relies on resident recall of up to 12 months regarding changes in their career decisions. The second main limitation of this study is that the survey does not collect information about which specific subspecialty a resident selected. There was no way to determine whether a resident's intended specific subspecialty was the same as the subspecialty fellowship into which they matriculated. Third, we focused our analyses on residents who ultimately entered fellowship training in 1 of the 14 medical subspecialties certified by the ABP, which

is not representative of all subspecialists for care for children. In addition, it was beyond the scope of this study to determine the capacity of fellowship programs within a given subspecialty to explore questions of supply and demand relative to fellowship positions. Fourth, the demographic characteristics available in the dataset are limited to those presented in this study, and we do not know what other specific factors were taken into account in the resident's decision to enter fellowship or choose a specific fellowship. A final limitation is that the survey is a self-report and responses were not verified.

Although more than one-half of pediatricians who entered medical subspecialty fellowship training planned to do so from the start of their internship, their selection of a specific subspecialty occurred across all 3 years of residency training. Women and AMGs in the subspecialty workforce decided on their field later in residency than men and IMGs. The timing and type of exposure to subspecialties during medical school and residency training therefore may be influential in subspecialty selection and the shaping of the pediatric workforce. Further research should explore factors influencing the choice of different subspecialties. ■

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Reprint requests: Gary L. Freed, MD, MPH, 300 NIB Room 6D21, Ann Arbor, MI 48109. E-mail: gfreed@med.umich.edu

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**Table I. Survey questions**

Questions	Response options
1. What do you intend to do after your residency?	a. Pursue fellowship training b. General pediatrics outpatient care with little or no inpatient care c. General pediatrics outpatient care with substantial inpatient care d. Hospitalist care only e. Unsure
2. Have you decided on a specific subspecialty?	a. Yes b. No
3. Have you changed your mind in the last 12 months regarding what you plan to do after residency?	a. No b. Yes, but only changed intended subspecialty field c. Yes, changed choice of generalist, subspecialist, or hospitalist career path d. Yes, I was unsure but have now decided on a career path e. Yes, I am now unsure of my postresidency plans

**Table III. Fellowship program entered by residents in the sample\***

Fellowship programs, n = 2843	%	n
Neonatology	20.2	575
Hematology–oncology	13.9	394
Critical care medicine	12.5	356
Emergency medicine	11.5	327
Cardiology	10.6	301
Gastroenterology	8.0	227
Endocrinology	6.1	175
Pulmonology	3.9	111
Infectious disease	3.6	101
Developmental–behavioral	2.5	72
Nephrology	2.3	67
Rheumatology	2.0	58
Adolescent medicine	2.0	56
Child abuse	0.8	23

\*Combined fellowship programs included allergy/immunology/rheumatology analyzed with rheumatology (n = 1); child abuse/emergency medicine placed with emergency medicine (n = 1); neonatology/genetics analyzed with neonatology (n = 1); infectious disease/hematology-oncology analyzed with hematology-oncology (n = 1); and critical care/infectious disease analyzed with critical care (n = 2).