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Faculty Development

Enhancing Research in a Family Medicine Program: One Institution's Story

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Background and Objectives: *To enhance research productivity among East Tennessee State University's faculty, the Department of Family Medicine developed and implemented a multi-component initiative to expand multidisciplinary primary care research. **Methods:** The research support infrastructure expanded to include a family physician research director, three PhD faculty researchers, two research assistants, a statistician, and a grant/science writer. A monthly seminar series, quarterly workshops, and a formal mentoring program paired more-experienced with less-experienced faculty researchers. Through a competitive mechanism in which junior faculty submitted proposals, a multidisciplinary committee selected two family physician researchers to receive protected time to develop their research. **Results:** From 2001–2006, more than 25 experienced researchers served as mentors, lecturers, consultants, or reviewers. Fifteen mentor-mentee pairs were formed. Of 30 family medicine faculty, the number actively engaged in research, including project design, data collection, oral presentation of results, or journal article submissions, increased from seven (23%) to 19 (63%). From 2001–2006 the number of presentations at professional meetings increased, and articles in peer-reviewed journals increased nearly fivefold. Grant submissions increased, with 19 faculty members participating in grant-writing teams. Based on the success of this initiative, the program has expanded to include faculty members in general internal medicine and general pediatrics. **Conclusions:** Our multi-component initiative successfully builds and sustains a primary care research program.*

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Although 95% of medical conditions are evaluated and treated outside of hospitals, the greatest body of knowledge available to physicians is from research involving patients in tertiary care hospitals or with advanced or complicated medical conditions.¹ In spite of the recognized need for primary care research, research in family medicine has been slow to develop,² and the growth of research productivity in this discipline has been challenged by competing clinical and other academic demands.³

The Department of Family Medicine at East Tennessee State University (ETSU), an established department of 24 full-time family physicians and six nonphysician faculty, has devoted much of its effort to developing rural education programs, through which it established

extensive linkages to rural primary care physicians, nurse practitioners, and communities. Although there had been a general trend over the years toward increased publications and presentations, the number of peer-reviewed journal articles by departmental faculty had plateaued by 2001. The ETSU College of Medicine dean designated family medicine to lead the 2001 development of a research capacity-building initiative to be carried out from 2002–2006. An assessment of current needs and barriers to reaching research goals in family medicine, nursing, and public health guided the process. Descriptions of research interests and ongoing activities were exchanged among departments as a first step in establishing multidisciplinary research groups.

A literature review identified strategies to increase research productivity. Important predictors of research productivity included institutional/departmental environments with an emphasis on and support for research, departmental mentorship and leadership, and protected time for research.³ Many of these elements were used

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by the University of Missouri’s Grant Generating Project (GGP), begun in 1995 “to train and assist family medicine researchers to secure research funding as part of an overall strategy to increase research capacity in family medicine.”⁴ The 1-year GGP included writing a concept paper, grant-writing training, networking, mock reviews, mentoring, and peer support. As of 2006, GGP alumni reported 292 grants (\$102 million) funded.

Other efforts, such as scientific writing training in family medicine programs, resulted in increased publication rates.^{5,6} A university-community physician collaboration in Sweden combined a formal research methods course and a supervised research project.⁷ Similarly, Rosser and colleagues developed a 5-weekend research training program for Canadian family physicians.⁸ Through year 5 (2007), it involved more than 140 physicians. Each cohort participated in five 2-day programs over a 10-month period. Another example is Pennsylvania State University’s “empowerment model” faculty development program, which combined training and mentored project guidance for

educational, clinical, or research projects conducted by junior faculty.⁹

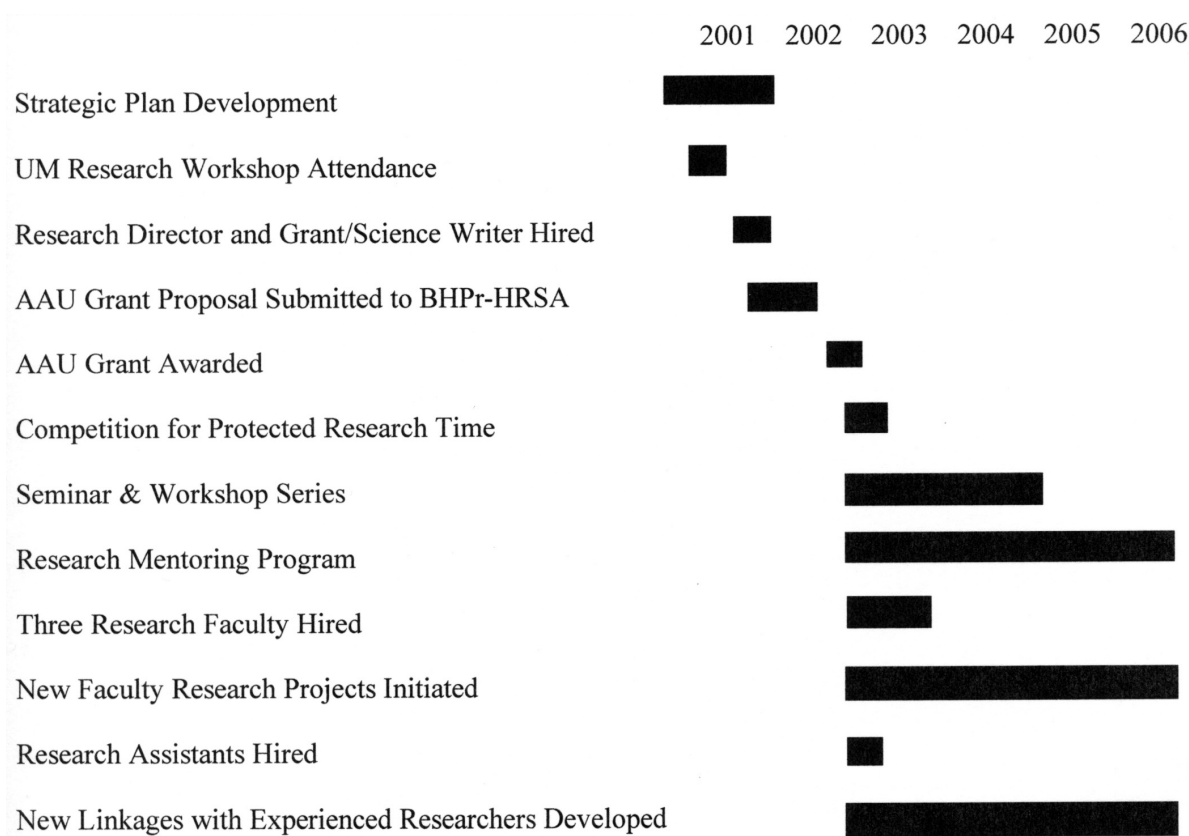
Although the aforementioned programs and others provide models for enhancing research in a variety of settings, there is less in the literature that tracks actual increase in research productivity across many parameters as a result of these efforts. We describe the initiative developed at ETSU and the subsequent effect on faculty research productivity.

Methods

The initiative began with an institutional self-study; three ETSU family physicians attended a research workshop conducted by the Department of Family and Community Medicine at the University of Missouri-Columbia. The workshop used a case-based approach to assist other family medicine departments in moving the level of their research forward. During this workshop the final research expansion plan was developed and critiqued. Figure 1 shows a timeline of ETSU research development activities from 2001–2006.

Figure 1

Timeline of Research Development Activities



Phase 1: Expanding the Research Infrastructure

Hiring Research Personnel

The initial phase, supported by institutional resources and an Academic Administrative Units (AAU) grant from the Bureau of Health Professions (BHPr) (HRSA #: D12 HP 00130-01), expanded the research support infrastructure to provide resources and expertise and to generate enthusiasm. The research director for primary care, a new position filled by an experienced family physician researcher, led the initiative. A grant/science writer explored sources of grant funding, wrote proposals, and assisted faculty in developing their writing skills. An epidemiologist, a health educator with rural community experience, and a psychologist whose research interests involved maternal and child health were hired as research faculty. Each became a liaison responsible for coordinating research in one of the three family medicine residencies and also initiated their own research programs. An existing statistical support position supervised two newly created research assistant (RA) positions.

Identifying Funding Sources and Opportunities

A recent analysis of NIH funding awarded to family medicine departments showed that half of awards were to nonphysician doctoral faculty, and many awards to physicians were to non-family physicians or to faculty in non-core areas such as cancer research.¹⁰ Primary care researchers are more competitive if they demonstrate previous scholarly accomplishments but to begin a small pilot research project, resources are needed for project design, pilot testing, and proposal writing.¹¹

Three sources of intramural research funds for pilot projects were developed or identified: (1) an ETSU primary care research grant program providing \$25,000 per year to fund up to five research projects, (2) university research development grants providing up to \$9,000 per project, to which primary care faculty seldom applied, and (3) a National Institutes of Health Center for Translational Research in Health Disparities (NIH Grant #1-R24-MD01106-01), a collaboration of the ETSU Colleges of Nursing and Medicine and Office of Rural and Community Health, providing funding for pilot primary care research projects. The grant writer also worked with faculty members to submit increased numbers of grant proposals to federal and foundation agencies.

Phase 2: Establishing a Multifaceted Program to Enhance Faculty Research Skills and Productivity

Mentoring Program

According to a Bureau of Health Professions-supported survey of family medicine departments, a significant obstacle to developing research capacity was the lack of mentoring.¹² A mentoring relationship increases research productivity and the chance of success for junior faculty.¹³ The ETSU program was patterned

after that described by Morzinski and colleagues¹⁴ and modified to specifically address acquisition of research skills, proceeding in five stages.

Organizational Readiness. The chair identified junior faculty who would benefit from establishing a mentor-mentee relationship, initially targeting tenure-track faculty. The research director interviewed prospective mentees to determine their research interests and needs.

Recruitment. Experienced researchers in family medicine, nursing, behavioral sciences, sociology, or anthropology were recruited via a letter from the Department of Family Medicine's chair. A list of areas of expertise was developed for each potential mentor.

Matching and Orientation. Descriptions of mentors and their research focus areas were given to prospective mentees who ranked their top three choices. The appropriate residency director, the chair, and the research director selected mentor-mentee pairs.

Ongoing Activities. Mentor-mentee pairs discussed the junior faculty member's research at least monthly. For the first 6 months, one-on-one meetings were in person. Thereafter, individual consultations were often by telephone or e-mail.

Monitoring and Revision. Formative evaluation surveys administered during the program indicated that the mentor-mentee pairing process needed to be ongoing. As new faculty members joined the department, they were given the opportunity to select mentors. Likewise, some long-term clinical faculty with little research experience decided during the course of this initiative to begin a research project. More experienced researchers requested mentoring in one or more research skills areas. An informal mechanism was created to provide skill-specific mentoring by the research faculty liaisons or director.

Seminar Series and Workshops

Although there is no best method for acquiring research skills, there is general agreement that these skills, not routinely taught in medical school, must be acquired through training.¹⁵ A recent study of grantees of the American Academy of Family Physicians (AAFP) Advanced Research Training Program reported that improved research, grant and publication writing ability, and leadership skills contributed to productivity.¹⁶ Attendance at conferences such as the annual Primary Care Research Methods and Statistics Conference in San Antonio, Tex, allows new researchers to acquire research skills and network with leading researchers.¹⁵

ETSU developed a monthly seminar series based on Henry's review of research skills necessary for medical school faculty.¹⁵ ETSU faculty and administrators and outside consultants lectured in their areas of expertise. Table 1 details the topics and content areas. Concepts presented in the seminars were applied to the junior faculty member's specific research project through activities with the mentor. During Year 1 and the first half of Year 2, basic research skills were presented (Table 1). During the latter half of Year 2, topics addressing advanced research skills alternated with formal presentations of research results.

Workshops on developing writing skills were created using the highly structured clinical inquiry (CI)¹⁷ format and generalizing in a subsequent workshop to writing for other article types. The developer of the CI format was a consultant for this initiative and participated in the workshops.

Mentor/mentee pairs and other interested research faculty and staff also attended interactive workshops on the use of computer-based and handheld resources to find the best evidence. Two workshops conducted by the faculty receiving protected time addressed the development of qualitative focus group methodology and survey design.

Selecting Faculty for Protected Research Time

Because lack of time for research was the barrier most frequently mentioned by academic physicians, and an optimal level of protected time is thought to be at least 40%–50%,¹⁸ we established a competitive mechanism for assigning protected research time. The mechanism was based on ETSU's Primary Care Research Grants and University of Toronto programs.¹⁹ Awardees received 40%–50% protected time to pursue primary care research for 2 ½ years. Interested faculty submitted a brief concept paper describing their research objectives, rationale, and proposed methods and provided information about their research background and letters of support. Table 2 lists concept paper requirements.

The research director, department chair, and director of research for the ETSU College of Nursing, plus internationally known consultants, reviewed proposals, conducted interviews, and selected two of the proposals submitted for funding. Upon selection, faculty awardees and their mentors met with the research director to set goals, including presentation of data at professional meetings, publishing articles in peer-reviewed journals, and competing for extramural funding. Both faculty members were expected to attend all

research seminars and workshops and to participate in the mentoring program. A research assistant (RA) was assigned to each grantee. The department established a policy of accountability using a contractual agreement.

Faculty Support

All tenure-track junior faculty members chose a research project. Goals and timelines were established through a research plan developed with a mentor and a research director. Data collection began in early 2003, with publication in a peer-reviewed journal as the goal, using local resources to carry each project to completion. RAs assisted all faculty with data collection, the grant/science writer helped them with manuscript development, and the statistician performed data analyses.

Program Evaluation

Methods to evaluate the ETSU research development initiative generally followed those of Brocato's and Mavis's national survey of research productivity in family

Table 1

Primary Care Research Skills Building Presentations 2002–2005*

<i>Skills Category</i>	<i>Topic</i>
Seminars	
Methods	Formulating answerable questions
Methods	Qualitative versus quantitative research
Content	Information-searching tools; literature search
Content	Critical literature appraisal
Methods	Building research capacity of individual faculty
Methods	Developing valid and reliable measures, external and internal validity, data analysis
Methods	Research to presentation—talks and posters
Management	Time management plans
Methods	Extramural funding—basic grant writing
Methods	Building research capacity of academic departments
Methods	Educational research
Methods	Community-based participatory research
Methods	Using reference management software
All	Faculty presentations of original research
Workshops	
Methods	Qualitative methods: semistructured interviews and data analysis
Methods	Quantitative methods: survey development and testing
Methods	Writing for Publication I: Clinical Inquiries
Methods	Writing for Publication II: Journal articles

* Skills-building seminars were not held as part of this initiative in 2006.

Table 2

Concept Paper for Research Release Time

Statement of research objectives:

- (1) Outline your research plan for the next 5 years and give a specific description of how you will proceed for the first 2 years. A timeline will be helpful.
- (2) Area(s) of research and specific questions to be addressed: In what way is this research compatible with your departmental mission? The College of Medicine mission?
- (3) Does the research area target improvement or increasing knowledge about one of the leading health indicators identified in Healthy People 2010?
- (4) Provide a list of proposed collaborators and what each will contribute to the project.
- (5) Describe the role of the senior mentor.
- (6) At what meetings will you present results? Where and when will you publish results?
- (7) If you are chosen you will be expected to apply for extramural funding. To what agencies or programs do you feel it would be appropriate to apply for support?

Statements related to individual's research background:

- (1) Educational background, including any formal or informal research training and experience prior to current position.
- (2) Are you currently participating in any community-based or rural programs that serve underserved or high-risk populations? Briefly describe.
- (3) Current CV with emphasis on research activities for the last 5 years.

medicine departments at US medical schools.³ These authors' measures included peer-reviewed journal articles, national conference presentations, and national grants submitted or funded. We included presentation at regional conferences if those presentations required peer-reviewed abstract submission and a tabulation of grant proposals submitted to state agencies or foundations. Finally, we calculated the costs of implementing the program.

Results

More than 25 experienced researchers participated from 2001–2006. These included two research consultants, the new research faculty members, statisticians, an information technology specialist, nursing researchers, and three family physician researchers. To date, 15 mentor-mentee pairs have been formed. Research faculty liaisons to each residency site have helped clinical research projects move forward. More than 50 faculty, residents, and staff from several disciplines attended seminars held on the ETSU campus and Web cast to the Kingsport and Bristol residencies.

Research Productivity

Each of the 15 faculty mentees is conducting a research project; some mentored residents and medical students in small projects. In 2004, the Department of Family Medicine initiated Primary Care Research Day, a regional conference with research poster displays and oral presentations by 100 researchers from five states, which has become an annual event.

Prior to this initiative only seven of 30 full-time family medicine faculty members were engaged in research, defined as participating in a research project in any role (eg, designing the methodology, collecting data, developing and giving presentations in any professional venue, and writing for publication). Currently, 19 faculty members are engaged in research, seven of whom never participated in research or had not been active researchers for some time.

Tables 3 and 4 show the increase in peer-reviewed journal articles and presentations from 2001, prior to the initiative, through 2006. In general, a large increase in presentations occurred, many of which resulted in publications; the annual total of peer-reviewed journal articles from departmental faculty increased between fourfold and fivefold from 2001–2006.

In 2001 there were no submitted research grants. By 2004, there were 14 grants submitted and 13 awarded. Numerous requests for funding opportunity searches resulted in a

Table 3

Number of Peer-reviewed Journal Articles With ETSU Family Medicine Faculty Authors 2001–2006*

Year	By Clinical Faculty**	By Research Faculty***	By Clinical-Research Faculty Collaborations	Total Articles
2001	4	0	0	4
2002	6	8	0	14
2003	5	6	1	12
2004	12	7	3	22
2005	10	10	2	22
2006	7	6	5	18

ETSU—East Tennessee State University

* Numbers represent articles rather than authors. Therefore one article may have more than one ETSU faculty member as an author.

** "Clinical faculty" are those full-time ETSU faculty members in the Department of Family Medicine prior to the initiative. These faculty members are family physicians or clinical psychologists in practice at one of the three residency sites.

*** "Research faculty" are those faculty members recruited for the initiative. Articles by research faculty prior to joining ETSU are not counted. The research director joined ETSU in December 2001. One research faculty member joined ETSU in 2002; two joined in 2003.

Table 4

Number of Professional Presentations 2001–2006*

Year	By Clinical Faculty**	By Research Faculty***	By Clinical-Research Faculty Collaborations	Total Presentations
2001	16	0	0	16
2002	22	1	1	24
2003	18	5	5	28
2004	26	13	6	45
2005	13	11	4	28
2006	13	6	3	22

ETSU—East Tennessee State University

* Numbers represent presentations rather than authors. Therefore one presentation may have more than one ETSU faculty member as an author. Only presentations at regional, national, or international professional meetings requiring abstract submission and peer-review were counted.

** “Clinical faculty” are those full-time ETSU faculty members in the Department of Family Medicine prior to the initiative. These faculty members are family physicians or clinical psychologists in practice at one of the three residency sites.

*** “Research faculty” are those faculty members recruited for the initiative. Presentations by research faculty prior to joining ETSU are not counted. The research director joined ETSU in December 2001. One research faculty member joined ETSU in 2002; two joined in 2003.

bimonthly newsletter that identified federal and private funding opportunities matched to faculty research interests. Six family medicine researchers submitted proposals to the ETSU Research Development Committee; three received grants from this program. Extramural funding became a reality, as the research director and one research faculty member were co-investigators for a \$1.2 million grant to establish an NIH-funded Center for Translational Research in Health Disparities.

Nineteen family medicine faculty members participated in grant writing teams between 2002 and 2006. Table 5 shows the increase in the total grant proposals submitted and funded. Between 2002 and 2005, 11 grant proposals were funded, for a total of \$5 million in direct costs (Table 5). One grant (\$800,000) awarded in 2005 is expanding the research development initiative to the other two primary care departments.

For many years, the family medicine department sponsored summer medical student research. Previously, one to four researchers identified projects for which student assistants were needed. During the summer of 2004, nine projects were conducted.

Program Costs

The cost of initiating and carrying out a comprehensive research development program was significant. Although both the College of Medicine and departmental administration provided support, obtaining extramural

funds from BHPH-HRSA was key to full implementation.

The two research faculty members were supported by departmental funds. Salary levels for two existing faculty positions were increased to \$168,000 (combined annual salary for both positions). Half of the third research faculty position was supported by departmental funds (\$30,000/year) and half by the College of Public Health. Faculty hired for these three positions were fully supported for 3 years; a percentage of their salaries is now supported through extramural funding. A portion of the research director’s salary and all of the grant/science writer’s salary (\$40,000/year) were supported by funds from the dean’s office, with the remainder of the research director’s salary supported by the department (\$175,000). The dean provided salary for a clerical support position (\$20,000/year) for an initial institutional commitment of \$463,000/year.

Academic administrative units grants from the Bureau of Health Professions of the Health Resources and Services Administration (HRSA) totaled \$600,000 from 2002–2005. These funds covered 40% of the faculty protected time (10% provided by the department), salaries for two full-time RAs (\$28,000/year each), seminar and workshop-associated costs, and travel for consultants and for the two selected faculty members for presentations and participation in the GGP at professional meetings.

Discussion

We demonstrated that a comprehensive approach to building research capacity in our department, including infrastructure support, personnel, assigned men-

Table 5

Grants Proposals Submitted 2001–2006

Year	Extramural Grants Submitted	Extramural Grants Awarded	Intramural Grants Awarded
2001	0	0	0
2002	7	4	6
2003	7	3	2
2004	14	7	6
2005	5	2	3
2006	13	7	0

tors, and education, resulted in increases in faculty publications, presentations, and grant submissions and awards. Faculty members now recognize that academic productivity is an important part of their work, and seeking external funding is critical. Although an alternate approach to developing family medicine research is to have a smaller number of full-time researchers conducting the preponderance of research in collaboration with other disciplines,²⁰ the department wished to engage many more faculty members in conducting some research to have a critical mass of researchers, particularly in the three residencies. These programs, which are at least 30 miles apart, otherwise had little opportunity for research faculty to interact across residencies prior to this effort.

Lessons Learned

We learned that some factors are key to successful research enhancement in primary care. First, just funding researchers does not mean they will become productive. It is critical to use well-considered criteria to select researchers, as some potentially productive researchers will move away from research to other career paths. Second, it is important that early in faculty members' careers they receive training in skills and are provided with resources leading to increased productivity: hands-on training in scientific writing and grant writing, mentoring with experienced researchers, release time for conducting research, and research assistance support where possible.

The most critical resources that lead to increased production are release time and RA support. If resources are limited, RAs may be shared and part-time graduate assistants employed instead of RAs. For our initiative, the grant/science writer spent about half time developing faculty workshops, assisting faculty with research design, conducting research, putting together writing teams, and writing manuscripts. If there are other faculty members who can play this role, grant writing may be a part-time position.

This initiative took an enormous amount of commitment at every level and significant, consistent funding over a period of several years. However, with this commitment, rewards in increased publications and new grant support happened rather quickly. Finally, sustaining the initiative requires continued enthusiasm and reinforcement from administrators and mentors, because competition for the family physician's time is ever present.

The Future

In 2005, a new HRSA grant (D54 HPO5443) provided support to extend our faculty development program to internal medicine and pediatrics researchers. The model is unfolding similarly, with three grantees, one each

in internal medicine, pediatrics, and family medicine, conducting research, presenting results, and writing their first journal articles. Faculty members who began their research during the first initiative continue to do research, publish, and develop grant proposals. New researchers from the other two departments participate in mentoring, skills-building sessions, and receive staff support. Two family medicine research faculty members recently received substantial research funding. A \$100,000 contract (2006) supported a survey of the need for physicians, physician assistants, and nurse practitioners for the Tennessee Demand Assessment Project of the Tennessee Rural Health Recruitment and Retention Center. A \$1.5 million award from the Tennessee Governor's Office of Care Coordination will support implementation and evaluation of a statewide program to prevent smoking during pregnancy.

In the current federal funding climate, extramural resources to develop research in primary care are scarce. ETSU grant proposals to federal agencies supporting health disparities research and community-based research with underserved groups have been successful. Faculty development and research capacity-building programs have been funded through Title VII of the Public Health Services Act. Without federal mechanisms to support these programs the future of family medicine research is uncertain. It is critical for those who make funding decisions to recognize the importance of building the knowledge base on which primary health care rests and to understand that changes do not happen overnight.

ETSU has made a good start, but there are challenges ahead. Family medicine faculty at ETSU have not yet had a funded R01 research grant application to NIH, although scores have improved with resubmission, and one research faculty member recently received his first NIH R03 small grant. Publication rates have increased but can still improve. We are confident that the research collaborations and mentorships begun through this initiative will be sustained for at least several years. Through continued submission of federal proposals and exploration of alternative sources of funding, ETSU's primary care faculty, led by our family medicine initiative, will continue to find resources to support this critical area of research.

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