

A Program to Increase the Number of Family Physicians in Rural and Underserved Areas Impact After 22 Years

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IN 1910, THE FLEXNER REPORT STATED that “the question is, then, not merely to define the ideal training of the physician; it is just as much, [to] . . . distribute as widely as possible the best type of physician so distributable.”¹ Eighty-six years later, the Institute of Medicine’s Committee on the Future of Primary Care reported that “geographic maldistribution in rural areas is worsening.”² These quotes reflect one of the most persistent and serious problems facing the US physician workforce—the shortage of physicians in rural areas.^{3,4}

Constituting more than 20% of the US population, rural areas contain one of the largest medically underserved populations in the country.^{5,6} Rural areas also have more primary care Health Professions Shortage Areas (HPSAs), a higher percentage of poverty, a greater number of patients with chronic disease, a greater percentage of elderly persons, and a greater proportion of patients receiving Medicare, Medicaid, or without health insurance than nonrural areas. While this shortage of physicians in rural areas is not new,⁷ it appears to be worsening despite the large and increasing number of physicians being trained in this country.^{2,8-10} Moreover, recent data that few medical school graduates (2.2%)

Context The shortage of physicians in rural areas is a longstanding and serious problem, and national and state policymakers and educators continue to face the challenge of finding effective ways to increase the supply of rural physicians.

Objective To determine the direct and long-term impact of the Physician Shortage Area Program (PSAP) of Jefferson Medical College (JMC) on the rural physician workforce.

Design Retrospective cohort study.

Participants and Setting A total of 206 PSAP graduates from the classes of 1978 to 1991.

Main Outcome Measures The PSAP graduates currently practicing family medicine in rural and underserved areas of Pennsylvania, compared with all allopathic medical school graduates in the state, and with all US and international allopathic graduates. All PSAP graduates were also compared with their non-PSAP peers at JMC regarding their US practice location, medical specialty, and retention for the past 5 to 10 years.

Results The PSAP graduates account for 21% (32/150) of family physicians practicing in rural Pennsylvania who graduated from one of the state’s 7 medical schools, even though they represent only 1% (206/14 710) of graduates from those schools (relative risk [RR], 19.1). Among all US and international medical school graduates, PSAP graduates represent 12% of all family physicians in rural Pennsylvania. Results were similar for PSAP graduates practicing in underserved areas. Overall, PSAP graduates were much more likely than their non-PSAP classmates at JMC to practice in a rural area of the United States (34% vs 11%; RR, 3.0), to practice in an underserved area (30% vs 9%; RR, 3.2), to practice family medicine (52% vs 13%; RR, 4.0), and to have combined a career in family practice with practice in a rural area (21% vs 2%; RR, 8.5). Of PSAP graduates, 84% were practicing in either a rural or small metropolitan area, or one of the primary care specialties. Program retention has remained high, with the number of PSAP graduates currently practicing rural family medicine equal to 87% of those practicing between 5 and 10 years ago, and the number practicing in underserved areas, 94%.

Conclusions The PSAP, after more than 22 years, has had a disproportionately large impact on the rural physician workforce, and this effect has persisted over time. Based on these program results, policymakers and medical schools can have a substantial impact on the shortage of physicians in rural areas.

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plan to practice in rural areas or small towns raise serious questions as to whether this is likely to improve in the future.¹¹ While some predict that the marketplace will solve many of the problems related to the physician work-

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force, market forces appear unlikely to resolve the scarcity of physicians in rural areas.¹² And family physicians, who have always been the major providers of care in rural areas,^{13,14} remain critical to the rural physician workforce.

Nationally and in almost every state, policymakers and educators continue to face the challenge of finding effective ways to increase the supply of rural physicians. For the past few decades, a small number of medical schools have developed programs designed to address this problem.¹⁵⁻¹⁹ One of these, the Physician Shortage Area Program (PSAP), was established at Jefferson Medical College (JMC) in 1974. The PSAP, which has been described previously,¹⁹⁻²¹ recruits and selectively admits medical school applicants who have grown up in a rural area and intend to practice family medicine in rural and underserved areas, especially in Pennsylvania. During medical school, PSAP students (averaging 15 per year, 7% of JMC matriculants) have family physician faculty advisors, take their required third-year family medicine clerkship in a rural location, take their senior outpatient subinternship in family medicine (usually at a rural preceptorship), and receive a small amount of additional financial aid (almost entirely in the form of loans). Upon completion of medical school, PSAP graduates are expected to complete a residency in family practice, and to practice family medicine in a rural and underserved area, although no formal mechanism exists to ensure compliance.

Although prior evaluation of the PSAP, as well as other programs with similar goals, has shown an increased percentage of graduates entering rural practice,¹⁵⁻²¹ these results have been limited in 2 important ways. First, they have not addressed the extent to which these programs have actually increased the supply of rural physicians.²² Second, little is known about the long-term retention of graduates from these programs. In addition, it is not known whether these programs will continue to maintain their successful outcomes as the health care system undergoes rapid change.

This study provides a comprehensive evaluation and follow-up of the PSAP after 22 years, including more policy-relevant outcomes regarding its effect on the rural physician shortage. First, it measures the direct impact of the PSAP on the supply of practicing physicians in rural and underserved areas at the state level. Second, it provides follow-up of all graduates of the PSAP for the past 2 decades regarding their practice in rural and underserved areas of the United States.

METHODS

The first part of this study addressed the contribution of the PSAP to the rural physician workforce at the state level. Data on the current practice location (county) for all allopathic physicians practicing in Pennsylvania who graduated from medical school during 1978 to 1991 were obtained from the American Medical Association (AMA) Physician Masterfile in 1997. When practice location was unavailable, home address was used, assuming that it was of similar rurality. Masterfile data were also obtained regarding physicians' self-reported specialties, their certification by the American Board of Medical Specialties, and whether they graduated from 1 of the 7 Pennsylvania allopathic medical schools, from another US medical school, or from an international medical school. Only JMC graduates were individually identified to locate PSAP graduates. Data regarding the total number of graduates from the Pennsylvania medical schools were obtained from the Association of American Medical Colleges.

Similar to prior studies, practice location was classified as rural if it was in a county designated as a non-Standard Metropolitan Statistical Area (non-SMSA) in either 1978 or 1993 (ie, AMA county codes 1-5 in 1978, or codes 1-4 in 1993).^{20,21} All other counties were classified as nonrural. Counties were considered to be medically underserved if the entire county was a physician-shortage area according to primary care Health Manpower Shortage Area (HMSA) codes (1980 or 1987) or HPSA codes (1993), or if a portion of the county was a shortage area and the county was also

a rural county, as defined above.^{20,21} Because use of a second definition for both rural counties (percentage of the population that was rural) and underserved counties (population-physician ratio) in prior evaluation of the PSAP had yielded similar results,²⁰ this study used only non-SMSA counties to define rural, and counties that contained HMSAs/HPSAs to represent areas that were underserved.

Since graduates in this study entered practice throughout the period from 1981 to 1996, SMSA and HMSA/HPSA designations were also used spanning these years. To determine whether inclusion of those counties that changed designations during this time appeared to affect our results, review of JMC graduates indicated that almost all (96%) were practicing in counties that had not changed their rural designation, or their underserved status (95%) during that time. In addition, review of Pennsylvania's 67 counties indicated that in 6 of the 7 counties that did change SMSA designation during that time, the majority of the population was rural, supporting their rural designation. Similarly, the physician-population ratio in 10 of the 14 Pennsylvania counties that changed their underserved designation over time was almost identical to that of counties that were always defined as underserved.

As in prior reports,²¹ practice specialty was considered to be that in which board certification was obtained. Graduates were considered to be practicing family medicine or general internal medicine if they were also certified in geriatrics or sports medicine; general pediatrics included those certified in sports medicine. For all other graduates who were board-certified in 2 or more specialties, or who were not board-certified in any specialty, primary self-reported specialty data from the AMA Physician Masterfile (or if not listed, the most specialized area of certification) were used. Only data from graduates in direct patient care were analyzed.

The PSAP graduates as a percentage of all Pennsylvania medical school graduates (including JMC) practicing family medicine in rural Pennsylvania was then calculated. Similar comparisons were

made for all US medical school graduates (USMGs) and international medical school graduates (IMGs). The PSAP graduates were also compared with all other Pennsylvania graduates (including non-PSAP graduates from JMC) and with all other USMGs and IMGs regarding their likelihood of becoming family physicians in rural Pennsylvania. Similar comparisons were made for graduates practicing primary care (family medicine, general internal medicine, and general pediatrics), and for graduates practicing in underserved areas.

The second part of this study longitudinally tracked all PSAP graduates from the classes of 1978 to 1991, and compared them with their non-PSAP peers at JMC regarding their geographic and specialty choices. Practice addresses throughout the United States were obtained from the JMC Alumni Association in 1996, which have previously been shown to be highly accurate.²⁰ Practice location and practice specialty were defined as in the first part of this study. For 6 individuals with certification in more than 1 specialty but without a specialty listed by the AMA, JMC alumni self-reported specialty was used, as in prior studies.^{21,23} The PSAP graduates were compared with the non-PSAP graduates from JMC to determine whether they were practicing in a rural area of the United States, practicing in an underserved area, practicing family medicine or primary care, and whether they combined a career in family medicine with practice in a rural area. Data regarding the number of applicants and matriculants to the PSAP from the classes of 1978 to 2000 were obtained from the JMC Office of Admissions.

To analyze the retention of PSAP graduates, current US practice location and specialty data (as defined above) were merged with comparable data from previous studies.^{20,21} For these analyses, rural counties were based only on 1978 AMA county code groups, and underserved counties were based only on 1980 HMSA codes, to be consistent with the prior data. Program retention was defined as the number of PSAP graduates practicing rural family medicine in 1996,

compared with the number practicing 5 to 10 years ago, when the locations of these graduates were first identified (ie, 1986 for the classes of 1978-1981, and 1991 for the classes of 1982-1986). Program retention in underserved areas was similarly defined.

Throughout this study inferential statistics were not needed to compare PSAP with non-PSAP graduates because the entire population of both groups was included in these evaluations.

RESULTS

Impact of the PSAP at the State Level

A total of 150 graduates from the classes of 1978 to 1991 of all 7 Pennsylvania allopathic medical schools were practicing family medicine in rural Pennsylvania in 1997. Twenty-one percent (32) of these rural family physicians were PSAP graduates (FIGURE 1), even though they represent only 1% (206/14 710) of all graduates from those schools (relative risk [RR], 19.1). Even compared with all medical school graduates during that time (ie, all USMGs and IMGs), PSAP graduates represent 12% (32/269) of family physicians in rural Pennsylvania.

Among primary care physicians in the state, PSAP graduates accounted for 16% (38/234) of those in rural areas who graduated from a Pennsylvania medical school (RR, 13.7) (Figure 1). Of all USMGs and IMGs, PSAP graduates accounted for 7% (38/532) of rural primary care physicians in the state. The results were similar for PSAP graduates in underserved areas.

Overall Outcomes of PSAP Graduates

Practice location in the United States was available for 97% of both PSAP (200/206) and non-PSAP (2702/2793) graduates of JMC, and practice specialty was available for all PSAP and all but 1 non-PSAP graduates. Sixty-eight (34%) of the 200 PSAP graduates from the classes of 1978 to 1991 were practicing in rural areas of the United States, compared with 303 (11%) of 2701 non-PSAP graduates (RR, 3.0). Similarly, 103 (52%) of 200 PSAP graduates were practicing the

specialty of family medicine, compared with 352 (13%) of 2701 of their non-PSAP peers (RR, 4.0). The PSAP graduates were also much more likely to combine the specialty of family medicine with practice in a rural area (42/200 [21%] vs 67/2701 [2%]; RR, 8.5) (FIGURE 2). In addition, PSAP graduates were more likely than their peers to practice the other primary care specialties, and the nonprimary care specialties in rural areas (RR, 1.9; RR, 1.4; respectively). Overall, the vast majority of PSAP graduates (84%) were practicing either in a rural or small metropolitan area or one of the primary care specialties. Only 16% of PSAP graduates were nonprimary care specialists in large metropolitan areas, compared with 51% of their non-PSAP peers (RR, 0.3). Similarly, PSAP graduates were more likely to practice in underserved areas (30% vs 9%; RR, 3.2), and to practice family medicine in an underserved area (19% vs 2%; RR, 9.5), than non-PSAP graduates.

Although the overall specialty and geographic distribution of JMC graduates from more recent classes (1987-1991) was similar to that previously reported for graduates of the first 9 classes (1978-1986), the percentage of all graduates practicing family medicine in rural areas decreased for the more recent classes, with a somewhat greater decrease for PSAP graduates. However, PSAP graduates from the past 5 years remained more than 7 times as likely to practice rural family medicine as their non-PSAP peers (16.7% vs 2.2%), even though this represented a decrease from the 10-fold difference during the initial 9 classes (25.9% vs 2.5%). This pattern was similar for graduates practicing family medicine in underserved areas.

Applicants to the PSAP, which had previously decreased to an average of 57 per year for the classes of 1991 to 1995, increased almost 3-fold to 150 applicants yearly for the most recent 5 classes of 1996 to 2000, similar to national trends. Likewise, matriculants to the program, which had decreased to 8 per year (classes of 1991-1995), increased by 50%, to 12 per year for the classes of 1996 to 2000.

Retention of PSAP Graduates

Nationally, the number of PSAP graduates who were practicing family medicine and practicing in a rural area remained relatively stable during the past 5 to 10 years (TABLE). Overall, total program retention has remained remarkably high, with the number of PSAP graduates currently practicing rural family medicine (33) equal to 87% of those practicing 5 to 10 years ago (38). Similarly, total program retention for graduates practicing family medicine in underserved areas was 94% (32/34).

COMMENT

The shortage of physicians in rural areas of the United States is one of the most-persistent health policy problems in this century, with serious implications for access to care.^{3,7,14} The results of this study indicate that the PSAP program has made a substantial contribution to the supply of physicians practicing in rural and un-

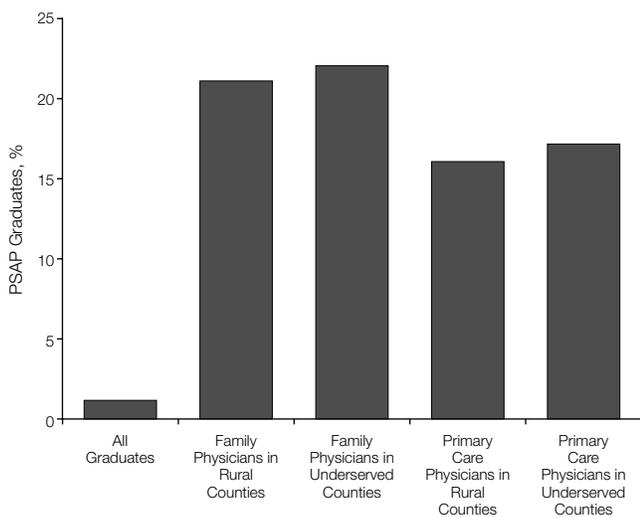
derserved areas and has had an extremely high rate of retention.

Although the PSAP is a small program, averaging only 15 graduates per year, it has had a disproportionate impact on the rural physician workforce. The PSAP graduates, who represent only 1 of every 100 Pennsylvania medical school graduates, account for 1 of every 5 family physicians practicing in rural Pennsylvania who graduated from these schools. Among all USMGs and IMGs, PSAP graduates represent 1 of every 8 rural family physicians in the state. The PSAP retention rate for rural family physicians has remained high, indicating that the program has been successful and long lasting. In fact, the overall retention of PSAP graduates was more than twice that reported for the National Health Service Corps.^{24,25}

While each of the components of the PSAP (admissions, advising, financial aid, curriculum) is important, the selective

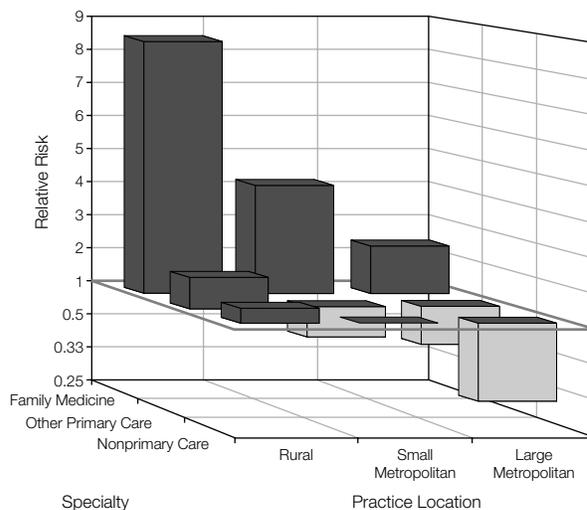
admissions process appears to be the most powerful factor. Although students selected for the PSAP must meet all of the academic and other criteria for admission to JMC, they are chosen primarily on the basis of their rural background and commitment to practice rural family medicine. By broadening the admission criteria in this way, the PSAP selects a different group of applicants than those admitted through the regular admissions process. In fact, more than two thirds of PSAP graduates were not accepted to any medical school other than JMC (according to Association of American Medical Colleges Joint Acceptance Reports). A review of all JMC matriculants during that period suggests that a similar percentage probably would not have been accepted to JMC without the program. Throughout the history of the program, the admission credentials, attrition rate, and academic performance during medical school and postgradu-

Figure 1. Physician Shortage Area Program (PSAP) Graduates as a Percentage of Pennsylvania Medical School Graduates for All Graduates and Those Practicing in Rural and Underserved Counties in Pennsylvania



Percentage comparison includes graduates from all 7 allopathic medical schools in Pennsylvania, including Jefferson Medical College, by specialty, classes of 1978 to 1991. Primary care physicians represent family physicians, general internists, and general pediatricians. Rural counties are those that were not in a Standard Metropolitan Statistical Area in 1978 or 1993. Underserved counties are those where the entire county was a physician-shortage area according to Primary Care Health Manpower Shortage Area codes (1980 or 1987) or Health Professions Shortage Area codes (1993), or where a portion of the county was a shortage area and the county was also a rural county.

Figure 2. Relative Risk Comparison of Physician Shortage Area Program (PSAP) With Non-PSAP Graduates of Jefferson Medical College, by Specialty and Practice Location



Relative risk comparison includes graduates from the classes of 1978 to 1991 who are practicing in rural, small metropolitan, and large metropolitan US counties. Other primary care specialties represent general internal medicine and general pediatrics. Rural counties are those that were not in a Standard Metropolitan Statistical Area (SMSA) in 1978 or 1993. Small metropolitan counties are those in an SMSA whose American Medical Association (AMA) county code was 6 in 1978 or 1993; large metropolitan counties are those in an SMSA whose AMA county code was 7 to 9 in 1978 and 1993. Dark shaded areas represent a relative risk of greater than 1, indicating PSAP graduates are more likely to practice than non-PSAP graduates; light shaded areas represent a relative risk of less than 1, indicating that PSAP graduates are less likely to practice than non-PSAP graduates.

ate training of PSAP students were similar to their classmates.²¹

The rural curricular experiences of the PSAP are also important although results of a multivariate study of JMC graduates showed this rural curriculum did not independently add to the likelihood of rural practice.²⁶ Similarly, it is unlikely that the small financial aid component of the PSAP (consisting of a few thousand dollars yearly in loans) contributed substantially to the success of the program.

If other medical schools want to increase the supply of rural physicians, they could develop targeted programs similar to the PSAP or other successful models.^{15-21,27} While each of these programs differs somewhat, they share 2 common elements, a focus on students who grew up in rural areas and the specialty of family medicine. A large body of literature has repeatedly and consistently shown that rural-raised individuals are more likely to practice in rural areas^{26,28-30} and that combining rural background with the specialty of family medicine has a cumulative effect.¹³ Studies have also identified the specialty of family medicine as an important factor related to rural practice,^{14,31} although it is primarily those family physicians who grew up in rural areas who are most likely to practice there.^{13,26} This is consistent with national data indicating that the recent increase in family physicians being trained has not been accompanied by a proportionate increase in those family physicians entering rural practice.³² While few national data support the role of rural curriculum as a major factor in rural career choice,^{28,33,34} the University of Minnesota's Rural Physician Associate Program has developed an extensive 9-month rural curriculum, which has resulted in an increased number of rural physicians.¹⁷

While JMC's role was critical in specifically developing and supporting the PSAP, it is unlikely that the success of the program is simply a reflection of the institution's overall and longstanding commitment to family medicine and rural practice. In fact, the percentage of JMC's non-PSAP graduates practicing ru-

ral family medicine and those practicing in Pennsylvania was similar to graduates from all other Pennsylvania schools combined.³⁵ Similarly, it appears unlikely that the National Health Service Corps program had a major role in the outcomes of the PSAP, since only 13% of PSAP graduates (27/206) were recipients of National Health Service Corps scholarships.

A major challenge for policymakers faced with a shortage of rural physicians is how to work cooperatively with medical schools to implement and continue these types of successful programs. Even though the direct costs of the PSAP are modest (consisting primarily of a portion of faculty effort and administrative support to run the program, and reallocation of available curricular and financial aid resources), rural communities are the primary beneficiaries and there are few incentives for medical schools to develop these programs. At JMC, support for the PSAP has been limited to institutional funding since its inception, although JMC does receive state appropriations, as do all Pennsylvania medical schools. However, with multiple competing missions and an increasingly competitive atmosphere,³⁶ changing priorities will increasingly pressure academic medical centers to align their missions with more specific funding sources. Both the state and federal governments have important roles here.³¹ Providing financial incentives to stimu-

late medical schools to develop these programs represents one important policy option, although in some states there may also be regulatory pressures. These incentives could be directly linked to the output of rural physicians, as well as to improving the quality of rural training. For medical schools, becoming more accountable for public problems such as the need for physicians in underserved areas could be an important way to justify new and continued public funding to support their social missions.³⁷

Although no consistent criteria define a rural area or one with a shortage of physicians,^{14,28} this study, like others, used the non-SMSA county to define rurality, and federal HMSA/HPSA designations to represent underserved areas. Although these do not equate perfectly with either rural or medically underserved areas, these counties are primarily rural, relatively underserved, and most areas of physician shortage are located here. These definitions do not, however, allow identification of those areas that are most remote or contain the greatest shortage of physicians. In addition, this study did not address the important problems related to urban underserved areas, and therefore addresses only part of the overall physician shortage in this country.

Also, this study did not measure the role of osteopathic physicians on the rural physician workforce. However, even considering that osteopaths are more likely than their allopathic peers

Table. Retention of Physician Shortage Area Program (PSAP) and Non-PSAP Graduates of Jefferson Medical College Practicing Family Medicine (FM), and Practicing in Rural and in Underserved Counties, Classes of 1978-1986*

Type of Practice	PSAP, No. (%)		Non-PSAP, No. (%)	
	First Location, 1986 or 1991	Current Location, 1996	First Location, 1986 or 1991	Current Location, 1996
FM	84 (57)	81 (55)	246 (14)	227 (13)
Rural county	57 (39)	54 (37)	182 (10)	209 (12)
FM and rural county	38 (26)	33 (23)	55 (3)	46 (3)
Underserved county	48 (33)	47 (32)	141 (8)	161 (9)
FM and underserved county	34 (23)	32 (22)	44 (3)	36 (2)

*There were 148 PSAP graduates when first located in practice (1986 for the classes of 1978-1981, and 1991 for the classes of 1982-1986), and in 1996. There were 1811 non-PSAP graduates when first located in practice (1986 or 1991), and 1793 in 1996. Specialty data were available for all graduates. Data regarding location of practice were available for 146 PSAP and 1746 non-PSAP graduates when first located, and 146 PSAP and 1749 non-PSAP graduates in 1996.

to practice in rural areas, including them in this study would have lessened somewhat, but not changed, the impact of PSAP graduates on the rural physician workforce.

Another limitation of this study is that it presents the outcomes of a program in one medical school whose major impact occurs in one state. Nevertheless, we believe that these results have important national implications. First, Pennsylvania is similar to most states in facing a shortage of rural physicians. In fact, Pennsylvania contains the largest rural population of any state,³⁸ and also has a severe geographic maldistribution of physicians, with just 3 metropolitan counties having almost half of all physicians in the state, even though the remaining 64 counties have almost three quarters

of the state's population.^{38,39} Second, because JMC is a large, private medical school located in a major urban area in the northeastern United States (characteristics related to low outcomes of rural physicians³¹), it is possible that the PSAP could have an even greater impact on the rural physician workforce in other medical schools.

In summary, outcomes of the PSAP after more than 22 years have shown that selectively admitting a small number of medical school applicants who are most likely to become rural family physicians based on their background and career intentions, supporting them during medical school, and allowing them to gravitate to rural and underserved areas to follow their professional and personal goals has had a substantial and

long-lasting impact on the source of medical care in traditionally underserved rural areas. These results indicate that medical schools can have an important role in meeting the needs of the public. Similarly, policymakers and educators who are committed to addressing the rural physician shortage can institute programs such as the PSAP to achieve these goals in a highly effective and long-lasting manner.

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