

# Differences in Lifetime Earning Potential for Pediatric Subspecialists

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abstract

**OBJECTIVES:** Our 2011 report, reflecting data from 2007–2008, demonstrated that, for many pediatric subspecialties, pursuing fellowship training was a negative financial decision when compared with practicing as a general pediatrician. We provide an updated analysis on the financial impact of pediatric fellowship training and model interventions that can influence the results.

**METHODS:** We estimated the financial returns a graduating pediatric resident might anticipate from fellowship training followed by a career as a pediatric subspecialist and compared them with the returns expected from starting a career as a general pediatrician immediately after residency. We evaluated the potential effects of eliminating medical school debt, shortening the length of fellowship training, and implementing a federal loan repayment program for pediatric subspecialists. We compared the financial returns of subspecialty training in 2018–2019 to those from our previous report.

**RESULTS:** Pursuing fellowship training generated widely variable financial returns when compared with general pediatrics that ranged from +\$852 129 for cardiology to –\$1 594 366 for adolescent medicine. Twelve of 15 subspecialties analyzed yielded negative financial returns. The differences have become more pronounced over time: the spread between the highest and lowest earning subspecialties widened from >\$1.4 million in 2007–2008 to >\$2.3 million in 2018–2019. The negative financial impact of fellowship training could be partially ameliorated by shortening the length of training or by implementing pediatric subspecialist specific loan repayment programs.

**CONCLUSIONS:** This report can be used to help guide trainees, educators, and policy makers. The interventions discussed could help maintain an adequate and balanced pediatric workforce.



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Drs Catenaccio, Rochlin, and Simon conceptualized and designed the study, collected and analyzed the data, and drafted the manuscript, including all revisions; and all authors approved the final manuscript as submitted and agree to be accountable for all aspects of the work.

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**WHAT'S KNOWN ON THIS SUBJECT:** A previous report conducted by using 2007–2008 data revealed that, compared with starting practice as a general pediatrician after 3 years of residency, pursuing an additional 3 years of subspecialty fellowship training was often a negative financial decision.

**WHAT THIS STUDY ADDS:** We use updated data from 2018–2019 and include additional subspecialties in this study. We compare results from 2007 to 2018 and model interventions that impact the financial results and might help maintain a balanced pediatric workforce.

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In 2011, we published the first study examining the financial returns of pediatric subspecialty fellowship training using compensation data from July 2007 to June 2008.<sup>1</sup> The study demonstrated that, compared with starting practice as a general pediatrician after 3 years of residency, pursuing an additional 3 years of subspecialty fellowship training was often a negative financial decision. In the intervening decade, the financial landscape has evolved, but medical students and residents face similar challenges, including increasing educational debt. For medical students graduating in June of 2008, 87% had educational debt and the mean debt burden was \$158 061. In June of 2019, 73% of graduating medical students had educational debt, but the mean debt burden had increased to >\$200 000.<sup>2</sup>

In this study, we performed an updated analysis of the financial returns of pediatric fellowship training using the most recent compensation data available from large surveys of pediatric physicians. We included additional subspecialties. We evaluated the impact of eliminating medical school tuition, of shortening the length of fellowship training, and of implementing a federal loan repayment program for pediatric subspecialists. Finally, we compared the results of the current analysis with our previous report to assess trends in the compensation patterns of pediatric subspecialists.

## METHODS

In our current analysis, we used methods similar to those in the 2011 report,<sup>1</sup> which are resummarized below with updates reflecting the 2018–2019 data. Using information on fellowship stipends, subspecialty-specific compensation, general pediatric compensation, and educational debt, we created a model that estimated age-specific net income

for general pediatricians and for pediatric subspecialists over a working lifetime. In addition to the 11 subspecialties analyzed in the previous report, we included the subspecialties of hospitalist medicine, which was approved as a board certified subspecialty by the American Board of Pediatrics in 2014,<sup>3</sup> as well as neurology, allergy and immunology, and adolescent medicine. As in our previous report, we used the net present value (NPV), a standard financial technique to analyze the value of different investments, to compare age-specific net incomes. This process allowed us to estimate the financial returns that a graduating pediatric resident might expect from fellowship training followed by a career as a subspecialist and to compare these with the returns that might be anticipated from starting a career as a general pediatrician directly after residency. Because we used publicly available aggregated and deidentified data, this study did not meet the criteria for human subject research and did not require institutional review board approval.

### Stipend and Compensation Data

Mean stipend and compensation information were obtained for the academic year of July 2018 to June 2019.

To estimate residency and fellowship stipends for each postgraduate year (PGY) from PGY1 to PGY6, we used the annual Association of American Medical Colleges (AAMC) Survey of Resident/Fellow Stipends and Benefits.<sup>4</sup>

For postfellowship subspecialty-specific compensation estimates, we used information from the AAMC's annual Medical School Faculty Salary Survey report.<sup>5</sup> The data represented mean actual annual total compensation, including bonus, before taxes and retirement and fringe benefits, of full-time faculty affiliated with Liaison Committee on Medical Education–accredited medical schools.

We used AAMC compensation data for subspecialists because the majority practice in academic affiliated environments.<sup>6–8</sup> We assumed that, after fellowship, graduates worked as assistant professors for 7 years, then as associate professors for 7 years, and then as full professors. Compensation by rank data were used to generate net income streams that could be used for calculation of the NPV for each subspecialty.

To estimate compensation by years in practice for general pediatricians, we used the Medical Group Management Association Physician Compensation and Production Survey,<sup>9</sup> which targets single and multispecialty medical group practices. Similar to the AAMC data, the Medical Group Management Association dataset reports mean actual annual total compensation, including bonus, before taxes and retirement and fringe benefits. We used data for general pediatricians in private practice because the majority of recently trained general pediatricians enter private practice.<sup>10</sup> However, we also included AAMC data for general pediatricians as a representation of academic pediatric practices.

### Educational Debt

We used data from the AAMC Medical School Graduation Questionnaire to estimate mean educational debt of those graduating medical school at the completion of the 2018–2019 academic year.<sup>2</sup> We assumed that loan repayment was deferred during residency and fellowship, then was repaid over 25 years, and that the accrued interest was capitalized once training was completed. We used the 2018–2019 annual interest rate on federal Stafford educational loans of 6.6%,<sup>11</sup> compared with a rate of 6.8% at the time of our previous publication.<sup>1</sup>

### Other Assumptions for the Financial Modeling

We assumed no time was taken off between high school, college, medical

school, residency, fellowship, and employment. We assumed a standard fellowship was 3 years long. Of note, pediatric neurology is often a combined 5 year program, but many graduating neurologists pursue an additional 1 year of fellowship training in areas such as epilepsy. We assumed graduating residents or fellows worked full-time for an equivalent number of hours per year until retirement at age 65.

## NPV

NPV is a financial concept that addresses the fact that income obtained today is more valuable than future income, because today's income can be invested at an interest rate to yield an immediate return. It allows for the comparison of different income streams over time by discounting them back to the present at a constant discount (or interest) rate. The formula for the NPV is:

$$\sum_{t=1}^n \frac{NI_t}{(1+r)^t}$$

where NI is the annual net income, which we defined as annual compensation less annual debt-repayment costs.<sup>12</sup> The formula takes the sum of the annual net incomes over time (from  $t = 1$  to  $n$  years) and discounts them back to the present at a discount rate ( $r$ ), which was set at 2.5% on the basis of the discount rate in July of 2018.<sup>13</sup> From this calculation, one is able to compare the current value of future net income streams. At the time of our previous publication, the discount rate was closer to 5%.

We calculated the Lifetime Relative NPV, which we defined as the present value of the net income generated from a career in 1 of 15 different pediatric subspecialties or in academic general pediatrics relative to that generated from a career in private practice general pediatrics over the working lifetime. This calculation incorporated the concept

of opportunity cost, which represents the value of an option that must be foregone to pursue another option. The opportunity cost of fellowship training was the additional net income a graduating pediatric resident could have earned had he or she started to work immediately after residency as a general pediatrician in private practice.

## Sensitivity Analyses

We performed several sensitivity analyses to model how different policies might impact the Lifetime Relative NPVs. The first evaluated the potential impact of medical school without tuition, a program that has received substantial interest recently.<sup>14</sup> For this model, we assumed that tuition was free for students regardless of future career plans; the mean educational debt at the start of residency was therefore set to \$0 for everyone whether they chose to pursue fellowship training or enter general pediatric practice. While some educational debt includes loans taken out prior to medical school, the vast majority of debt for residents is from medical school.<sup>2</sup> The second analysis examined the impact of decreasing the length of fellowship training from 3 years to 2 years. Finally, we analyzed the effect of a loan repayment program for pediatric subspecialists. The 2010 Affordable Health Care Act included a pediatric subspecialist loan repayment program, which was never implemented. However, in March 2020, the Coronavirus Aid, Relief, and Economic Security Act reauthorized the program.<sup>15,16</sup> Similar to the 2010 program, the 2020 bill allocates up to \$35 000 per year in loan repayment funds for up to 3 years to individuals employed as pediatric subspecialists. For the purposes of our model, we assumed that the funds were granted during the first 3 years of practice as a subspecialist.

## Comparison of NPV in 2007 and 2018

To assess trends in lifetime earning potential for pediatric subspecialists

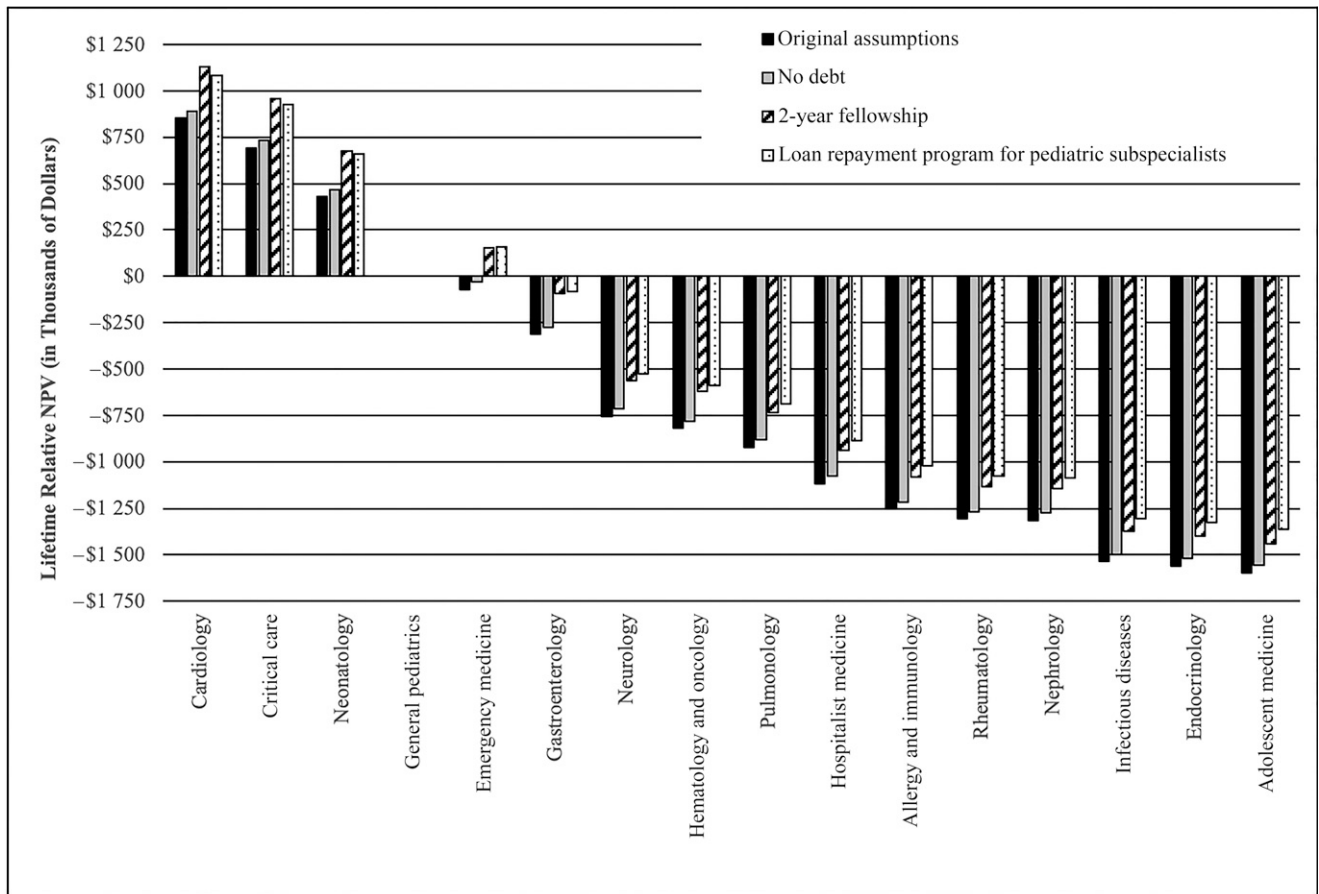
since our original report, we compared the Lifetime Relative NPV for each subspecialty in 2007 and 2018. To calculate the value of the Lifetime Relative NPV from 2007 in 2018 dollars, the 2007 data were adjusted for inflation as follows:

$$\text{Lifetime Relative NPV}_{2018} = \text{Lifetime Relative NPV}_{2007} \left( \frac{CPI_{2018}}{CPI_{2007}} \right)$$

where CPI is the consumer price index.<sup>17,18</sup>

## RESULTS

Our study included data from 7056 pediatric subspecialists, 2025 academic general pediatricians, and 1082 private practice general pediatricians. Figure 1 displays the Lifetime Relative NPVs of 15 pediatric subspecialties relative to private practice general pediatrics and is an illustration of the present value of the difference in lifetime net income between a pediatric subspecialist and a general pediatrician in private practice. As such, the Lifetime Relative NPV of general pediatrics is \$0. The solid black bars represent the Lifetime Relative NPV on the basis of our original assumptions: average debt burden at the start of residency, pediatric fellowship of 3 years, and no pediatric subspecialty-specific loan repayment program. In this scenario, the largest Lifetime Relative NPV is seen in cardiology, which yields a positive \$852 129 financial return relative to general pediatrics over the working lifetime. Positive returns are also seen for critical care and neonatology, mirroring our previous findings.<sup>1</sup> Careers in the other 12 subspecialties generated negative financial returns relative to general pediatrics ranging from negative \$69 637 for emergency medicine to negative \$1 594 366 for adolescent medicine. Stated differently, to make the decision to forego a career in general pediatrics and enter



**FIGURE 1**  
Lifetime Relative NPVs.

fellowship training in adolescent medicine financially neutral, a graduating third-year pediatric resident would need to be given a lump sum payment of \$1 594 366.

The comparison between private practice and academic general pediatrics (not shown in Fig 1) demonstrates a Lifetime Relative NPV of negative \$819 024 for an academic general pediatrician, falling between neurology and hematology/oncology.

The second bar for each subspecialty (gray fill) shows the potential effect of eliminating medical school debt through free tuition. This intervention did not make a substantial difference in the Lifetime Relative NPVs because it was applied to subspecialists and

general pediatricians alike. However, this did increase the NPV generated from careers in both general pediatrics and the pediatric subspecialties by an average of \$507 049.

The third bar for each subspecialty (striped fill) shows the impact of reducing the length of fellowship training from 3 years to 2 years. While there is no change in the compensation of a general pediatrician, pediatric subspecialists experience an increase in compensation associated with completing training 1 year earlier and earning a greater level of compensation for 1 extra year over the course of their careers. In addition, shortening fellowship decreases the interest on educational

debt that accrues during training and thereby reduces the annual debt-repayment costs. This scenario enhanced the financial returns for cardiology, critical care, and neonatology, reversed the relationship for emergency medicine, and brought the financial returns of the other 11 subspecialties closer to that of general pediatrics.

Finally, the fourth bar for each subspecialty in Fig 1 (polka dot fill) shows the potential effect of the loan repayment program for pediatric subspecialists. Annual debt-repayment costs are reduced for subspecialists, but not for general pediatricians. Of our 3 sensitivity analyzes, the loan repayment scenario was, in general, the most impactful in terms of reducing the gap between

general pediatrics and the subspecialties.

The comparison between the Lifetime Relative NPV in 2007 (black bars) and 2018 (gray bars) for the 11 subspecialties included in our first report is shown in Figure 2.<sup>1</sup> This figure demonstrates that the differences between general and subspecialty pediatrics have become more pronounced over time with most subspecialties having moved lower relative to general pediatrics. For example, the Lifetime Relative NPV of endocrinology has decreased by an additional \$500 000 between 2007 and 2018. Furthermore, the spread between the highest and lowest Lifetime Relative NPVs has widened: in 2007 the gap between the Lifetime Relative NPV of

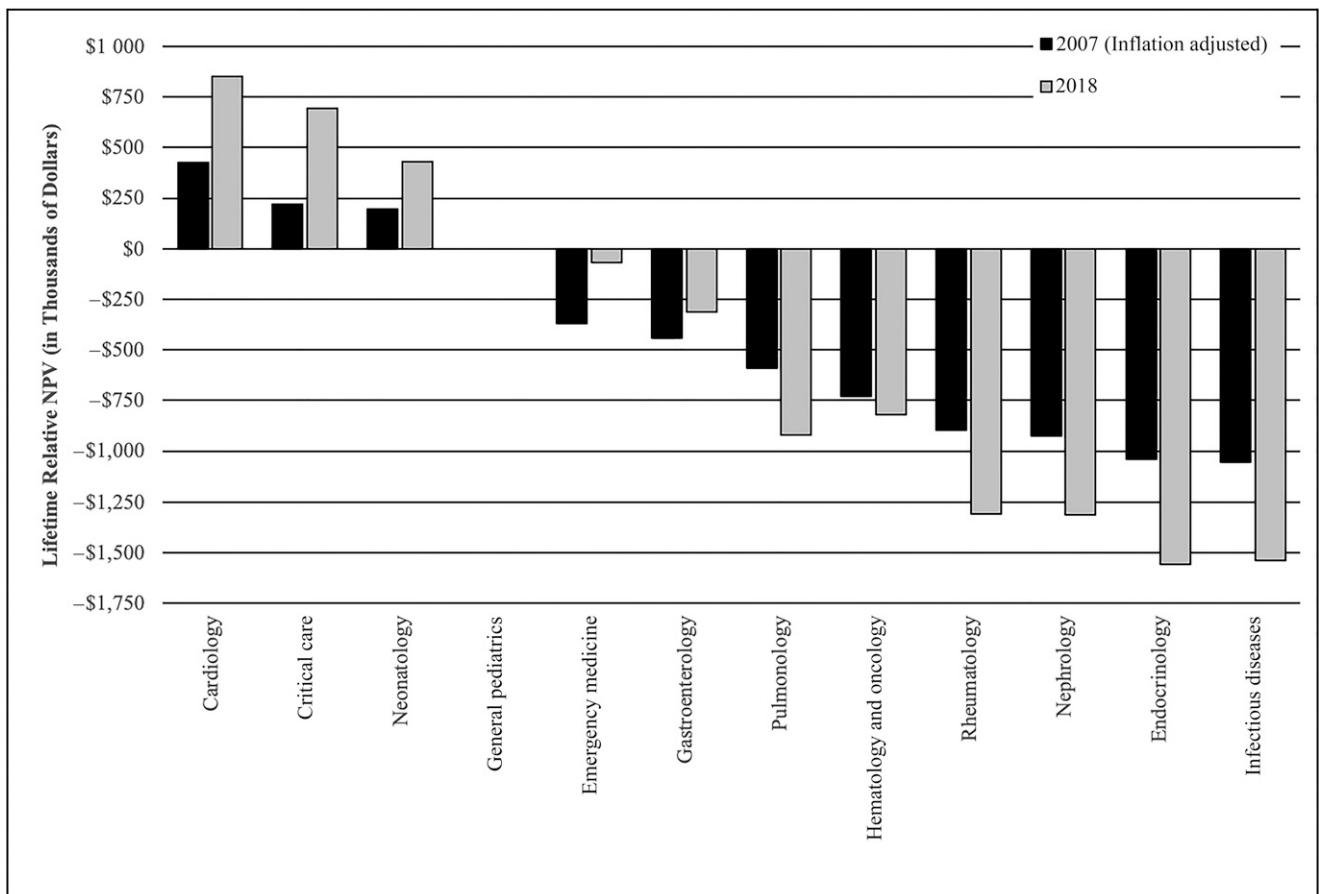
cardiology and infectious diseases was \$1 478 875; by 2018, it had increased to \$2 388 323.

## DISCUSSION

We used standard financial techniques to estimate the financial returns of fellowship training in pediatrics and to compare them to those generated by a career in general pediatrics. An investment in a pediatric fellowship generated variable returns depending on the subspecialty. Similar to previous findings, pursuing fellowship in most of the subspecialties analyzed was a negative financial decision. Moreover, we found that the differences in fact have worsened over time, both between general pediatrics and the pediatric

subspecialties and between the subspecialties themselves.

These findings are the result of several patterns in financial compensation for pediatricians. Most pediatric subspecialists do not experience financial benefits from additional training because there is often no relative increase in compensation after training compared with that of a general pediatrician. Moreover, the delays in garnering increased compensation after training and in repaying educational debt contribute to the negative career long financial impact of fellowship training. These differences cannot be attributed to the differences between private and academic practices. Even if we had based our Lifetime Relative NPVs on



**FIGURE 2**  
Lifetime Relative NPVs in 2007 vs 2018.

academic pediatrics instead of private practice pediatrics, the general pattern would have been the same. In a trend that is seen across all of medicine, inpatient and procedure-oriented subspecialties (such as cardiology, critical care, and neonatology) tend to be better compensated than outpatient- and cognitive-based subspecialties (such as infectious diseases, endocrinology, and adolescent medicine). This pattern is replicated even for the new subspecialties that have emerged over the past decade, such as hospitalist medicine. Although there are many benefits to the enhanced training in these subspecialties, they were previously areas that were open to general pediatricians. If additional areas of pediatrics become board certified subspecialties in the future (eg, complex care pediatrics), we can expect similar financial outcomes.

Our results may be helpful to policy makers. The pediatric subspecialty workforce continues to be insufficient to meet the needs of children with complex medical conditions, particularly in rural areas.<sup>7</sup> The differences in financial returns may have a significant effect on the distribution of physicians, with fewer graduating pediatric residents choosing to pursue careers with longer training and lower returns. Understanding these forces can lead to targeted interventions to balance physician workforce distribution. Eliminating debt can make both general pediatrics and pediatric subspecialties more attractive overall; this is significant as pediatrics as a field generates lower compensation compared with most other medical specialties. Decreasing the length of fellowship training from 3 years to 2 years or considering models of combined and shortened residency and fellowship training also may be potential interventions to encourage

subspecialization. However, shortened training may lead to concerns regarding clinical competence and whether this intervention would impact the rates of subspecialization is unclear. Finally, the federal loan repayment program for pediatric subspecialists could have a substantial impact on the financial returns of fellowship training and increase the economic attractiveness of many of the subspecialties.

Our results may also be helpful to physicians in training and to those educating future physicians. This study only captures the financial considerations of fellowship training and does not address the myriad of nonfinancial considerations for career choice including intellectual stimulation, desire to work with specific patient populations, interest in specific diseases or organ systems, opportunities for research and teaching, and so on. Fellowship training remains a popular choice for many pediatric trainees,<sup>19</sup> and regardless of the decision to subspecialize, surveys of pediatricians demonstrate that most are satisfied with their careers.<sup>20</sup> Trainees can use this analysis as a framework to understand the financial effects of additional training as well as to understand the impact of educational debt. Medical educators could consider including basic financial concepts as part of medical school and residency curricula to increase financial literacy among physicians.

There are several reasons our results may not match actual financial returns. Our results are dependent on the assumptions inherent to our models. For example, we assumed that pediatric subspecialists were eligible for promotion after 7 years at a particular rank. However, if promotion occurred later, those in the subspecialties would experience even lower financial returns. This may be the scenario for many women,

particularly in academic medicine, where promotion to a higher academic rank tends to happen later and less frequently than for men.<sup>21</sup> Conversely, as in our previous publication, we assumed that debt would be repaid over a 25 year period. However, since 2011, several federal income based loan repayment programs have become available, which in theory might increase the relative net income of some of the pediatric subspecialties.<sup>22</sup> In general, alternative assumptions that would prolong training or that would delay debt-repayment or salary increases, such as taking a gap year or placing debt into forbearance for financial hardship, would negatively impact the relative returns of fellowship training. Conversely, assumptions that would enhance salary, such as getting promoted more quickly or having a higher proportion of practitioners in private practice, as can be seen with certain subspecialties like neonatology or critical care, would positively impact the relative returns of fellowship training. Additionally, our model does not address geographic differences in practice patterns or compensation; in regions where subspecialists tend to be better compensated, the relative financial returns of subspecialty training may be higher. Overall, we believe our assumptions are representative of the choices faced by the majority of pediatric trainees and will provide the most useful information for stakeholders who are contemplating health care reform and pediatric workforce allocation strategies.

Our results indicate a widening career long financial gap between general pediatrics and the pediatric subspecialties over the last decade. Continuation of this trend could contribute to shortages in the pediatric subspecialty workforce. However, multiple interventions (eliminating medical educational

debt, shortening the length of fellowship training, and enacting pediatric subspecialist loan repayment programs) could have a potential positive impact on the financial gap between subspecialties as well as on overall lifetime earning potential. While financial considerations are only one aspect of career choice, the interventions analyzed, as well as enhanced reimbursements, particularly for less

procedure-oriented subspecialties, could potentially impact workforce distribution across the entire field of pediatrics.

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#### ABBREVIATIONS

AAMC: Association of American Medical Colleges  
NPV: net present value  
PGY: postgraduate year

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