Faculty promotion in academic medicine is largely based on excellence in teaching and scholarship. Peer-reviewed publications are a principal part of the body of evidence documenting research productivity and faculty progress toward promotion. Although the majority of published research in family medicine comes from individuals in academic departments, many faculty members in residency program settings also publish as part of their personal and academic mission. Young et al found that the majority of family medicine residency programs in 2006 had at least one faculty family physician who participated in research, with 86% of medical school-based programs, 50% of the nonmedical school-affiliated programs, and 43% of the community-based medical school-affiliated programs reporting at least one published paper by a physician faculty member in the last 3 years.\(^1\) In addition, the Residency Review Committee (RRC) has recently emphasized faculty scholarly work with an active research component.\(^2\)

Many faculty who wish to advance their academic careers seek additional academic training though participation in faculty development fellowships. Fellowship-trained primary care physician faculty in medical school departments were more likely to have a refereed publication and more likely to achieve senior academic rank than were their peers.\(^3\) Faculty graduates from three part-time faculty development fellowship programs also reported high satisfaction with training; markers of success included 32% having published peer-reviewed articles.\(^4\)

Despite additional training, many family medicine faculty members have difficulty achieving academic productivity. For example, family medicine graduates of the National Research Service Award (NRSA) Program for Research in Primary Medical Care reported fewer subsequent publications than their general internal medicine and general pediatric peers (12.5% versus 36.5%), in part due to less post-fellowship mentoring,
more time on clinical work, and less time devoted to re-
search.6 Other reported barriers to publication included
lack of time, failure to submit manuscripts, publication
in forms other than peer-reviewed journal articles, and
issues of ineffective relationships with coauthors.6,7

Facilitators of academic scholarship have been identi-
died to some extent. Bland et al developed a conceptual
model of individual, institutional, and leadership char-
acteristics that predicted faculty research productivity
in the setting of a large medical school.8,9 Brocato et
al, in a similar setting, found that psychological and
cognitive factors, including enhancing research skills,
in-depth knowledge of one's research area, networking,
and research expectations, were most predictive of
manuscripts submitted.10 Collegial relationships also
facilitate productivity, and fellowship graduates in one study attributed some of their success to these
relationships.11

We found that graduates of our fellowship program,
despite graduating with prepared manuscripts of their
fellowship projects, rarely published their results. This
study's purpose was to understand factors related to
scholarly project publication among fellowship gradu-
ates, few of whom came from academic departments
within medical schools, and to explore the role of col-
legial relationships and institutional characteristics on
ever having published and number of publications.

Methods
Subjects and Setting
We surveyed 5 years of graduates (2000–2004) from
the Michigan State University (MSU) Primary Care
Faculty Development Fellowship Program (n=90). We
selected this group to allow a reasonable amount of
time to have passed for their projects to be published
but also to keep their memory fresh about changes
in the collegial relationships since graduation. In our
2000–2004 graduate follow-up survey (not linked to the
present survey), most respondents (87.5%) were non-
tenure track clinician-educator faculty. Respondents
also reported spending an average of 12.7% of their
total effort on research and scholarly activities.

The MSU Fellowship Program is a year-long,
part-time faculty development fellowship program. It
has been conducted for the past 29 years, supported
by grants from the Health Resources and Services
Administration (HRSA). Each year, approximately
18 primary care physician faculty attend 5 weeks of
on-campus training in a core curriculum of clinical
teaching/evaluation, research/evidence-based medi-
cine, leadership/management, instructional technology,
core competencies, scholarly communication (with
an emphasis in writing for publication), and career
planning. Ten percent of the core curriculum time is
devoted to scholarly communications. At their home
institutions, fellows complete readings, assignments,
and a scholarly research, curriculum, or leadership
project with guidance from a faculty mentor. At the end
of their fellowship year, participants present the results
of their scholarly projects at a fellows' conference and
submit a final manuscript formatted for publication.
The manuscript undergoes both internal and external
faculty review. The fellowship also provides an "after-
care" program to assist fellows with project completion
and publication.

Instruments
The survey of graduates consisted of three parts.
First, we requested demographic and current job in-
formation. Second, we asked about publication of their
fellowship project in a peer-reviewed journal. We also
asked about facilitators and barriers to publication of
their project, the number of other journal publications,
and about several types of colleague relationships, in-
cluding mentors, peers, collaborators, and consultants
(see Appendix 1 for definitions), including the number
of these colleagues that they had during the fellowship
and at follow-up. We included a question on academic
physician socialization using a scale developed by
Morzinski and Fisher.12

The final section of the instrument was adapted from
a previously validated survey designed by Bland et al.10
There were 26 items addressing various components
of the research environment, including clear goals,
research emphasis, research culture, group climate,
governance, decentralized organization, communica-
tion, resources, faculty size and make-up, rewards,
hiring practices, and leadership. We added three items
on teaching, collaboration, and publication expectations
based on our own beliefs and experience. Respondents
were asked to rate each of the 29 characteristics as they
applied to their department/program on a 5-point scale
from 0 (not at all) to 5 (completely), with higher scores
representing more research-facilitative environments.

Procedures
The study was reviewed and approved by MSU's
institutional review board. The survey was delivered
to graduates via e-mail on SurveyMonkey, a secure en-
vironment with features that facilitate survey research.
One week after the initial contact, an e-mail reminder
was sent, and in three weeks a second e-mail was sent
to all subjects. After 3 months, a final personalized
plea to complete the online survey was sent by program
county members.

Data Analysis
Descriptive statistics were used to summarize the
data. We used the Kolmogorov-Smirnov test of normal-
ity and found one key variable, number of publications,
was not normally distributed (Z=1.16, P=.14).Written
comments were reviewed and categorized indepen-
dently by two investigators, who then met to compare results and resolve discrepancies.

To obtain a score on the Bland instrument, we summed the scores of the 26 items to create a total score with a range of 0 to 130; a zero score noting that the characteristics describe one’s department “not at all” and a score of 130 noting that the characteristics describe one’s department completely. We also summed the scores of all 29 items to create an expanded Bland score with a potential range of zero to 145. Finally, we created three subscales from the 26 Bland items to describe the three domains used to develop her original scale—individual characteristics, institutional characteristics, and departmental leadership characteristics (Table 1).

To compare numbers of colleagues and changes in relationships with colleagues (mentors, peers, collaborators, and consultants) with number of publications, we used the Wilcoxon signed rank test to determine whether the observed differences and changes were significant. We used t tests to compare the means of the Bland subscales, the Bland score, and the expanded Bland score between those who had ever published or never published a peer-reviewed manuscript. We used Spearman rank correlation coefficients to explore associations between the Bland subscales, the Bland score, the expanded Bland score, and numbers and change in mentors, peers, colleagues, and consultants with number of publications. We used ANOVA to test the association between the number of publications and fellowship track (curriculum, research, educational leadership).

Table 1

<table>
<thead>
<tr>
<th>Characteristic</th>
<th>Ever Published (n=27)*</th>
<th>Never Published (n=28)</th>
<th>P Value (t test)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bland subscale: Individual†</td>
<td>21.2</td>
<td>15.2</td>
<td>.01</td>
</tr>
<tr>
<td>Bland subscale: Institutional‡</td>
<td>31.3</td>
<td>25.1</td>
<td>.06</td>
</tr>
<tr>
<td>Bland subscale: Leadership§</td>
<td>16.4</td>
<td>10.6</td>
<td>.001</td>
</tr>
<tr>
<td>Total Bland Score (range 15–117)</td>
<td>69.1</td>
<td>51.5</td>
<td>.01</td>
</tr>
<tr>
<td>Expanded Bland (range 22–131)</td>
<td>77.2</td>
<td>57.9</td>
<td>.01</td>
</tr>
</tbody>
</table>

*Bland scores were not available for one individual who published and four who never published.
† Individual subscale (eight items): personal motivation, in-depth knowledge, basic research skills, socialization, work habits, simultaneous projects, orientation, autonomy.
‡ Institution (12 items): clear goals, culture, positive group climate, mentoring, communication, recruitment, resources, work time, diversity, rewards, brokered opportunity, decentralized organization.
§ Leadership (six items): career development, research emphasis, governance, local peers, professional network, leadership.

Results

Demographic Data

Our response rate was 63 of 90 fellowship graduates (70%). The mean age of respondents was 41 years, with a median age of 39. Thirty-two (51%) were women, and 47 (75%) were Caucasian. Currently, 36 were assistant professors, 12 were associate professors, and two were instructors. Thirteen respondents had no academic title, but only one of them was not in an academic/teaching practice. Respondents reported working for a mean of 6.4 years in education (median 6) with a range of 3 to 12 years and had been in their current positions for a mean of 4.2 years (median 4) with a range of 3 months to 12 years. Most respondents (67%) reported being in the same academic unit or department as they were during attendance in the fellowship.

Publications

Seven respondents (four research track and three curriculum track—11% of the total group) had published the results of their fellowship project within 1 to 4 years, and another three had published papers related to their project even though they did not publish the results of their projects. Twenty-eight respondents (44%) reported publishing at least one paper; two others had published abstracts. Among those who published papers, the mean number of publications was three (median two) and the range was one to nine. There were no differences in number of publications between men and women (2.9 versus 3.1, P=.85). There were fewer curriculum track fellows having ever published a paper compared with their colleagues in the research and educational leadership tracks (n=9/32, 5/8, 14/23, respectively, P=.03, Fishers Exact Test). There was no association between fellowship track and number of publications (P=.36).

Barriers and facilitators for publication of their project results are shown in Table 2. The most common barriers were lack of time and assistance, inability to finish the project, and rejection of a submitted paper. Mentors (n=3) and fellowship instruction (n=2) were the most common facilitators.

Academic Relationships

Changes in academic relationships over time are shown in Table 3. We saw an increase in all academic relationships, with few reporting decreases. More importantly, the number of fellows having no academic relationships dropped considerably.

Most fellows (n=39 [62%]) agreed that the fellowship had a positive effect on forming academic relationships. In solicited comments about the influence of the fellowship on these
There was a positive association between ever having published and the current number of collaborators (2.7 versus 1.7, respectively, \( P = 0.005 \)), collaborator change (2 versus 1, \( P = 0.03 \)), the current number of consultants (1.3 versus 0.7, \( P = 0.01 \)), and the change in consultants (0.9 versus 0.3, \( P = 0.03 \)).

There was no correlation between the current number of mentors, peers, collaborators, or consultants and the number of publications. However, the number of publications was positively correlated with an increase in the number of mentors (RS statistic = 0.45, \( P = 0.01 \)) and peers (RS = 0.45, \( P = 0.01 \)) since graduation from the fellowship program.

When looking at the other survey items related to academic relationships, advisor/mentoring functioning (RS = 0.40, \( P = 0.03 \)) and productive local peer support (RS = 0.42, \( P = 0.02 \)) were also significantly correlated with number of publications.

### The Bland Score and the Role of the Academic Institution

The mean Bland score was 61.7, and the median was 59. The mean score for the expanded Bland instrument was 69.0, with a median of 63.

With respect to ever having published, the Bland subscales of individual and leadership, and the total and expanded Bland score, were positively associated with having ever published a manuscript (Table 1). There was a significant moderate correlation between the number of publications and the Bland subscales of institution and leadership (RS = 0.40, RS = 0.41, respectively), the

---

**Table 2**

Barriers and Facilitators for Publication (50 Respondents)

<table>
<thead>
<tr>
<th>Barrier</th>
<th>n</th>
<th>Facilitator</th>
<th>n</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lack of time</td>
<td>18</td>
<td>Home/fellowship mentor</td>
<td>3</td>
</tr>
<tr>
<td>Never finished project/unable to implement/lost data</td>
<td>11</td>
<td>Instruction during fellowship</td>
<td>3</td>
</tr>
<tr>
<td>Paper rejected</td>
<td>8</td>
<td>Gained confidence</td>
<td>1</td>
</tr>
<tr>
<td>Lack of help</td>
<td>8</td>
<td>Experience of presenting poster</td>
<td>1</td>
</tr>
<tr>
<td>Poor quality project precluded publication</td>
<td>4</td>
<td>“Ton of work and a little luck”</td>
<td>1</td>
</tr>
<tr>
<td>Lazy/not motivated</td>
<td>4</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Left position</td>
<td>2</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Not personal goal to publish</td>
<td>2</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ongoing project</td>
<td>2</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Lacked confidence</td>
<td>2</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Change in paradigm</td>
<td>1</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Respondents could make more than one comment

relationships, respondents most often reported that the gain in understanding the value of these relationships and the provision of knowledge, skills, and expectations enabled them to make these connections (Table 4). Fifteen of the 20 respondents reported no effect of the fellowship on relationship building due to limited home mentors and collaborators, already being in a rich academic environment, and personal characteristics such as poor fit and job transfer.

### Table 3

Academic Relationships Among Fellowship Graduates Over Time

<table>
<thead>
<tr>
<th>Characteristic</th>
<th>Time of Fellowship</th>
<th>Time of Survey</th>
<th>Positive Change</th>
<th>Negative Change</th>
<th>No Change</th>
<th>( P ) Value* (Wilcoxon)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mentors</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mean (range)</td>
<td>1 (0–4)</td>
<td>1.8 (0–12)</td>
<td>26</td>
<td>4</td>
<td>28</td>
<td>&lt;.0001</td>
</tr>
<tr>
<td>No mentor</td>
<td>19</td>
<td>9</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Peers</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mean (range)</td>
<td>3.3 (0–15)</td>
<td>5.8 (1–22)</td>
<td>38</td>
<td>3</td>
<td>16</td>
<td>&lt;.0001</td>
</tr>
<tr>
<td>No peers</td>
<td>9</td>
<td>0</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Collaborators</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mean (range)</td>
<td>0.49 (0–6)</td>
<td>2.27 (0–8)</td>
<td>39</td>
<td>2</td>
<td>17</td>
<td>&lt;.0001</td>
</tr>
<tr>
<td>No collaborator</td>
<td>39</td>
<td>9</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Consultants</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mean (range)</td>
<td>0.3 (0–1)</td>
<td>1.05 (0–4)</td>
<td>25</td>
<td>3</td>
<td>26</td>
<td>&lt;.0002</td>
</tr>
<tr>
<td>No consultant</td>
<td>47</td>
<td>17</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

* Significant increase; we excluded cases that had missing values.
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Table 4
Comments* From Respondents About the Role of the Fellowship on Establishing Academic Relationships

<table>
<thead>
<tr>
<th>Comment</th>
<th>Count</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gained better understanding of the value and types of academic relationships</td>
<td>14</td>
</tr>
<tr>
<td>Provided with skills (eg, communication) that enabled acquiring relationships</td>
<td>11</td>
</tr>
<tr>
<td>Requirement for home mentor for the fellowship project</td>
<td>5</td>
</tr>
<tr>
<td>Networking opportunities provided by the fellowship</td>
<td>4</td>
</tr>
<tr>
<td>Gained knowledge that facilitated forming these relationships</td>
<td>3</td>
</tr>
<tr>
<td>Having a high-quality project attracted collaborators</td>
<td>2</td>
</tr>
<tr>
<td>Motivated to form relationships</td>
<td>1</td>
</tr>
</tbody>
</table>

*More than one comment could be made by an individual respondent

Discussion

We found that publishing the results of their fellowship scholarly projects presented several challenges to our fellowship graduates. Having time to work on scholarship remains one of the most important barriers for junior faculty, who also reported an inability to complete projects, lacked assistance in doing so, and received manuscript rejections by journals.

Not surprisingly, academic relationships fostered publications in our study but in interesting ways. Fellows were more likely to ever publish if they reported they had more consultants and collaborators. This may indicate that encouragement or pressure from sources outside of one’s close network (mentors and peers) fostered at least an initial publication. Mentors and peers but not collaborators and consultants were important for maintaining publication productivity. Fellows who increased the size of their academic networks with new mentors and peers and had ties to local mentors/advisors and productive local peers reported more publications.

The type of scholarly project chosen was significantly related to having ever published. We suspect that having a completed research project is for many fellows the entrée into their first publication. Fellows choosing curriculum development projects were generally not able to complete their project during their fellowship year. These projects require additional time to implement and to collect evaluation data.

Factors such as type of faculty appointment and a supportive institutional environment are likely to play major roles in predicting manuscript publication success. We were hoping to identify aspects of the institution regardless of program type that were strongly correlated with publication. Most of our fellowship program graduates are clinician-educator faculty in community-based residency training programs that rarely place an expectation of publishing scholarly work. However, residency programs can provide important support systems including a collegial network that has been shown to increase academic activity. While expectation for research productivity and publication were moderately correlated with numbers of publications in this study, advisor/mentor functioning and teaching expectations had similar positive correlations. It is likely that having sufficient time for research is a critical element, but this was reported by only five of our fellowship graduates. We did not have enough subjects to further refine the instrument or develop predictive models for publication success. In future research, we hope to explore these relationships using a larger sample.

Several barriers to publication reported by respondents are potentially remediable during fellowship training. Faculty can assist fellows in selecting projects that are novel, feasible, likely to be completed, and more likely to result in publication. Because protected time has been reported as a major barrier to publication, faculty can assist fellows with time management and negotiating skills to create more time for scholarly work and writing for publication. Finally, preparing fellows for manuscript rejection and providing ongoing support for revision may be helpful in reaching publication.

Limitations

There are several limitations to this study. Our respondents were mostly clinician-educators beginning their academic careers. They often came from programs with low expectations for scholarly work and publication. They may not be, however, representative of all junior faculty because they chose to participate in a faculty development fellowship program. Second, the time frame for follow-up in the most recent cohort was only 3 years, which was a shorter time than for the first cohort (7 years). However, most fellows who published their scholarly project results did so within 1 to 4 years. In addition, the rating of the academic environment was from the perspective of the graduates and may not accurately reflect characteristics of the institution.

Conclusions

In summary, although few fellows published the results of their scholarly projects, 44% of our fellowship graduates received manuscript rejections by journals. This indicates that encouragement or pressure from sources outside of one’s close network (mentors and peers) fostered at least an initial publication. Mentors and peers but not collaborators and consultants were important for maintaining publication productivity. Fellows who increased the size of their academic networks with new mentors and peers and had ties to local mentors/advisors and productive local peers reported more publications.

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graduates published at least one paper. Factors including lack of time and assistance, inability to finish the project, and rejection of a submitted paper were commonly reported barriers. Strong academic relationships were facilitative, with increasing numbers of local mentors and peers being most influential on numbers of publications. Aspects of the institutional environment were also found to be moderately correlated with publication success, but no single factor was strongly correlated with numbers of publications. Fellowship training can provide important skills in skill building, modeling, and developing mentoring relationships, but is clearly not sufficient to ensure publication success. There is a body of literature about the academic productivity of faculty in resource-rich environments that helps to raise the ceiling for potentially elite scholars. Part-time academic fellowship programs, however, are designed to raise the floor of scholarship so that more faculty can participate in generating and disseminating new knowledge.

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Appendix I

Definitions Provided to Respondents for Types of Colleagues Who Can Be Helpful to One’s Career

- **Mentors**, who are often in advanced career stages. They foster academic identity, confidence, and career advancement. Mentors might link someone to new opportunities and people or advise on career goals.

- **Peers**, who are often at similar career stages. They provide informal feedback and friendship. With peers a faculty member might discuss difficult students or team teach a continuing medical education workshop.

- **Collaborators**, who work directly with you on projects. They may be mentors or peers who plan or develop curricula or conduct research with you.

- **Academic consultants**, who provide specialized help in activities and projects that aid efficiency and quality. Academic consultants might assist with data analysis or edit meeting abstracts.

References


