



How and Why Trainees Choose a Career in Pediatric Pulmonology

A Qualitative Study

Benjamin A. Nelson¹, Jennifer A. Rama², Pnina Weiss³, and Laura J. Hinkle⁴

¹Department of Pediatric Pulmonology, MassGeneral Hospital for Children, Boston, Massachusetts; ²Department of Pediatric Pulmonology, Baylor College of Medicine and Texas Children's Hospital, Houston, Texas; ³Department of Pediatric Pulmonology, School of Medicine, Yale University, New Haven, Connecticut; and ⁴Department of Pulmonary and Critical Care Medicine, School of Medicine, Indiana University, Indianapolis, Indiana

ORCID IDs: 0000-0001-7811-9632 (B.A.N.); 0000-0001-9065-083X (L.J.H.)

ABSTRACT

Background: There is concern that inadequate recruitment of new subspecialty trainees to replace the aging physician population will lead to significant workforce issues in pediatric pulmonology. The factors leading trainees to pursue a fellowship in pediatric pulmonology are unclear.

Objective: To gain a better understanding of the decision-making process surrounding the choice to pursue a pediatric pulmonary fellowship and to provide informed recommendations to increase recruitment of new trainees.

Methods: Informed by the Social Cognitive Career Theory, eight focus groups were held with pediatric residents and fellows attending the 2019 American Thoracic Society International Conference. Questions focused on personal background, learning experiences, self-efficacy and outcome expectations, interests, and goals. Transcripts were analyzed by conventional content analysis.

Results: Fifty-six residents and fellows representing 42 different institutions participated. Responses resulted in seven major themes: 1) attractive aspects of pediatric pulmonology draw trainees to the field, 2) exposure to the breadth and scope of the field is limited, 3) mentorship is key, 4) decisions surrounding fellowship selection occur early in the second year, 5) trainees want flexibility in length and structure of fellowship, 6) financial considerations are not the driving factor in decision-making, and 7) there are inherent aspects of pulmonology that trainees may not enjoy.

Conclusion: A lack of broad exposure to pediatric pulmonology during residency results in false perceptions of the field and is a deterrent to recruitment. Improving faculty engagement, guaranteeing broad and early exposure to the field, and creating learning experiences aimed at raising self-efficacy may improve recruitment and ultimately improve the pediatric pulmonary workforce.

Keywords:

fellowship; medical education; career in pediatric pulmonology

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There are physician shortages in multiple pediatric subspecialties, which are anticipated to worsen as the number of children with chronic health problems and special medical needs increases (1). In pediatric pulmonology, there is increasing concern about inadequate recruitment of new trainees to replace the aging physician population (2–4). As a field, pediatric pulmonology has an aging workforce (4), a high percentage of unfilled fellowship positions and programs (5), and a significant percentage of international trainees who may return to their country of origin (2). In the 2019 National Resident Matching Program, 45% of pediatric pulmonary fellowship positions went unfilled (5). The number of filled fellowship positions required to ensure an adequate workforce is unknown; however, if the current status does not improve, future patients requiring subspecialty care may have difficulty accessing the physicians they need (3). Broad exposure to a subspecialty (6), mentorship (7), and financial implications for prolonging training (8) are relevant factors in the career choices of pediatric trainees. However, how and why pediatric residents reach the decision to pursue pulmonary fellowship, and which factors are most influential, are still unclear, and a

better understanding may reveal potential opportunities to enhance recruitment.

Lent's Social Cognitive Career Theory (9) (SCCT) has been used to explore career choices among medical students (10) and describes the complex interplay among the person, context, and learning experiences in influencing career interests and choices (Figure 1). Within the experiential aspect of the SCCT, high self-efficacy and favorable outcomes aligned with the trainees' expectations may reinforce interests, goals, and behaviors toward choosing a career. In methods consistent with those of prior work (10), we use the SCCT to make sense of the complexity involved in the career decision-making of a cohort of current pulmonary fellows and residents interested in pediatric pulmonology. To our knowledge, this is the first qualitative study examining the cognitive processes that lead to the career-goal attainment of becoming a pediatric pulmonologist. Our purpose is to gain a better understanding of how and why the decision to pursue pulmonary fellowship is made.

METHODS

Setting and Participants

The study was conducted at the American Thoracic Society International Conference in May 2019, enabling us to capture a national sample of pediatric residents and

Author Contributions: B.A.N. conceptualized and designed the study, coordinated and participated in data collection, performed the initial analyses, drafted the initial manuscript, and reviewed and revised the manuscript. J.A.R. conceptualized and designed the study, collected data, designed the data collection instrument, and reviewed and revised the manuscript. P.W. conceptualized and designed the study, collected data, and reviewed and revised the manuscript. L.J.H. conceptualized and designed the study, collected data, performed the initial analyses, and reviewed and revised the manuscript. All authors approved the final manuscript as submitted and agree to be accountable for all aspects of the work.

Correspondence and requests for reprints should be addressed to Benjamin Nelson, M.D., Department of Pediatrics, MassGeneral Hospital for Children, 175 Cambridge Street, Fifth Floor, Boston, MA 02114. E-mail: banelson@mgh.harvard.edu.

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This article has a data supplement, which is accessible from this issue's table of contents at www.atsjournals.org.

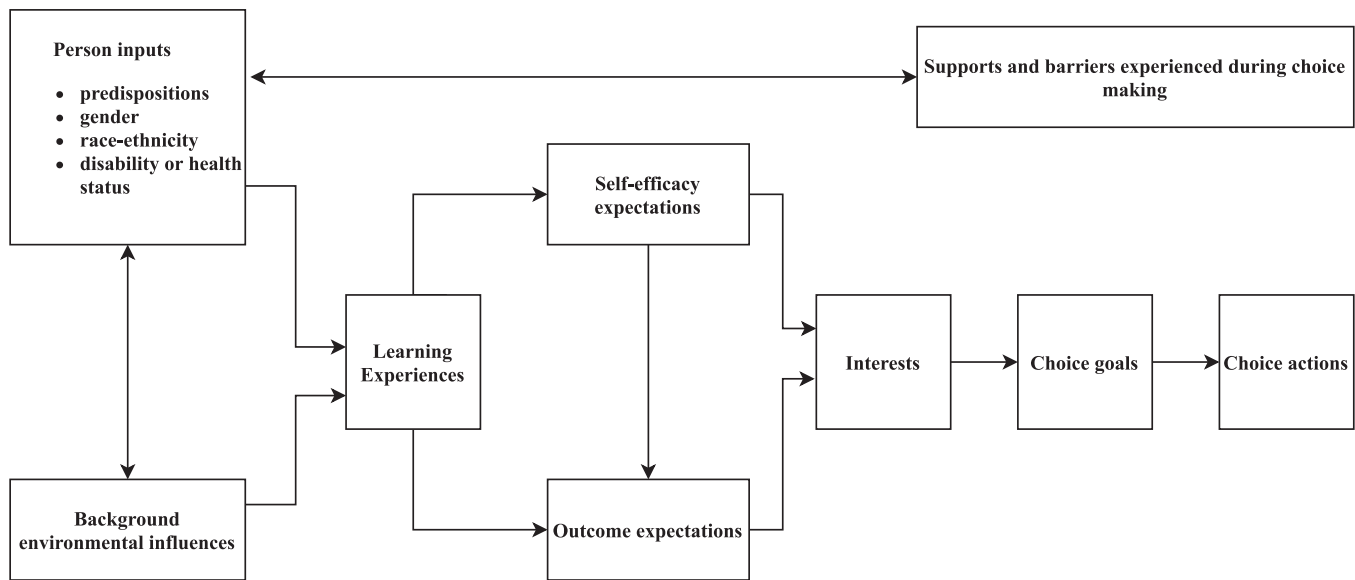


Figure 1. Model of social cognitive influences on career choice behavior. Reprinted by permission from Reference 11.

fellows from diverse institutions, varying geographic locations, and different training levels, including residents who planned on pursuing both pulmonary and critical care fellowships. All pediatric residents and fellows who attended trainee-focused educational courses at the meeting were eligible for study participation. These courses included the Pediatric Residency Development Scholarship Program for postgraduate year 1 (PGY1) and PGY2 pediatric residents who expressed an interest in pulmonology, the Resident Boot Camp for PGY3 residents who had matched into either pediatric pulmonary or pediatric critical care fellowships, and the Fellows Track Symposium for current pediatric pulmonary fellows.

The project was approved by the Partners HealthCare Institutional Review Board at Massachusetts General Hospital.

Recruitment

Trainees attending the educational courses ($N=99$) were eligible for voluntary participation. Participants were recruited via e-mail before attending the conference

and were also provided the opportunity to enroll onsite. Electronic consent was obtained before the focus groups when possible or verbally in person. An institutional review board–approved study fact sheet was provided before participation. No incentive was offered.

Data Collection

Informed by the SCCT and existing literature (6, 11–13), we developed a facilitator guide (*see* Appendix E1 in the data supplement), which was refined by an expert group of pediatric pulmonologists, study investigators, and two educational researchers. Questions focused on personal background, learning experiences, self-efficacy and outcome expectations, interests, and goals. To test the clarity and interpretation of our questions, we first conducted a pilot focus group at MassGeneral Hospital *for* Children and subsequently made minor revisions to the facilitator guide.

We conducted eight focus groups over 2 days. Each lasted approximately 60 minutes and consisted of five to nine trainees. Participants were informed of the

study question and the roles the facilitators and note-takers had at their respective institutions. The focus groups were audio-recorded, transcribed, deidentified, and reviewed for accuracy before analysis.

Each focus group was led by one of three pediatric pulmonologists who were also study investigators (B.A.N., P.W., and J.A.R.). Two are current program directors, and one is Vice Chair of Education. Each focus group had note-takers who were either residency or fellowship program directors. Neither the focus-group facilitators nor the note-takers had a current or known future relationship with trainees in their assigned group. All focus-group leaders and note-takers attended a brief training led by the study investigator (B.A.N.) to review roles, focus-group facilitation, note-taking, and the importance of maintaining impartiality.

Debriefing meetings with all facilitators and note-takers occurred immediately after each focus group, concentrating on question clarity and trainee engagement.

Data Analysis

The data from each focus group were analyzed separately using qualitative conventional content analysis. In this form of analysis, codes and themes were allowed to emerge from the raw data (14). Two of the authors (B.A.N. and L.J.H.) reviewed the verbatim transcripts from each focus group to produce the working codebook (*see* Appendix E2 in the data supplement). The emerging themes were then analyzed within the context of the SCCT.

Both members of the analysis team then recoded the first transcript using Dedoose Software (15); interrater reliability between the primary coders demonstrated a high degree of agreement ($\kappa = 0.86$).

Subsequently, using Dedoose, the first author (B.A.N.) applied the working codebook to the remaining seven transcripts. A small number of additional codes were added when new concepts emerged from the data; none were removed. The research team subsequently met to discuss the refined codes, which were collapsed into categories and, finally, major themes and subthemes.

Two trainees who participated in the focus groups served as member checkers and received preliminary findings consisting of the main themes. The trainees provided feedback and agreed that these themes accurately reflected the focus-group discussions.

RESULTS

Fifty-six pediatric trainees representing 42 different programs across the United States participated in eight focus groups: 2 groups consisted of PGY3 residents entering a pulmonary fellowship (PGY3_Pulm_1 and 2), 1 group had PGY3 residents entering a critical care fellowship (PGY3_ICU), 2 groups were comprised of PGY1 and two residents who expressed an interest in pulmonary fellowship training (PGY1–2_Pulm_1 and 2), and current pulmonary fellows made up the final three groups (PGY4–6_Pulm_1–3). Table 1 lists the characteristics of the trainees. We discuss the seven main themes below.

Theme 1: Attractive Aspects of Pediatric Pulmonology Draw Trainees to the Field

Trainees consistently mentioned attractive aspects of pediatric pulmonology, including a mix of acute and chronic patients coupled with continuity of care and building long-term relationships with families. Those who opted to pursue a

Table 1. Trainee characteristics

Characteristic	Number (%)
Participation rate	56/99 (57)
Program location	
Midwest	12 (21)
Northeast	23 (41)
South	13 (23)
West	8 (14)
Outside the United States	0 (0)
Primary program affiliation	
Academic	52 (93)
Community-based	4 (7)
Veterans affairs or military	0 (0)
Sex	
Female	36 (64)
Male	20 (36)
PGY	
1–2	16 (29)
3	16 (29)
4–6	24 (42)

Definition of abbreviation: PGY = postgraduate year.

pulmonary fellowship commented on the variety in clinical practice and the ability to see patients in the clinic and the inpatient floor, as well as the emergency department and intensive care units (ICUs). They appreciated applying respiratory physiology to clinical problems and acquiring hands-on experience with bronchoscopy.

. . . The combination of inpatient and outpatient, having that continuity from diagnosing a kiddo in the [Neonatal ICU] with cystic fibrosis and getting to follow them throughout their childhood, and then also getting to do procedures with bronchoscopy, that was really the three things that I was looking for. . .

—PGY1–2_Pulm_2

Theme 2: Exposure to the Breadth and Scope of the Field Is Limited

Trainees' current experiences in pediatric pulmonology are limited. Many are exposed to patients with pulmonary disease only while on the inpatient service, whereas those who see patients in clinic may do so only in a shadowing capacity.

. . . it was basically an inpatient rotation . . . chronic vent patients who are awaiting home nursing. . . that's kind of what they see [as] the breadth of peds pulmonary . . . no one wanted to do pulmonary, they dreaded the rotation . . . it's repelling them.

—PGY4–6_Pulm_2

Trainees consistently mentioned the lack of exposure to the most attractive aspects of the field. Some reported never having the opportunity to complete a pulmonary elective or experience bronchoscopy, which led to misconceptions about what pediatric pulmonologists do in clinical practice.

. . . at our hospital, our experience on pulmonary is only inpatient, and so you see really sick kids with really rare things, and I think some residents feel like oh, this is pulmonary . . .

—PGY1–2_Pulm_1

Theme 3: Mentorship Is Key

Trainees indicated that “mentorship” was key to determining their career path. More accurately, many described experiences with faculty who served in an advisory capacity, providing general advice without a longitudinal relationship. Having a trusted faculty member identify interested residents and explain the field was important in correcting misconceptions that arose because of inadequate exposure. Trainees noted this relationship fit into two key areas: faculty engagement and role modeling.

Given their limited exposure, trainees believed it was challenging to make an informed career decision and to fully

understand the field of pulmonary medicine. Many trainees acquired more intimate knowledge of the field by active engagement with a mentor or advisor through a quality improvement project, writing a case report, or attending a national conference.

... it was my first year of residency... I was doing the pulmonary inpatient rotation, and the attending who was on service... was like, 'Hey, the [Cystic Fibrosis] conference is coming up, and I think you should go.'... I had never really said anything about pulmonary prior to that, but this attending just showed a lot of interest in me and my future and got excited about getting me excited about pulmonary, and that made a big impression on me ...

—PGY3_Pulm_2

Faculty who taught on rounds, attended morning report, and gave lectures on a regular basis were viewed as positive role models. Several participants chose to pursue a pulmonary fellowship on the basis of these specific interactions, rather than on the basis of the traditional exposure received while on the pulmonary service.

I got to work with a variety of the faculty... they were... incredibly engaged with teaching me and making sure that I got to go to CF clinic and bronchoscopies and I spent time in pulmonary hypertension clinic and vent clinic and high risk asthma clinic... I felt like there was a lot of investment in my education and in my interest in pulmonary... I think for me, having the opportunity to do the elective, but then also the faculty engagement were two key critical pieces.

—PGY1-2_Pulm_2

Theme 4: Decisions Surrounding Fellowship Selection Occur Early in the Second Year

Most trainees decided to apply for a specific fellowship during their second year of residency. They believed strongly that exposure to pulmonology must occur

during intern year to allow enough time to make an informed career decision.

... I had been completely set on endocrine... and then I did my pulmonary rotation, and I just fell in love with it, and I did it pretty [early] on during intern year which was helpful because it was a big switch for me.

—PGY1-2_Pulm_1

Theme 5: Trainees Want Flexibility in Length and Structure of Fellowship

Participants consistently questioned the rationale for a uniform duration of fellowship training regardless of career path. They shared that some of their colleagues indicated 3 additional years of postresidency training was a significant barrier to pursuing fellowship. They speculated that increased flexibility in fellowship training duration might increase interest in the field.

I think that another 3 years is a long time, and it's a lot of training. It's a long time out of your life.

—PGY1-2_Pulm_1

Trainees suggested that track options within training may allow customization based on career interest and increase interest in the field. Trainees questioned why a scholarly project was mandatory for all fellows. Instead, they suggested that a 2-year clinical fellowship be offered for those without a significant research interest and a 3-year fellowship for those interested in obtaining a strong research background. In this model, trainees could decide after the first year of training whether to pursue a 2-year clinical fellowship, a 3-year research fellowship, or use a third year to complete another fellowship, such as sleep medicine.

I think it's good to know how research is done... , but I don't think it's necessarily worthwhile to make everyone use 18 months of their lives to do something that they don't really have an interest in doing

—PGY3_ICU

They recognized that many residents do not have prior research experience and would be unable to make an informed decision about career track at the end of residency, and suggested it may be valuable to spend time exploring various types of research during the first year of fellowship.

I thought I hated the research when I started, but now I really like it, so I probably would have started with a 2-year path, but then if I had the option to extend, I might have.

—PGY4–6_Pulm_1

Theme 6: Financial Considerations Are Not the Driving Factor in Decision-Making

Finances did not play a significant role when trainees were deciding to pursue fellowship, including those who chose a more financially lucrative field such as critical care. Trainees commented that they have already made the decision to forgo some future earnings when they chose the field of pediatrics.

At this point, I figured I've been training for so long, I may as well do something I like.

—PGY3_Pulm_2

Many, but not all, trainees were aware that pursuing a pediatric pulmonary fellowship may have a negative impact on future potential earnings compared with other subspecialties or even primary care. However, their love of the specialty outweighed the adverse financial impact.

Theme 7: There Are Inherent Aspects of Pulmonology That Trainees May Not Enjoy

Trainees pursuing critical care commented that they preferred shift work and did not enjoy seeing patients in the clinic. In contrast, pulmonary applicants

and current fellows believed that fostering longitudinal relationships with patients was a highlight.

I knew I didn't really want to do outpatient medicine because that would be too frustrating for me.

—PGY3_ICU

DISCUSSION

This is the first qualitative study to gain insight into how trainees decide to pursue a pediatric pulmonary fellowship. Previous studies focused on identifying important factors, or the “what” of recruitment (6–8, 12, 13), whereas in this study, we address the “how” and “why” and place our results in the context of the SCCT.

Qualitative data revealed major themes, which led to specific action items that may increase recruitment, including meaningful faculty engagement, broad and early exposure, and learning experiences aimed at raising self-efficacy.

Self-efficacy describes the belief in one's capabilities to successfully perform a task or achieve a goal. It is a significant driving force to explain why residents make career choices, and our results are consistent with four sources that enhance self-efficacy (16): performance accomplishments, vicarious learning, social persuasion, and physiologic cues (Figure 2, box 5). In contrast, exposure to chronic inpatients or passive learning by shadowing were experiences that led to low self-efficacy and the perception of undesirable outcomes. This creates the potential scenario in which trainees who might otherwise have been inclined to choose a pulmonary fellowship pursue other fields.

The SCCT describes the complex interplay among the person, their background and immediate environments, and their learning experiences. In our

context, the background environment encompasses contextual and environmental influences, including the availability of role models and early exposure to pulmonary medicine (Figure 2, box 2), whereas the immediate environment describes supports and barriers during the active decision-making process (Figure 2, box 3).

According to the SCCT (17), individuals are more likely to translate their career interests into goals (become a pediatric pulmonologist) and their goals into actions (apply for fellowship) (Figure 2, boxes 7–9) when they feel capable of successfully achieving a goal (16) (Figure 2, box 5) and when positive results are expected (Figure 2, box 6). Therefore, in this study, we underscore the importance of shaping a positive environment for trainees and creating learning experiences that raise self-efficacy and produce valued outcomes.

Many studies have addressed contextual and environmental influences, citing that mentorship (7, 18) and early exposure (13, 19, 20) may strengthen interest in the field, whereas duration of fellowship (21, 22) and downstream effects of limited institutional funding might endanger the pulmonary workforce (23). To gain a better understanding of how and why these contextual and environmental influences affect trainees' career decisions, we analyzed our data in the context of the SCCT.

Mentorship

Faculty played key roles by shaping positive learning experiences, serving as role models and advisors, and clarifying misconceptions. To this end, faculty development focused on how to be an effective advisor or role model, how to teach today's learners in the clinical learning environment, and how to balance

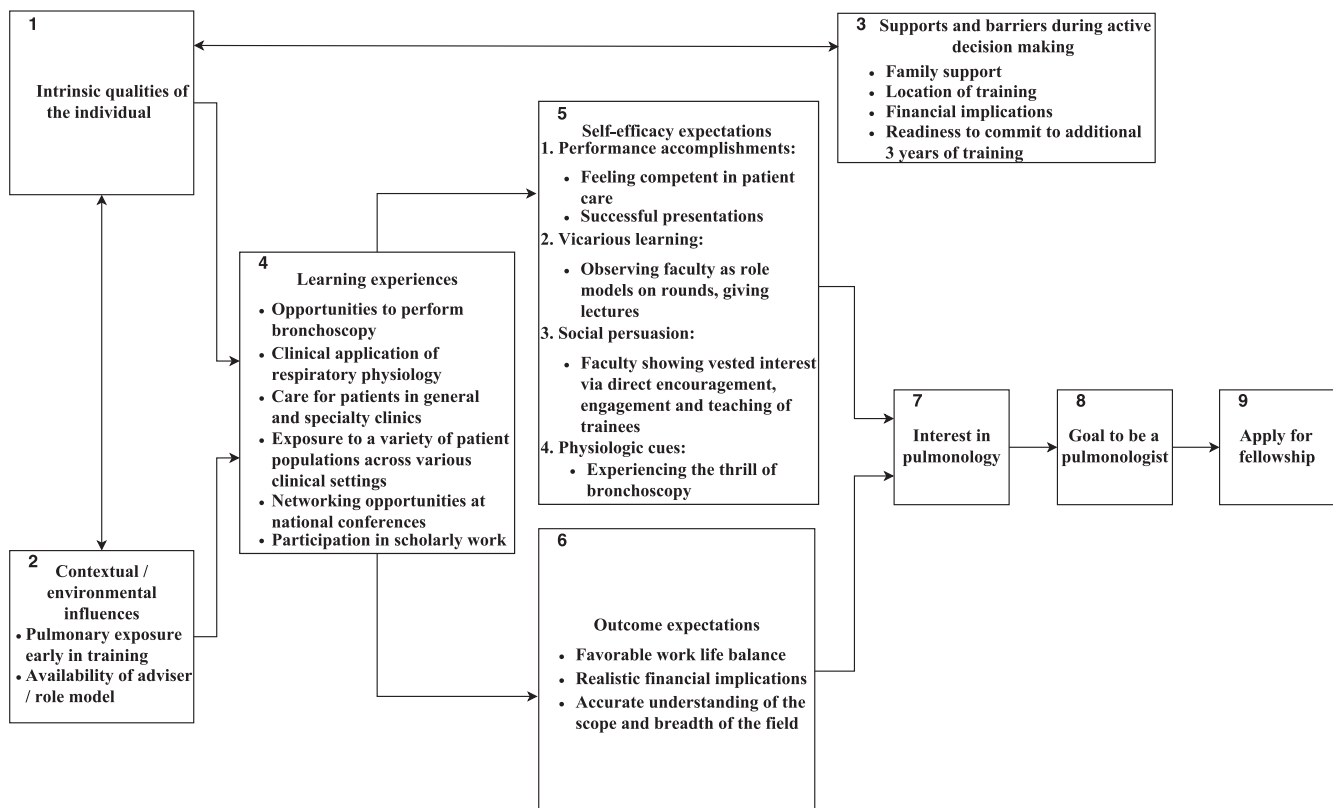


Figure 2. Social Cognitive Career Theory applied to trainees pursuing a pulmonary fellowship. Adapted by permission from Reference 11.

competing obligations to allow increased engagement with trainees. Our results build on existing studies describing the positive association between subspecialty mentors and career choices (7) by highlighting practical tips for faculty to add to their mentoring armamentarium. Identifying interested residents, encouraging them, and giving them learning opportunities in any of the four sources of self-efficacy proved to be pivotal points toward pursuing a pulmonary fellowship among our cohort of trainees.

Exposure

Because of work-hour restrictions and other external requirements, pediatric pulmonary exposure is often limited in scope and not timely enough for many residents to consider the field as a career choice. In findings similar to those of previous resident surveys (12), we found that bronchoscopy and respiratory physiology are examples of positive learning experiences. However, our data show that these learning experiences must be provided early in training and structured to raise self-efficacy. Currently, the most common exposure trainees receive, caring for chronic inpatients, has been described as a less attractive aspect of the field. This precludes trainees from experiencing the full breadth of pulmonary medicine, thus paving the way for misconceptions to form. Consistent with what has been shown in previous work (13), our cohort, including those who chose to pursue critical care, decided on specific fellowship training during their second year of residency, underscoring the importance of early exposure.

Trainees in our cohort cited that early exposure during intern year, hands-on experience tailored to their skills, participation in scholarly activity, and effective advising from faculty, including teaching on rounds and participating in morning report, helped them

overcome these inherent deterrents to choosing a pulmonary fellowship.

Duration of Fellowship

Consistent with what has been shown in prior work (21, 22), our cohort, including those who chose to pursue critical care, desired flexibility in the duration of fellowship training. Specifically, committing to 3 additional years of training and the requirement to complete a scholarly project were reported as deterrents. Flexibility in the duration of training and offering track options may overcome trainees' initial hesitation when considering fellowship. The option to pursue a 2-year clinical fellowship, a 3-year research fellowship, or use a third year to complete another fellowship, such as a fellowship in sleep medicine, may increase recruitment and warrants further research. Of note, shortening the duration of fellowship is not easily achievable, as it requires all subspecialty programs and stakeholders to achieve consensus. In addition, there is concern that this may adversely impact the training of physician investigators in the field.

Financial Implications

Although most studies have concentrated on contextual and environmental influences, a few have addressed the immediate environmental influences on career choices, such as personal finances (8, 21, 22). We found that financial implications did not serve as an impediment to pursuing pulmonary fellowship training in our cohort, supporting data that most residents are not likely to report salary as the primary motivating factor for entering fellowship (21, 22).

Strengths and Limitations

This study has limitations as participating trainees who attended a national conference

may be inherently different from those who did not or could not attend. Furthermore, trainees may have refrained from sharing all opinions in a focus-group setting, as program directors were the facilitators. We had the opportunity to collect data from residents entering a critical care fellowship to understand why trainees do not choose pulmonology. However, critical care is a nonambulatory subspecialty, and the main reason these trainees did not choose pulmonology was a lack of interest in

ambulatory medicine. To better answer this question, trainees pursuing subspecialties such as gastroenterology or allergy–immunology may have been more informative, but we were limited by which trainees we could access.

Future studies should focus on the financial implications of prolonged training, fellowship track options, the optimal duration of fellowship, and why trainees choose other career paths. Specifically, examining motivating factors of trainees

Table 2. Recommendations to increase recruitment in pediatric pulmonology on the basis of qualitative themes aligned with the SCCT

SCCT Category	Recommendations
Contextual and environmental influences	<ul style="list-style-type: none"> • Ensure adequate exposure (e.g., dedicated pulmonary elective) during internship • Broad exposure allowing trainees to weigh all aspects when making career decisions • Provide faculty development: teaching skills, advising, coaching, mentoring, and time management
Learning experiences	<ul style="list-style-type: none"> • Hands-on exposure to bronchoscopy • Apply respiratory physiology to patient care • Active involvement in ambulatory clinics • Expose to a variety of patients and clinical settings • Limit inpatient exposure during elective rotations • Identify interested trainees early in training, engage them in scholarly work, and support their attendance at national conferences
Self-efficacy	<ul style="list-style-type: none"> • Tailor electives to individual resident's goals • Avoid shadowing; encourage active participation in patient care • Faculty should be active participants in residency curriculum (e.g., teach on inpatient rounds, attend morning report, and give regular lectures)
Outcome expectations	<ul style="list-style-type: none"> • Expose fellows to research during their first year of training • Discuss salary differences between specialties with residents • Faculty should meet with residents to dispel misconceptions about the field and explain the work–life balance of a pulmonologist • Explore different track options to align with career interests: <ul style="list-style-type: none"> • 2-yr clinical fellowship • 3-yr research fellowship • Sleep fellowship as third year of training

Definition of abbreviation: SCCT = Social Cognitive Career Theory.

who considered pulmonology but opted against it would provide invaluable insight. In our efforts to understand the processes by which pediatric trainees choose to pursue a pulmonary fellowship, we identified what trainees perceive to be unique and attractive characteristics of our field and also gained insight into the timing, duration, and types of learning experiences trainees should receive. We identified opportunities to promote pediatric pulmonology as a career choice and developed an understanding of how career behaviors are situated within a larger context of other influences. Equipped with this understanding, we make informed recommendations to increase pulmonary recruitment (Table 2).

Conclusions

Modifiable factors impacting the decision to pursue a pediatric pulmonary fellowship

include meaningful faculty engagement, broad and early exposure, and learning experiences aimed at raising self-efficacy. Concentrating efforts in these arenas, as aligned with the SCCT, may help ensure an adequate workforce in pediatric pulmonology and move us closer to meeting the respiratory needs of children.

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