



Funding Sources and Perceived Financial Insecurity in Pediatric Subspecialty Fellowship Programs

Pnina Weiss, MD; Angela L. Myers, MD, MPH; Kathleen A. McGann, MD; Katherine E. Mason, MD; Jennifer C. Kesselheim, MD, EdM; Geoffrey Fleming, MD; Christine Barron, MD; Ann Klasner, MD, MPH; Melvin B. Heyman, MD; Doria L. Weiss, BS; Elizabeth Mauer, MS; Linda M. Gerber, PhD; Erika L. Abramson, MD

From the Yale University School of Medicine (P Weiss), New Haven, Conn; Children's Mercy Kansas City (AL Myers), Kansas City, Mo; Duke University Medical Center (KA McGann), Durham, NC; The Warren Alpert Medical School at Brown University (KE Mason and C Barron), Providence, RI; Harvard Medical School (JC Kesselheim), Boston, Mass; Vanderbilt University School of Medicine (G Fleming), Nashville, Tenn; University of Alabama at Birmingham (A Klasner), Birmingham, Ala; University of California at San Francisco (MB Heyman), San Francisco, Calif; University of Michigan (DL Weiss), Ann Arbor, Mich; and Weill Cornell Medicine (E Mauer, LM Gerber, and EL Abramson), New York, NY

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Address correspondence to Pnina Weiss, MD, Department of Pediatrics, Yale University School of Medicine, 333 Cedar Street, PO Box 208064, New Haven, CT 06520 (e-mail: pnina.weiss@yale.edu).

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ABSTRACT

OBJECTIVE: Shortages of pediatric subspecialists exist in many fields with insufficient recruitment of new fellows. The current system of funding graduate medical education is inadequate. We examined funding sources for trainee salary and educational expenses in pediatric fellowship programs, effects of funding constraints, and program characteristics associated with financial insecurity as reported by fellowship program directors (FPD).

METHODS: We conducted a national survey of FPD between November 1, 2016 and February 9, 2017. We used multivariable logistic regression to examine the association between perceived financial insecurity, program characteristics, and funding sources for fellow salary.

RESULTS: We obtained data from 519 FPD, representing 14 different pediatric subspecialties. FPD reported that funding limitations restricted program size and educational resources in 22% and 36% of programs, respectively. Nineteen percent of FPD perceived funding of their program to be insecure. Programs with 7 or more fellows (OR .50 [95% CI .27–.90],

$P = .03$) or hospital or graduate medical education/Children's Hospital graduate medical education funding (OR .58 [95% CI .35–.96], $P = .04$) were less likely to be perceived as insecure. Conversely, programs with extramural (OR 1.74 [95% CI 1.07–2.81], $P = .03$) or division funding (OR 1.70 [95% CI 1.02–2.82], $P = .04$) or in subspecialties with more than 25% unfilled positions or programs (OR 1.86 [95% CI 1.11–3.09], $P = .02$) were more likely to be perceived as insecure.

CONCLUSIONS: Perceived financial insecurity of fellowship programs was strongly associated with program size, funding source, and unfilled positions, limiting recruitment and resources. Stable funding of fellowship programs is critical to maintain an adequate pediatric subspecialty workforce.

KEYWORDS: Funding; graduate medical education; pediatric fellowships

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WHAT'S NEW?

Fellowship program directors report that funding constraints limit fellow recruitment and resources. Programs that are smaller (≤ 6 fellows), in $\geq 25\%$ unfilled subspecialties, lack hospital/graduate medical education/Children's Hospital graduate medical education funding or use division or extramural funding are more likely to be perceived as financially insecure.

THERE ARE CRITICAL shortages in pediatric subspecialties in the United States which are likely to worsen with

the increasing number of children with chronic health problems and special medical needs.¹ Many areas of the country lack pediatric subspecialists² and pediatricians report inadequate access to many subspecialists to meet the needs of their patients.³ In some subspecialties such as pulmonology, nephrology, developmental and behavioral pediatrics and rheumatology, there is concern about inadequate recruitment of new subspecialty trainees to replace the aging, retiring physician population.^{4–7} In addition, the development of pediatric physician scientists (primarily subspecialists) to further the mission of pediatric research is threatened.⁸

Despite the need to increase the pediatric subspecialty workforce, training programs are vulnerable to elimination because of insecure funding streams. According to a recent American Academy of Pediatrics report, “The current system of funding graduate medical education (GME). . . provides insufficient financial support to address the current and future pediatrician workforce needs of the nation’s infants, children, adolescents, and young adults.”⁹ For most academic centers, the largest source of funding for GME is the Centers for Medicare and Medicaid Services (CMS).¹⁰ However, CMS only funds subspecialty trainees at the 50% level.⁹ In addition, time spent in scholarly activity, required by the American Board of Pediatrics (ABP), does not qualify for payment from CMS. At free standing children’s hospitals, an important additional source of funding is the Children’s Hospital GME (CHGME) Payment Program which must be approved by Congress annually and is, therefore, unreliable.⁹ The National Institutes of Health sponsors a limited number of institutional (T32) training grants, which has decreased over the last decade, and budget cuts would further curtail the ability to train academic pediatric subspecialists and physician scientists.¹¹

Despite the need to increase the number of subspecialists in many fields, the effect of these limitations in funding for pediatric fellowships has not previously been studied. Identification of the sources of funding and characteristics of fellowship programs associated with financial insecurity are critical to develop specific strategies to preserve the integrity of the pipeline for the subspecialty workforce. We, therefore, conducted a national survey of pediatric fellowship program directors (FPD) to examine the sources of funding for trainee salaries and educational resources, effects of financial constraints, and the characteristics of programs associated with perceived insecurity about future funding.

METHOD

We designed the survey (Appendix) after a review of the literature. We obtained content validation with expert reviews by members of the FPD Executive Committee of the Association of Pediatric Program Directors (APPD) and the APPD Research and Scholarship Task Force.¹² We pilot tested it and received feedback from select FPD and members of the APPD Executive Board. The study was reviewed by the Yale University Human Investigative Committee and was exempted. Surveys were anonymous, although FPD could submit their names and contact information.

We distributed the survey to all FPD in the United States via APPD and Council of Pediatric Subspecialties listservs between November 1, 2016 and February 9, 2017. The APPD listserv includes FPD who are members of the APPD; two reminders were sent. The Council of Pediatric Subspecialties listserv includes representatives of pediatric subspecialty organizations who forwarded the survey once; both listservs were used to gain access to the greatest number of FPD. FPD were asked to complete one survey per program. We queried the data to ensure that there were no duplicate entries. The response rate for a

subspecialty was defined as the percent of responses/total number of programs in the subspecialty as listed by the ABP. Subspecialties that were 3 year programs, accredited by the Accreditation Council for Graduate Medical Education (ACGME) and certified by the ABP were included in the data analysis.

We assessed the degree to which the FPD felt secure about funding with the question, “Indicate how secure you feel about funding for fellow salary this year and in future years,” [2016–2017,” “2017–2018,” and “2018 and later” (academic years (AY) 2017, 2018, 2019 and later)] using a slider with ordinates “very insecure (0),” “insecure (1),” “neutral (2),” “secure (3),” and “very secure (4).” A slider was used as perceived security was viewed as a spectrum to avoid forced responses to categories. After review of the data, we selected the value of ≤ 1.5 (midway between “insecure” and “neutral”) by consensus agreement as the cut point for perceived insecurity since there was no clear threshold observed. Conversely, we defined perceived security as a score ≥ 2.5 , midway between “neutral” and “secure.”

We assessed the effects of funding limitations on recruitment of fellows with the question, “In the last 2 years, have concerns about insufficient funding had an impact on the number of fellows that you have in your program?” FPD were asked to elaborate by free text. We defined limitations in access to educational resources as “No funding to cover,” in response to the question “How do you pay for the following fellowship expenses?”

Data were described as N (%) for categorical survey items and as a mean and standard deviation (SD) for continuous items. Programs were grouped by size (0–3, 4–6, 7–9 and >9 total fellows) and as hospital-based (neonatology, critical care, emergency medicine) or non-hospital-based (all others), higher revenue (cardiology, critical care, neonatology, emergency medicine) or lower revenue (all others: adolescent medicine, child abuse, developmental and behavioral pediatrics, endocrinology, gastroenterology, hematology-oncology, infectious diseases, nephrology, pulmonology, and rheumatology) and $\geq 25\%$ unfilled positions or programs in National Resident Matching Program (NRMP) 2018 appointment year (child abuse, developmental and behavioral pediatrics, endocrinology, infectious diseases, nephrology, pulmonology, and rheumatology) versus $< 25\%$ unfilled positions or programs (all others).¹³ Bivariate relationships of interest were analyzed by Chi-square/Fisher’s Exact tests. For analyses, perceived insecurity for “AY 2019 and later” was of primary interest. To determine the characteristics of programs associated with perceived financial insecurity, we first fit univariate logistic regressions modeling perceived insecurity (AY 2019 and later). Independent variables were program size, program type (hospital-based vs nonhospital-based, higher revenue vs lower revenue, and $< 25\%$ NRMP unfilled positions/programs vs $\geq 25\%$ NRMP unfilled positions/programs), and funding sources. Program size was dichotomized as 0 to 6 versus 7 or greater due to similarities in insecurity between the more granular groups and because of small cell counts.

Funding sources were defined as yes/no items representing "yes" (ever) funding across any of the fellowship years and "no" (never) funding for any of the fellowship years. The exception was Hospital or GME/CHGME funding which was defined as yes/no funding for either fellowship year 2 or 3. Independent variables were selected for multivariable modeling if significant at the .20 level from univariate model. The final model was constructed by bi-directional stepwise selection based on the Akaike Information Criterion. Similarly, univariate logistic regressions modeling security (defined as ≥ 2.5) were fit and a multivariable model was constructed in the same manner. All *P* values were two-sided with statistical significance evaluated at the .05 alpha level. Analyses were run in R version 3.4.1 (Vienna, Austria).¹⁴

RESULTS

PROGRAM CHARACTERISTICS

We obtained complete data for 14 subspecialties, including 519 fellowship programs out of a total of 802 programs listed by the ABP (Table 1). In most of the subspecialties, the response rate was high, falling below 50% in only three subspecialties – emergency medicine, nephrology, and rheumatology. Geographic distribution of responding programs included Midwest 153 (29%), Northeast 136 (26%), Southeast 107 (21%), Southwest 21 (8%), and West 81 (16%), which is similar to the distributions of fellowship programs in the United States. The average time in the role for FPDs was 7.1 (SD 6.3) years with a median of 5 years. Of the programs, 204 (39%) had 0 to 3 fellows, 162 (31%) had 4 to 6 fellows, 83 (16%) had 7 to 9 fellows, and 70 (13%) had greater than 9 fellows. Hospital-based programs were larger; 81 (58%) of hospital-based programs had 7 or more fellows, and only 71 (19%) of nonhospital-based programs had 7 or more fellows (*P* < .001). When compared to larger programs (7 or more fellows), smaller programs (0–6 fellows) were in subspecialties with $\geq 25\%$ unfilled

positions/programs (33% vs 6.5%, *P* < .001) and lower revenue (70% vs 32%, *P* < .001).

SOURCES OF FUNDING FOR PEDIATRIC FELLOW SALARIES

The funding sources of fellows' salaries for all subspecialties are shown in Figure 1. The major source of salary funding for all programs was the hospital or GME/CHGME for all levels of training, particularly during the first year, followed by the pediatric department and division. Institutional T32 training grants became an important source of salary support in the second and third years of fellowship. Most of the T32 training grants were awarded to the division, followed by sources outside the pediatric department. Extramural and other sources of funding were used in approximately 15% of programs during the first year and increased in the second and third years of training. Compared with nonhospital-based programs, hospital-based programs received more hospital or GME/CHGME funding (73% vs 57%, *P* < .001) and less T32 training grants (11% vs 25%, *P* < .001), pediatric department (27% vs 37%, *P* = .04), and extramural funding (8% vs 24%, *P* < .001). Division funding was similar between the two (35% vs 30%). When compared to larger programs (7 or more fellows), smaller programs (0–6 fellows) had less funding from hospital or GME/CHGME (57% vs 71%, *P* = .004) or the division (28% vs 39%, *P* = .03).

SOURCES OF FUNDING FOR EDUCATIONAL EXPENSES

In contrast to salary support, the majority of programs relied on the division to fund trainee-related educational expenses such as travel to meetings, research supplies, courses, advanced degrees, journals and books, licenses, society membership, and in-training exams (Fig. 2). Other important sources of funding for trainee-related educational expenses included the hospital or GME/CHGME and pediatric department. Extramural funding was also an important funding source for research supplies after the division. Research mentors were identified most often as a source of funds for research supplies. However, 12% of programs reported no funding for research supplies. In contrast, only 2% of the programs had no funding to cover travel to meetings. Funding for courses and advanced degrees was limited with no funding in 17% and 36% of programs, respectively. Ten percent of programs had no funding to cover journals and books. No funds were available for society membership and licenses in 20% and 23% of programs, respectively. Almost all programs (97%) had funds for in-training exams.

FPD REPORTED EFFECTS OF LIMITED FUNDING

Over the previous 2 years, 116 FPD (22%) reported that insufficient funding limited the number of fellows in their program; 34 had to decrease the number, while 82 were not able to increase the number as desired. While all subspecialties had at least one program that had to decrease the number of fellows; the highest number were in adolescent medicine (6; 32% of participating programs),

Table 1. Programs Participating in the Study as a Percentage of Total Programs Listed by the American Board of Pediatrics in Each Subspecialty

Program	Responded	Total Programs	% Total Programs
Adolescent medicine	19	28	68
Cardiology	39	59	66
Child abuse	20	29	69
Critical care	46	67	69
Developmental behavioral	20	39	51
Emergency medicine	30	77	39
Endocrinology	55	70	79
Gastroenterology	46	62	74
Hematology – Oncology	58	73	79
Infectious disease	44	64	69
Neonatal – Perinatal	66	99	67
Nephrology	13	45	29
Pulmonology	48	54	89
Rheumatology	15	36	42
Total	519	802	65

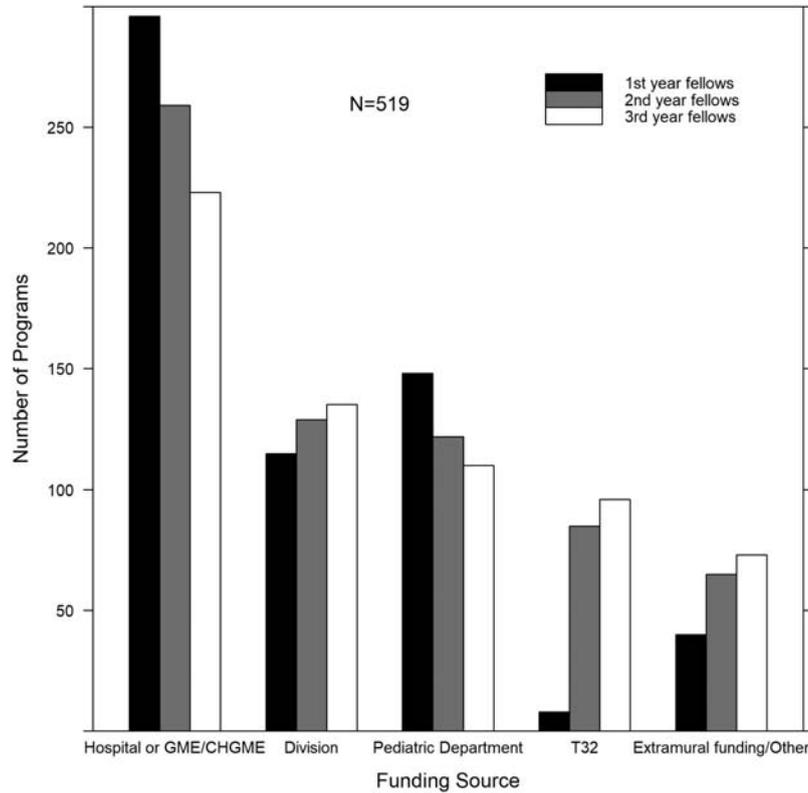


Figure 1. Funding sources of trainee salary in pediatric fellowship programs by year of training.

cardiology (5; 13%), rheumatology (4; 27%), and pulmonology (3; 6%). The subspecialties with the most programs reporting an inability to increase the number of fellows due to funding limitations were neonatal-perinatal

medicine (14; 21%), endocrinology (11; 20%), pulmonology (12; 25%), hematology-oncology (9; 16%), infectious diseases (7; 16%), rheumatology (5; 33%), and nephrology (3; 7%). In addition, another 35 FPD reported that

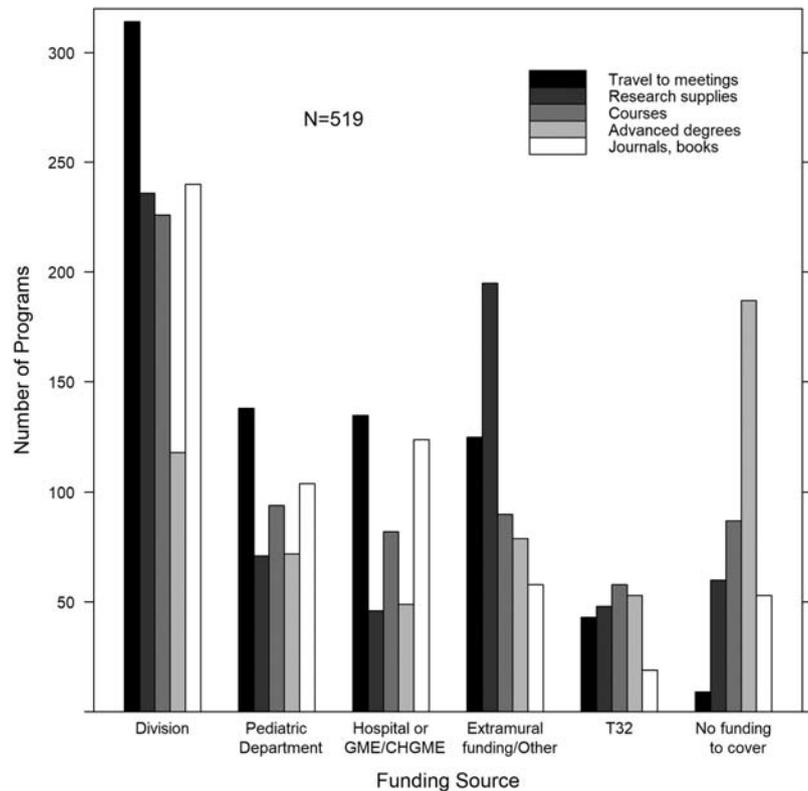


Figure 2. Funding sources of educational expenses in pediatric fellowship programs by year of training.

while insufficient funding did not limit the number of fellows, it impacted their programs adversely in other ways. In free text, they reported: challenges to finding the funding (20), recruitment (4), supporting research and fellow scholarly activity (3), advanced degrees (3), educational resources (2), supporting fellows for a fourth year (2) and increased use of international fellows because of their extramural funding (2).

PERCEIVED FINANCIAL INSECURITY

The percentage of FPD who felt insecure about funding for their programs increased over the academic years (6%, 13%, 19% for AY 2017, 2018, and 2019 and later, respectively). For AY 2019 and later, the proportion of FPDs who perceived their program as insecure is shown in Table 2. Insecurity was perceived to be higher in programs that were small (≤ 6 fellows), nonhospital-based, had division or extramural funding or $\geq 25\%$ unfilled positions/programs. Those with hospital or GME/CHGME funding or in subspecialties with higher revenue were perceived as more secure. There was no difference in perceived security with regards to funding from T32 training grants or the pediatric department.

Multivariable logistic regression analysis predicting the characteristics of programs associated with perceived financial insecurity is summarized in Table 3. Programs with seven or more fellows or those receiving hospital or GME/CHGME funding in years 2 or 3 were less likely to be perceived as insecure. Conversely, programs using

division or extramural funding or those in subspecialties with $\geq 25\%$ unfilled positions or programs in NRMP were more likely to be perceived as insecure. When a security score of ≥ 2.5 was used, similar findings were obtained for most program characteristics; programs with 7 or more fellows or hospital or GME/CHGME funding in years 2 or 3 were more likely to be perceived as secure while those with division funding were less likely to be perceived as secure.

DISCUSSION

This study underscored the high reliance on hospital or GME/CHGME funding for fellow salaries, with increasing importance of institutional training grants and

Table 3. Multivariate Models Predicting Perceived Insecurity for AY 2019 and Later*

Characteristics of Program	Insecurity	
	OR	95% CI
Number of fellows – 7 or more	0.5	[0.27, 0.90]
Subspecialty $\geq 25\%$ unfilled programs	1.86	[1.11, 3.09]
Funding sources		
Hospital or GME/CHGME (years 2 or 3)	0.58	[0.35, 0.96]
Division	1.70	[1.02, 2.82]
Extramural	1.74	[1.07, 2.81]

OR indicates odds ratio; CI, confidence interval.

*Model was adjusted for all variables in the table: number of fellows (7 or more), subspecialty $\geq 25\%$ unfilled programs, and funding from hospital or GME/CHGME, division and extramural.

Table 2. Perceived Financial Insecurity and Characteristics and Sources of Funding of Pediatric Fellowship Programs

Characteristics of Program	Insecurity, AY 2019 and Later			P
	No	Yes		
	(n = 395) N (%)	(n = 98) N (%)		
Number of fellows				0.012
	0-3	144 (36.5)	51 (52.0)	
	4-6	123 (31.1)	30 (30.6)	
	7-9	68 (17.2)	10 (10.2)	
	>9	60 (15.2)	7 (7.1)	
Hospital-based	No	279 (70.6)	81 (82.7)	0.023
	Yes	116 (29.4)	17 (17.3)	
Unfilled positions	$\leq 25\%$	309 (78.2)	59 (60.2)	<0.001
	>25%	86 (21.8)	39 (39.8)	
Revenue	High	144 (36.5)	24 (24.5)	0.032
	Low	251 (63.5)	74 (75.5)	
Funding sources				
Hospital or GME/CHGME	No	141 (35.7)	51 (52.0)	0.004
	Yes	254 (64.3)	47 (48.0)	
Division	No	284 (71.9)	59 (60.2)	0.028
	Yes	111 (28.1)	39 (39.8)	
Extramural or other	No	273 (69.1)	49 (50.0)	<0.001
	Yes	122 (30.9)	49 (50.0)	
Pediatric department	No	264 (66.8)	60 (61.2)	0.34
	Yes	131 (33.2)	38 (38.8)	
T32	No	318 (80.5)	74 (75.5)	0.27
	Yes	77 (19.5)	24 (24.5)	

extramural funding during the second and third years of training. In contrast, the division was the most common source of funding for trainee educational expenses. These data would be helpful to guide financial analyses and comparisons between subspecialties and programs by pediatric chairs, division chiefs, and subspecialty organizations, in addition to FPDs.

Despite the fact that both the ABP and ACGME report increases in the total number of subspecialty fellows, first year fellows, and fellowship programs over the last 15 years,^{15,16} almost 25% of FPD (116) reported that constraints in funding limited the number of fellows in their training programs, necessitating a decrease in 34 programs. How can this be reconciled with the ABP and ACGME tracking data? While recruitment of new fellows during that time period (as reflected by the number of first fellows) has increased by 65%, growth rates have been disproportionate among the subspecialties, with some such as adolescent medicine, endocrinology, nephrology, and pulmonology, actually demonstrating a decrease in the number of first year fellows 2012 to 2017.¹⁵ This was consistent with the results of our study with FPD in adolescent medicine, pulmonology, and rheumatology reporting most frequently that they had to decrease the number of fellows in their programs because of inadequate funding. However, other factors outside of financial limitations, such as interest in the subspecialty, likely play an important role in the decreased or negative growth rates of fellowships in some subspecialties, as reflected by the number of unfilled positions in the NRMP match. As a subspecialty, having $\geq 25\%$ unfilled (positions or programs) in the NRMP match was also an independent predictor for perceived insecurity. It is possible that having unfilled positions can actually lead to FPD concerns about future funding for their program.

The potential for vulnerability in funding for fellowship programs underscores the importance of advocacy by pediatric leaders, especially departmental chairs and division chiefs, for pediatric fellowships both nationally and within their institutions and departments. The educational leadership, FPD, and subspecialty societies should be aware of the characteristics of programs that are associated with perceived financial insecurity such as smaller size (≤ 6 fellows), $\geq 25\%$ unfilled positions or programs in NRMP match, and reliance on division or extramural funding for fellow salaries. The fact that hospital-based programs were perceived as more secure and had more hospital or GME/CHGME funding may be related to higher reimbursement to the hospital in those subspecialties.

Over one third of FPD report that there is inadequate funding for educational resources, an expense that resides most commonly in the divisions. Courses, advanced degrees, journals, books, society membership, and research supplies are important to the career development of academic subspecialists and production of high quality scholarship. Commitment of resources is critical to preserving the pipeline of pediatric physician scientists. Interestingly, despite the decrease in the number of T32 training grants, reliance on them was not associated with perceived

program insecurity. However, that may be dependent on the stage in their renewal process or by inadequate power in the study.

Preservation of the educational environment and funding of pediatric fellowship programs may require rethinking their structure. Shortening the duration of fellowships may need to be considered, if trainees can demonstrate clinical and scholarly competence with abbreviated training. While this could decrease the amount of financial support required for fellowship training, it is unclear whether this would increase the number of residents going into fellowship programs. Consolidating fellowship programs into fewer, larger training programs may be more financially efficient. The creation of separate tracks for training of clinician-educators and physician scientists may better utilize the limited educational and financial resources.

Despite threats of budget cuts to hospitals and GME/CHGME, programs with those funding sources in the second and third years were most likely to be secure. However, since GME funding is at political risk, its security will likely be challenged and advocacy for pediatric fellowships by pediatric leadership will be critical. Full GME funding at the 100% level for the duration of pediatric fellowship training, stable funding to freestanding children's hospitals, and an increase in the number of funded GME positions would be important measures to improve the financial security of fellowship training programs.⁹

LIMITATIONS

Despite the overall high response rate, it is possible that the survey did not accurately reflect the perceptions of FPD in all subspecialties, particularly in emergency medicine, nephrology, and rheumatology, which had lower response rates. It is possible that FPD perceptions of security of trainee-salary related funding did not match the true availability of funds. In addition, we did not assess other factors which could impact the quality and viability of the training programs (eg faculty stability, patient volume, research resources). The study was performed between December 2016 and February 2017 and recent political or budgetary changes may have altered funding sources or FPD perception of security. Longitudinal follow-up studies would help identify trends. The study was not designed to examine differences between or collect data on fellowship funding in free standing children's hospitals versus those that are part of university hospitals. In addition, the proportion of funding supported by each source is unclear. Finally, this study did not assess sources of funding for program administration to support the efforts of the program or associate program directors.

CONCLUSIONS

Insecure funding for fellowship training is reported by almost 20% of FPD and is strongly associated with program size and source of funding. In addition, FPD report that limited funding has a number of negative effects on the program and training environment. Addressing these key issues could help stabilize and continue the pipeline

of pediatric subspecialists that are needed to care for the increasing number of children with medically complex conditions.

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SUPPLEMENTARY DATA

Supplementary data related to this article can be found online at <https://doi.org/10.1016/j.acap.2019.06.006>.

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