# Summer in the Country: Changes in Medical Students' Perceptions Following an Innovative Rural Community Experience

Kevin Y. Kane, MD, MSPH, Kathleen J. Quinn, PhD, James J. Stevermer, MD, MSPH, Jana L. Porter, MS, Weldon D. Webb, MA, Harold A. Williamson, Jr., MD, MSPH, and Julie Burdin, MD

## Abstract

### Purpose
The University of Missouri School of Medicine developed the Summer Community Program through which rising second-year medical students work alongside rural, community-based physician preceptors. This program is part of a comprehensive, longitudinal pipeline designed to increase student interest in rural practice. The authors describe the Summer Community Program, explain changes in students' perceptions of rural practice and rural lifestyle post program, and report participants' specialty choices and first practice locations.

### Method
The authors analyzed 229 participant responses (1996–2010) to pre- and postexperience questionnaires focused on perceptions of rural practice and lifestyle. The authors calculated the likelihood of participants matching into primary care compared with nonparticipants and analyzed participants' first practice locations.

### Results
After the experience, participants' perceptions toward rural practice and lifestyle changed favorably, and 72% (n = 208) reported more interest in rural practice. Compared with nonparticipants, summer participants were more likely to enter a primary care residency (relative risk [RR] = 1.31; 95% confidence interval [CI]: 1.12–1.50) and twice as likely to choose specifically family medicine (RR = 2.21; 95% CI: 1.68–2.88). Forty-six percent (n = 78) of participants chose rural locations for their first practices.

### Conclusions
This program has positively influenced students' perceptions of rural practice and lifestyle and increased their interest in rural practice. Participants entered primary care and family medicine residencies at higher rates than nonparticipants, and nearly half started their medical practices in rural locations. Replicating this program may increase interest in rural medicine and address rural physician workforce needs.

Like many states, Missouri faces a shortage of rural health care providers. Nationally, less than 11% of physicians choose to practice rural medicine.[1] In Missouri, only 18% of primary care physicians practice in rural areas, whereas 37% of the population resides in these communities.[2] With the passing of the Patient Protection and Affordable Care Act, the demand for health care providers will increase, and access to care for rural populations will be further strained—unless there is a concomitant increase in the number of practicing rural physicians.[3] Similar to trends nationally, Missouri's shortage of rural physicians is further complicated by both a rural physician workforce that is aging and a rural population that is older and poorer compared with metropolitan populations.[3]

Policies and programs targeted to increase the number of rural physicians can address this shortage.[4–6] According to one estimate, if 125 U.S. MD-granting medical schools trained 10 students per class in a rural program in the next decade, the number of rural physicians produced in the United States would more than double.[6] Medical schools have used targeted interventions to influence and prepare physicians for rural practice; these include increasing the number of rural-committed students admitted from a rural background and offering rural clinical rotations during medical school. However, these interventions alone may not be enough to influence students' career decisions.[7,8] Students need not only understand the rural community; they should also develop an emotional attachment to rural living by making connections with local people and culture. These experiences help students determine whether or not practicing in a similar area would provide professional and personal satisfaction.[9]

Perceptions of rural medicine may be positively influenced through clinical training and research experiences.[10,11] Several programs have demonstrated success in changing students' perceptions, increasing their knowledge of rural medicine and patient care, and/or influencing their choice to practice in rural communities.[4,11,12]

In an effort to address physician shortages in rural Missouri, the University of Missouri School of Medicine (MUSOM) developed the University of Missouri Rural Track Pipeline Program (MU-RTPP) in 1995.[7] The MU-RTPP is multifaceted and includes a preadmissions program, a Summer Community Program, third-year rural clerkships, and fourth-year rural electives. As part of the larger MU-RTPP, the primary goal of the Summer Community Program is to increase interest in rural practice. The purpose of this report is threefold: to describe the Summer Community Program in

Please see the end of this article for information about the authors.

Correspondence should be addressed to Dr. Kane, University of Missouri, School of Medicine, DC032.00, M221 Medical Sciences Building, Columbia, MO 65212; telephone: (573) 882-3183; fax (573) 884-5734; e-mail: kanek@health.missouri.edu.

Acad Med. 2013;88:1157–1163.
First published online June 26, 2013
*doi: 10.1097/ACM.0b013e318299fb5d*

sufficient detail so other institutions can replicate it, to explain the changes in participating students' perceptions of rural practice and lifestyle, and to convey the associated outcomes of participating in the program, including program participants' eventual specialty choices and first practice locations.

## The Summer Community Program

### Logistics and preceptors

The Summer Community Program provides medical students with clinical training in a rural community during the summer between their first two years of medical school. All first-year students in good academic standing are eligible for the program. Those who express an interest in rural practice are given preference, and students who are part of the MU-RTPP preadmissions program are required to participate for at least six weeks.[7] The Summer Community Program accepts 20 to 30 participants per year. During their first year of medical school, students receive information about the program and the application process (which entails writing a brief essay expressing interest in the experience). Students indicate their preferences for location, specialty, and duration when they apply. Many students request their hometown or a location where friends and/or family reside.

Generally, each Summer Community Program participant is the only medical student at a particular site; exceptions occur when the site sponsors more than one student from the program, or when other students (who are not in the program) from MUSOM or other schools are at a site completing clinical rotations.

Through participation in the Summer Community Program, students have the opportunity to increase their knowledge of rural practice; to learn about the spectrum of specialties commonly available in rural communities; to improve their clinical skills in history-taking, physical examination, assessment, and medical management; to explore common acute and chronic clinical problems; and to compare medical practice in a community setting to practice in an academic health center.

Participating community hospitals and clinics provide each student with a small stipend ($1,000–$2,000 per student based on length of the experience) as well as room and board if needed. This stipend is the same as those provided for other MUSOM-sponsored summer opportunities.

During the program, students work with one or more community-based physician preceptors for four, six, or eight weeks depending on their preferences (or requirements in the case of the MU-RTPP students) and preceptor availability. Of the 344 participating volunteer preceptors, 268 (78%) practice primary care (family medicine, internal medicine, pediatrics, or internal medicine/pediatrics); the majority (n = 201; 58%) practice family medicine. Collectively, the remaining 76 preceptors (22%) practice a variety of non-primary-care specialties and subspecialties including obstetrics–gynecology, emergency medicine, general surgery, and cardiology. The diversity allows students to personalize their experience and work with a variety of specialists. This is an attractive feature for those medical students who remain interested in exploring multiple disciplines. Alternatively, if a student knows he or she wants to practice a particular specialty, the experience can be tailored accordingly.

### Student responsibilities

During the experience, students identify learning objectives on the basis of their clinical encounters and address these through supplemental readings (all students have remote access to MUSOM's digital library). At a minimum, they perform history and physical exams under the supervision of the preceptor. Many students participate in procedures and other activities commensurate with their level of skill, experience, and interest. At all times, we expect students to conduct themselves in a manner consistent with MUSOM's professional standards and norms.

### Preceptor responsibilities

Each participating preceptor receives a copy of MUSOM's expectations for preceptors. These expectations include orienting the student to office and hospital functions, explicitly discussing with the student expectations regarding his or her level of involvement in patient care, providing the student with regular feedback, encouraging the student to complete research and readings on specific patient encounters, and modeling life as a physician (e.g., demonstrating how to balance family/personal life and a career, and performing the duties associated with the specialty choice and practice location).

### Student evaluation

Preceptors provide students with frequent feedback, incorporating personal observations and comments from patients, office staff, and hospital personnel. Additionally, each preceptor completes a brief evaluation of the student at the end of the experience. These evaluations are shared with the student and kept in the student's permanent file at MUSOM. Students do not receive a grade because the Summer Community Program is not part of the MUSOM's required curriculum.

### Program costs and changes

Program operation requires a 25% FTE coordinator at the school of medicine and approximately $40,000 contributed annually by community partners to fund student stipends and housing. Establishing the clinical and financial partnerships with the community partners is relatively straightforward because they perceive offering medical students early clinical experiences in their rural community to be a powerful recruiting tool. Preceptors generously volunteer their time and expertise for teaching. The regional Area Health Education Centers provide additional support to students during the experience.

Since the inception of the program in 1995, we have made several changes to enhance it. Initially, all Summer Community Program students completed eight full weeks in a rural community-based practice. We have reduced this to a range of four to eight weeks to allow students to participate in other summer programs or to have time off. We have also increased the student stipend over time to stay comparable with the other MUSOM-sponsored summer programs. In addition, we have more clearly defined preceptor expectations to provide a more consistent experience.

## Method

We tracked Summer Community Program participants from 1995 through

2010, maintaining a database of their high school's location, their responses to pre- and postquestionnaires, their evaluations of the program, and their eventual postgraduate specialty training and first practice location, as detailed below. We also recorded and tracked demographic and other information about the patients whom program participants encountered so as to measure the breadth of experiences participants gain.

We used information from the MUSOM Alumni Association database, the National Residency Match Program (NRMP), and the American Board of Medical Specialties (ABMS), as well as information gleaned from Internet searches and from personal correspondence with program participants, to populate our database. If we could not verify board certification using ABMS data, we reported the participant's specialty as stated on the NRMP list. For graduates who certified in geriatrics, sports medicine, or adolescent medicine, we used their primary specialty. If a student had both a transitional year and another residency specialty listed on the match list, we used the residency specialty.

### Measures of rural status

We used the National Center for Education Statistics' Urban-Centric Locale codes to determine whether a participant's high school was rural (defined by these codes: "Town, Fringe-31," "Town, Distant-32," "Town, Remote-33," "Rural, Fringe-41," "Rural, Distant-42," or "Rural, Remote-43").[13]

We used first practice location (office address and county) to determine whether a graduate was practicing in a rural county, based on the Rural-Urban Density Typology (RUDT).[14] The RUDT classifications system uses the population density thresholds of the U.S. Census Bureau's classification system, the U.S. Office of Management and Budget's urban population nucleus requirements, and other criteria to classify counties as "rural," "mixed rural," "mixed urban," and "urban." We used the RUDT classification because it is the standardized method of separating rural and urban counties that most accurately classifies rural counties for the purpose of our study.

### Student questionnaires and analysis

Starting in 1996, participants completed a 12-item pre- and postexperience questionnaire to assess their perceptions of rural practice and lifestyle using a five-item Likert Scale (1 = strongly agree, 5 = strongly disagree). Since 1995, students have also completed a five-item, postprogram questionnaire that evaluates their perceptions of the quality of their overall experience with the program and their interest in rural medical practice.

We calculated the mean and modal responses on the 12-item pre–post questionnaire before and after the experience and compared changes in responses using the nonparametric sign test. Further, we used the Wilcoxon rank sum test to analyze whether the change in score on the 12 items differed on the basis of gender, high school designation (rural or urban), or first practice location designation (rural or urban).

We used the Wilcoxon two-sample test to compare the differences in change score between primary care versus non-primary-care specialty choice; family medicine versus non-family-medicine specialty choice; rural versus urban practice location; and in-state versus out-of-state residency location for each of the 12 items on the pre–post questionnaire and the relevant items (i.e., 1, 3, and 5) on the postprogram questionnaire. We used SAS version 9.2 for statistical analysis (Cary, North Carolina). We calculated relative risks [RRs] and 95% confidence intervals [CIs] with the online calculator at StatPages.org.[15]

### Patient demographics and ethical considerations

Students were expected to complete patient log cards for every patient encounter during a one-week period during the experience. However, in 1995, these cards were required for every patient seen for the entire duration of the program, and in 2010, the patient log requirement was discontinued.

The University of Missouri–Columbia Health Sciences institutional review board (IRB) reviewed and approved this study (IRB project #1053899) and gave a waiver of documentation of consent. No patient names or other protected health information were collected or stored. We secured data in compliance with appropriate Family Educational Rights and Privacy Act and IRB requirements.

## Results

From 1995 through 2010, 296 students participated in the Summer Community Program. Collectively, as Table 1 shows, these students gained exposure to a variety of patients of varying visit types in multiple settings.

Further, as Table 2 shows, these students pursued primary care and residencies in Missouri at greater rates compared with nonparticipants who graduated from MUSOM between 1998 and 2011. Specifically, Summer Community Program participants were more likely to match into a primary care residency (relative risk [RR] = 1.31; 95% confidence interval [CI]: 1.12–1.50) and twice as likely to match into a family medicine residency (RR = 2.21; 95% CI: 1.68–2.88; see Table 2). Summer participants were

Table 1

**Demographic Information for Patient Visits, Collected by Students at the University of Missouri School of Medicine Who Participated in the Summer Community Program, 1995 to 2009**

| Demographic information | No. (% of 27,631) |
|---|---|
| **Patient gender** | |
| Female | 16,239 (58.8) |
| Male | 11,392 (41.2) |
| **Patient age** | |
| Less than 1 year | 1,490 (5.4) |
| 1–18 years | 4,447 (16.1) |
| 19–65 years | 13,619 (49.3) |
| Greater than 65 years | 8,075 (29.2) |
| **Visit site** | |
| Office | 21,382 (77.4) |
| Hospital | 4,604 (16.7) |
| Emergency room | 763 (2.8) |
| Nursing home | 546 (2) |
| Home | 49 (<1) |
| Other | 287 (1) |
| **Visit type** | |
| Acute, minor, self-limited | 9,734 (35.2) |
| Chronic disease | 5,552 (20.1) |
| Preventative | 4,271 (15.5) |
| Acute, major, serious | 2,812 (10.2) |
| Follow-up | 2,609 (9.4) |
| Prenatal/postpartum care | 1,476 (5.3) |
| Other | 1,177 (4.3) |

Table 2

**Specialty Choice and Residency Location of Summer Community Program Participants (Compared With Nonparticipants) From the University of Missouri School of Medicine Who Graduated Between 1998 and 2011**

| Measure | No. (% of 253*) of summer participants | No. (% of 997) of nonparticipants | Relative risk (95% confidence interval) |
|---|---|---|---|
| **Specialty choice** | | | |
| Primary care† | 132 (52) | 398 (40) | 1.31 (1.12–1.50) |
| Family medicine | 70 (28) | 125 (13) | 2.21 (1.68–2.88) |
| Total other specialty (not primary care) | 121 (48) | 599 (60) | — |
| **Residency located with the state of Missouri** | 121 (48) | 378 (38) | 1.26 (1.07–1.47) |

* A total of 296 students have participated in the Summer Community Program, so the numbers in this column do not include 43 students still in medical school.
† Primary care is defined as family medicine, general internal medicine, pediatrics, or internal medicine/pediatrics.

also more likely to match into a Missouri residency compared with nonparticipants (RR = 1.26; 95% CI: 1.07–1.47). We found similar results after controlling for concurrent participation in our rural preadmissions program, a potential confounding variable.

Of the 168 students who have participated in the Summer Community Program since 1995 and have graduated from medical school, 78 (46%) chose a rural location for their first practice location (see Table 3). Because we did not have complete practice location data on nonparticipants, we were unable to compare participants with nonparticipants.

From 1996 to 2010, 229 (86%) of the 266 participants completed the 12-item pre- and postquestionnaires assessing perceptions of rural practice and lifestyle.

Table 3

**First Practice Location of Summer Community Program Participants at the University of Missouri School of Medicine Who Graduated From 1998 Through 2007**

| First practice location* | No. (% of 168 summer participants†) |
|---|---|
| Rural | 78 (46) |
| Urban | 90 (54) |

* Rural-Urban Density Typology (RUDT) identifies rural and urban counties according to the percentage of the population that is rural or urban, the population in urban areas, and population density. Here, rural counties are those classified as rural or mixed rural; urban counties are those classified as mixed urban or urban.[14]
† Total does not include 128 students still in medical school or residency

Table 4 shows the mean change in scores between the pre- and posttest responses. The scores changed significantly after the summer program for 9 of the 12 items. In general, students viewed rural practice and the life of a rural physician more favorably after the summer experience. Students' perceptions of close scrutiny of a rural physician's social life did not change significantly. There was also no significant change in their perceived likelihood of practicing in a rural area or marrying a person from a small town. We performed an analysis of questionnaire responders and nonresponders and found no statistically significant differences in gender or graduating high school designation (rural versus urban) between the two groups.

Compared with participants who attended a rural high school, participants who attended an urban high school demonstrated greater change between pre- and posttest scores for two items: *Rural physicians make barely enough money to make ends meet* (change toward stronger disagreement, $P = .01$) and *Rural practice is just overwhelming* (change toward stronger disagreement, $P = .03$). The degree of change did not differ significantly for any of the 12 items when controlled for gender, locale of first practice, specialty choice, or residency location.

Compared with participants who entered a non-primary-care or non-family-medicine residency or those who ended up in an urban practice location following residency, participants who later entered a primary care or family medicine residency, or who practiced in a rural location after residency, more often agreed with item 11, *I am likely to practice in a rural area someday* after the experience ($P = .013$, $P < .001$, and $P < .001$, respectively). It appears that a higher level of agreement with this item as a rising second-year medical student may be a predictor for future primary care or family medicine residency or rural practice location.

Between 1995 and 2010, 288 (97% of 296) students completed the postexperience questionnaire. Table 5 shows the mean scores for each of the five Likert or Likert-type questions. Participants rated the experience highly and recommended it to other students. Participants indicated the experience helped them improve their clinical skills and gave them insight into the role of a community doctor. Of the 288 students, 72% (n = 208) agreed or strongly agreed with item 5, *As a result of this experience, I am more interested in a rural community practice*. The mean scores for items 1, 3, and 5 did not vary when analyzed for differences between gender, specialty choice, or first practice location.

## Discussion and Conclusion

The Summer Community Program has positively influenced medical students' perceptions regarding rural practice and rural lifestyle. Our findings are in line with reports from other programs reporting on student perceptions.[4,11,12] This body of work is important because collectively it shows that although overcoming the myths associated with rural practice and living is challenging, doing so is possible. The finding that 72% of students reported greater interest in rural community practice after participating in the Summer Community Program supports our belief that early rural clinical training experiences can not only positively influence students' interest in and perceptions of rural medicine and rural lifestyle but may also sustain or even increase their interest in rural practice.

Clearly, selection bias could explain at least some of our findings. Because this is a voluntary program, students from a rural background or with a greater inclination toward rural living and/or future rural practice would be more likely to participate in a rural-based

Table 4

**Change in the University of Missouri School of Medicine Student Responses Regarding Perceptions of Rural Practice and Lifestyle Before and After the Summer Community Program, 1996 to 2010**

| Items | No. of responses | Pretest score* | Posttest score* | Mean change | Direction of change | *P* value |
|---|---|---|---|---|---|---|
| 1. A problem with rural practice is the difficulty in accessing continuing medical education | 228 | 2.81 | 3.67 | 0.86 | Less agreement | <.001 |
| 2. Rural doctors are accorded much respect from other professionals | 227 | 2.91 | 2.46 | –0.45 | More agreement | <.001 |
| 3. Rural doctors have lots of opportunities to teach others | 228 | 2.38 | 2.06 | –0.32 | More agreement | <.001 |
| 4. Rural practice is often repetitive and boring | 227 | 3.71 | 4.03 | 0.32 | Less agreement | <.001 |
| 5. Rural doctors are professionally isolated | 228 | 3.07 | 3.77 | 0.70 | Less agreement | <.001 |
| 6. Rural doctors aren't up to date on recent medical advances | 228 | 3.84 | 4.32 | 0.48 | Less agreement | <.001 |
| 7. There's just not much to do in rural towns | 228 | 3.17 | 3.35 | 0.18 | Less agreement | .038 |
| 8. Rural doctors earn barely enough money to make ends meet | 229 | 3.98 | 4.34 | 0.36 | Less agreement | <.001 |
| 9. A physician's social life in a small town is under close scrutiny | 228 | 2.22 | 2.35 | 0.13 | Less agreement | .101† |
| 10. Rural practice is just overwhelming | 228 | 3.45 | 3.96 | 0.51 | Less agreement | <.001 |
| 11. I'm likely to practice in a rural area someday | 226 | 2.34 | 2.28 | –0.06 | More agreement | .224† |
| 12. I'm likely to marry someone from a small town | 155 | 2.68 | 2.74 | 0.06 | Less agreement | 1† |

*The pre- and posttest scores range from 1 (strongly agree) to 5 (strongly disagree).
† Nonsignificant.

educational program. However, as only two-thirds of our participants were from rural backgrounds, selection bias cannot explain all of our findings. Indeed, we found that the Summer Community Program also increased interest among the students who grew up in an urban environment—who, arguably, are more likely to harbor negative myths about rural practice and living. To illustrate, compared with their peers from rural environments, medical students from urban backgrounds showed a greater degree of favorable change in their attitudes regarding how much money rural physicians earn and how overwhelming rural practice is.

Table 5

**Postprogram Questionnaire Mean Scores of 288 Students From the University of Missouri School of Medicine Who Participated in the Summer Community Program, 1995 to 2010**

| Postexperience questionnaire items | Response options: 1–5 | Mean score | No. (% of 288) students giving a rating of 4 or 5 |
|---|---|---|---|
| 1. I found MU's Summer Community Program experience … | 1 = not valuable<br>3 = okay<br>5 = very valuable | 4.73 | 278 (97) |
| 2. I think I improved my clinic skills … | 1 = very little<br>3 = somewhat<br>5 = a lot | 4.37 | 247 (86) |
| 3. The experience gave me insight into the role of a community doctor. | 1 = strongly disagree<br>2 = disagree<br>3 = neutral<br>4 = agree<br>5 = strongly agree | 4.59 | 277 (96) |
| 4. I would recommend the experience to another student … | 1 = not at all<br>2 = with reservations<br>3 = with some reservations<br>4 = without reservations<br>5 = enthusiastically | 4.64 | 269 (93) |
| 5. As a result of this experience, I am more interested in a rural community practice. | 1 = strongly disagree<br>2 = disagree<br>3 = neutral<br>4 = agree<br>5 = strongly agree | 3.94 | 208 (72) |

We are not surprised by the finding that overall students' self-reported likelihood of practicing in a rural area did not change significantly. The low degree of change may be due, in part, to the relatively high number of students who endorsed this possibility before experiencing the Summer Community Program. We believe a single four- to eight-week program before the second year of medical school is unlikely to significantly impact a student's likely practice location.[7] Rather, it takes a comprehensive, longitudinal, supportive program, as previously described, to influence eventual rural practice location.[7] We also believe our summer program, although not associated with a significant change in the likelihood to practice in a rural area, does positively influence other perceptions of rural practice and living, and thereby increases interest in future rural practice.

Importantly, the finding that summer program participants were more likely to enter a primary care residency and twice as likely to enter a family medicine specialty supports this belief because interest in family medicine plays a role in the selection to practice rural medicine.[16] Further, graduates of our summer program were also more likely to choose a Missouri residency program, which, we believe, will benefit the Missouri rural physician workforce because physicians tend to select practices near their residency.[17,18]

We acknowledge both that participation in other aspects of our MU-RTPP likely influenced Summer Community Program participants' specialty and location choices and that we cannot prove a direct cause-and-effect relationship between the program and these study outcomes. Another limitation is that we do not have practice location data for students who did not participate in the Summer Community Program, limiting our ability to compare these other MUSOM students with program participants. However, we can compare our results with available national data. Our study indicates that 46% of Summer Community Program participants chose to practice in a rural location following their postgraduate training. This percentage is much higher than the 3% of matriculating medical students nationally who plan to practice in rural areas and small towns,[6] the 9% of graduating medical students nationally who plan to practice in underserved rural communities,[19] and the 11% of physicians who actually practice in rural areas.[1]

Further, we acknowledge that although our survey completion rate is good (86.1%), it is still low enough to pose a potential threat to validity. Additionally, although unlikely, the stipend could have influenced responses on our measurement and evaluation tools. Finally, we report on changes in perception over a relatively short period of time and do not have data to demonstrate any definitive cause-and-effect relationships.

In summary, our four- to eight-week Summer Community Program has positively influenced students' perceptions of rural practice and lifestyle. Students reported more interest in a rural community practice, and they highly rated and recommended the experience to others. Program participants entered primary care and family medicine residencies at higher rates than nonparticipants. Nearly half of the program participants have started practice in a rural location after their postgraduate training. We believe this program is an important part of our comprehensive, longitudinal rural track training program. Replicating the Summer Community Program at other schools may increase student interest in rural medicine and help address the rural physician workforce shortages so as to enable care for rural populations.

*Acknowledgments:* The authors wish to thank Nancy Franklin, Summer Community Program coordinator from 1995 to 2010, Area Health Education Center, Rural Track Pipeline Program, Department of Rural Health Programs, University of Missouri School of Medicine, Columbia, Missouri, for maintaining the data and identifying training sites and faculty preceptors. Her expertise was integral while conducting this study. They would also like to thank Bin Ge, MD, MA, Office of Research, Biostatistics and Research Design Unit, School of Medicine, University of Missouri, for her assistance with data analysis, as well as all of their 25 rural community partners, 350 community-based physician preceptors, and the statewide Area Health Education Centers for supporting their program and mission to train more rural physicians for Missouri.

*Funding/Support:* The Health Resources and Services Administration (HRSA) provides a Model State-Supported Area Health Education Centers grant (U77HP01069-07-01) to Curators of University of Missouri–Columbia, Missouri.

*Other disclosures:* None.

*Ethical approval:* The University of Missouri–Columbia Health Sciences institutional review board approved this study (IRB project no. 1053899).

*Previous presentations:* The authors have previously presented some information from this study at the Jack Colwill Seminar, Department of Family and Community Medicine; April 4, 2012; University of Missouri–Columbia, Columbia, Missouri; at the 38th Annual Medical Student Education Conference; February 2–5, 2012; Long Beach, California; at the Central Group on Education Affairs, Association of Medical College Spring Conference; March 18, 2011; Omaha, Nebraska; at the 29th Annual National Rural Health Association Conference; May 17, 2006; Reno, Nevada; and at the 39th Annual STFM Spring Conference; April 29, 2006; San Francisco, California.

**Dr. Kane** is faculty director for clinical curriculum, University of Missouri School of Medicine, and associate clinical professor, Department of Family and Community Medicine, University of Missouri School of Medicine, Columbia, Missouri.

**Dr. Quinn** is program director, Area Health Education Center, Rural Track Pipeline Program, Department of Rural Health Programs, and assistant professor, Department of Family and Community Medicine, University of Missouri School of Medicine, Columbia, Missouri.

**Dr. Stevermer** is medical director, Area Health Education Center, Rural Track Pipeline Program, Department of Rural Health Programs, and clinical professor, Department of Family and Community Medicine, University of Missouri School of Medicine, Columbia, Missouri.

**Ms. Porter** is coordinator program/project support, Area Health Education Center, Rural Track Pipeline Program, Department of Rural Health Programs, University of Missouri School of Medicine, Columbia, Missouri.

**Mr. Webb** is associate dean, Department of Rural Health Programs, University of Missouri School of Medicine, Columbia, Missouri.

**Dr. Williamson** is vice chancellor for health sciences, University of Missouri School of Medicine, and professor, Department of Family and Community Medicine, University of Missouri School of Medicine, Columbia, Missouri.

**Dr. Burdin** is preceptor, Department of Family and Community Medicine, University of Missouri School of Medicine, Columbia, Missouri.

## References

1 UnitedHealth Center for Health Reform and Modernization. Modernizing Rural Health Care: Coverage, Quality and Innovation. Working Paper 6. Minnetonka, Minn: UnitedHealth Group; 2011. http://www.unitedhealthgroup.com/hrm/unh_workingpaper6.pdf. Accessed April 11, 2013.

2 Brendel B, Temmen L, Harvey B. Missouri Rural Health Biennial Report, 2010–2011. Jefferson City, Mo: Office of Primary Care and Rural Health, Center for Health Equity, Department of Health and Senior Services; 2011. http://health.mo.gov/living/families/ruralhealth/pdf/biennial2011.pdf. Accessed April 11, 2013.

3 Becker M, Porth L. Primary Care Physicians: The Status in Rural Missouri. Jefferson City, Mo: Missouri Hospital Association; 2011. http://web.mhanet.com/uploads/media/0711_Physician_Workforce_Report.pdf. Accessed April 29, 2013.

4 Shannon CK, Baker H, Jackson J, Roy A, Heady H, Gunel E. Evaluation of a required statewide interdisciplinary rural health education program: Student attitudes, career intents and perceived quality. Educ Health (Abingdon). 2005;18:395–404.

5 Rabinowitz HK, Diamond JJ, Markham FW, Santana AJ. Increasing the supply of rural family physicians: Recent outcomes from Jefferson Medical College's Physician Shortage Area Program (PSAP). Acad Med. 2011;86:264–269.

6 Rabinowitz HK, Diamond JJ, Markham FW, Wortman JR. Medical school programs to increase the rural physician supply: A systematic review and projected impact of widespread replication. Acad Med. 2008;83:235–243.

7 Quinn KJ, Kane KY, Stevermer JJ, et al. Influencing residency choice and practice location through a longitudinal rural pipeline program. Acad Med. 2011;86: 1397–1406.
8 Woloschuk W, Tarrant M. Does a rural educational experience influence students' likelihood of rural practice? Impact of student background and gender. Med Educ. 2002;36:241–247.
9 Denz-Penhey H, Shannon S, Murdoch CJ, Newbury JW. Do benefits accrue from longer rotations for students in rural clinical schools? Rural Remote Health. 2005;5:414.
10 Azer SA, Simmons D, Elliott SL. Rural training and the state of rural health services: Effect of rural background on the perception and attitude of first-year medical students at the University of Melbourne. Aust J Rural Health. 2001;9:178–185.
11 Zorzi A, Rourke J, Kennard M, Peterson M, Miller K. Combined research and clinical learning make Rural Summer Studentship Program a successful model. Rural Remote Health. 2005;5:401.
12 Halaas GW. The Rural Physician Associate Program: Successful outcomes in primary care and rural practice. Rural Remote Health. 2005;5:453.
13 National Center for Education Statistics. Status of education in rural America. http://nces.ed.gov/pubs2007/ruraled/exhibit_a.asp. Accessed April 11, 2013.
14 Isserman AM. In the national interest: Defining rural and urban correctly in research and public policy. Int Reg Sci Rev. 2005;28:465–499.
15 Pezzullo JC. 2-way contingency table analysis. http://statpages.org/ctab2x2.html. Accessed April 11, 2013.
16 Rabinowitz HK, Diamond JJ, Markham FW, Hazelwood CE. A program to increase the number of family physicians in rural and underserved areas: Impact after 22 years. JAMA. 1999;281:255–260.
17 Bowman RC, Penrod JD. Family practice residency programs and the graduation of rural family physicians. Fam Med. 1998;30:288–292.
18 Rosenthal TC, McGuigan MH, Anderson G. Rural residency tracks in family practice: Graduate outcomes. Fam Med. 2000;32: 174–177.
19 Association of American Medical Colleges. Medical School Graduation Questionnaire (GQ): 2012 All Schools Summary Report. Washington, DC: Association of American Medical Colleges; February 2012. https://www.aamc.org/download/300448/data/2012gqallschoolssummaryreport.pdf. Accessed April 11, 2013.