



The Research Mentoring Relationship in Family Medicine: Findings From the Grant Generating Project

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BACKGROUND AND OBJECTIVES: Mentoring has been acknowledged as a critical factor in the development of family medicine academicians. Specific aims were to describe the research mentoring in family medicine from the experience of both mentors and protégés and identify characteristics that mentors and protégés associated with a successful mentoring relationship. The Grant Generating Project (GGP) Fellowship, a training and mentoring program for family medicine researchers, provided a natural opportunity to study these issues and better understand what is successful in research mentoring.

METHODS: Separate mentor and protégé surveys measured perceptions about the extent of mentoring assistance, perceived relationship success, costs and benefits of the relationship, and the nature and duration of the relationship. Correlations between demographic characteristics and the mentoring relationship were also examined.

RESULTS: Mentors were generally professors (78%), male (82%), with a mean age of 53 years, while protégés were assistant professors (53%) and almost evenly divided between male (51%) and female (49%) with mean age of 44 years. Both mentors and protégés describe the mentoring relationship in general to be of benefit to both mentor and protégé. Nonetheless, statistically significant differences between mentor-protégé responses were found for nine of the 20 survey items. Mentors tended to give higher values in their ratings of specific mentor-protégé relationship variables. Significant positive correlations were found between benefit, quality of the relationship, and mentoring assistance and the number of hours per month of mentor-protégé interaction, the number of mentor-protégé meetings per month, and the number of months the mentor worked with the protégé. Mentor-protégé acquaintance before the GGP fellowship was significantly correlated with cost, benefit, and mentoring assistance.

CONCLUSIONS: This study shows agreement between mentor and protégé regarding the mentors' ability to promote the protégés, provide important technical skills, convey respect for the protégés, and serve as a friend and role model. Protégés tend to be more connected with their colleagues and with their profession, perhaps in part because the mentoring relationship facilitates networking opportunities provided by the mentor. In particular, excellent mentors can provide protégés with opportunities to meet other influential scholars at conferences and/or through various forms of correspondence. Such relationships can be helpful to the protégé in developing a constellation of mentoring relationships that may result in more successful research careers. Future studies should examine the relationship upon various outcomes.

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In the developing culture of the primary care Patient-centered Medical Home,¹⁻⁴ the Future of Family Medicine Project calls for generating new knowledge that can be "integrated into the values, structures, and processes of family medicine."⁵ However, in a national survey of family medicine residencies, only half of the programs produced research of a nationally recognized caliber.⁶ Mentoring has been acknowledged as a critical factor in the development of family medicine academicians and researchers. For example, in one family medicine department that implemented a mentoring process over a 5-year period, the number of faculty engaged in research increased from seven to 19, and journal articles increased fivefold.⁷

Studies consistently support the hypothesis that a successful mentorship relationship facilitates preparation for careers in academe. The impact of being trained and mentored by a productive scholar is

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substantial.⁸ However, in a recent review of the research literature of academic mentoring, Johnson⁸ notes that, overall, this literature, compared to the literature from research in work organizations, is sparser and more variable. Nonetheless, these studies suggest that faculty mentors enhance professional skill development, network connections, initial employment, professional confidence and identity development, career eminence, program and institution satisfaction, and psychological health. This study describes the mentoring relationship from the perspective of both mentors and protégés. Future studies should examine the relationship upon various outcomes.

Protégés tend to be more connected with their colleagues and with their profession, perhaps in part because the mentoring relationship can facilitate networking opportunities provided by the mentor. In particular, excellent mentors can provide protégés with opportunities to meet other influential scholars at conferences and/or through various forms of correspondence. Such relationships can be helpful to the protégé in developing a constellation of mentoring relationships that may result in more successful research careers.

Stange and Hekelman, discussing research mentoring in family medicine, note the longstanding view of mentoring as “an important mechanism for facilitating...personal and professional development”⁸ and identify several needs likely to be met by a mentor, including professional socialization, role modeling, nurturing, teaching, and advocacy.⁸ Mentors can promote psychological well-being throughout life and support the self-image, self-worth, and self-esteem of the protégé.⁹ Johnson and colleagues note the potential value of mentoring as a strategy for enhancing career development among minority faculty.¹⁰

Faculty development models have used external mentors to stimulate rapid growth and productivity in building faculty research capacity. One university developed an external

mentor program to assist faculty in developing a 5-year research career trajectory and developing a research proposal for extramural funding, as well as providing critical review of proposals and manuscripts. This model led to an increase in proposal submissions and the number of faculty who submitted proposals as well as a positive environmental ethic of high achievement.¹¹ Other studies report enhanced research activity of primary care fellows, increased grant and publication submissions, and academic advancement.^{12,13} A systematic review concluded that although academic mentoring is perceived as valuable and valued, the actual evidence base is less strong, and additional research is needed to support the value of the mentoring relationship.¹⁴

This paper helps fill an important gap in our knowledge of research mentoring in family medicine by describing the nature of research mentoring as experienced by mentors and protégés and identifying differences and similarities in mentors' and protégés' responses to selected survey questions.

Methods

Grant Generating Project

The Grant Generating Project (GGP) Fellowship, a family medicine research grantsmanship program, has utilized a similar mentoring strategy to develop family medicine faculty from throughout the United States and Canada, and an assessment of that program provides evidence of an increasing track record of grant submissions and receipt of federal, state, and private foundation funding.¹³

The GGP Fellowship provided a natural opportunity to study the research mentoring experience and outcomes since its inception as a project of the North American Primary Care Research Group (NAPCRG) Committee on Building Research Capacity (BRC). GGP provides a year-long grantsmanship training experience, combining workshops and individual mentoring, to equip family medicine researchers

with skills to become successful at getting grants. Up to 10 GGP fellows are selected each year, through a competitive application process.

Longitudinal tracking of grant proposals submitted by GGP alumni documents overall program success. As of March 2010, GGP alumni reported obtaining a total of \$280.8 million in external funding since the program was launched in the 1995–1996 academic year (655 funded grants, plus seven more for which specific dollar amounts were not reported). Total value of grants received as principal investigator was \$119,240,846 (42% of funding received).

Instrument Development

Mentor and protégé surveys were constructed to measure perceptions of both mentors and protégés about the extent of mentoring assistance provided to protégés (referred to as “mentoring assistance” domain 1), perceived costs (referred to as “costs” domain 2), perceived “benefits of the relationship” (referred to as “benefit” domain 3), and perceived “success of the mentoring relationship” (referred to as “success” domain 4). Tables 1 and 2 provide the exact wording of all questions (variables) that were used to form the four domains.

Mentoring assistance was measured using 20 items, adapted from Turban and colleagues' 2002 study of doctoral student protégés and their mentors,¹⁵ that measured psychosocial assistance (eg, friendship and counseling), career assistance (eg, coaching, exposure, and visibility in the field), and role modeling. As examples, protégés were asked, “To what extent has your primary mentor introduced you to important people in the field?” and “To what extent has your primary mentor encouraged you to talk openly about anxiety and fears that detracted from your work?” The items were measured on a 7-point scale from “Not at all” to “To a very large extent.”

The perceived benefits and costs of the relationship for both mentors and protégés were measured using

Table 1: Variables Comprising Four Domains

COST	BENEFIT	SUCCESSFUL MENTORING RELATIONSHIP	MENTORING ASSISTANCE
Mentors	Mentors	Mentors	Mentors
23. Quality of protégé's work possibly reflected poorly on mentor 25. Relationship took an inordinate amount of mentor's time 26. Produced more drawbacks than advantages for mentor 30. Interactions with protégé were more trouble than they were worth 33. Relationship was an energy drain 37. Relationship took valuable time away from mentor's own tasks	21. Relationship enhanced mentor's professional contacts and networks 22. Mentor received positive recognition from colleagues 24. Relationship helped mentor increase own productivity 27. Mentor felt pride in watching fellow develop 28. Protégé's success reflected positively on mentor's competencies 29. Protégé's success enhanced mentor's reputation 31. Relationship enhanced mentor's self-esteem 32. Relationship enhanced mentor's professional values, ethics 34. Relationship enhanced mentor's creativity 36. Relationship provided fulfillment in passing on experience, wisdom	38. Relationship has been positive experience for me 39. Glad I had the opportunity to participate in this relationship 40. (reversed) Would NOT want to work with this fellow again 41. (reversed) Relationship with fellow has not been very successful	Questions 1-20 (see Table 2 for text)
Protégés	Protégés	Protégés	Protégés
21. Relationship limited rather than enhanced protégé's development 23. Relationship drained too much time away from protégé's other work 25. Relationship inhibited mentor from developing own professional style 26. Relationship was an energy drain 27. Interactions with mentor were more trouble than they were worth 28. Relationship caused protégé to develop a narrow, limited view of field	22. Enhanced protégé's present or future reputation in field 24. Helped protégé develop variety of valuable grant-writing skills 30. Enhanced protégé's professional values, personal ethics 31. Enhanced protégé's creativity, problem-solving skills	32. Relationship has been positive experience for me 33. Glad I had the opportunity to participate in this relationship 34. (reversed) Would NOT want to work with this mentor again 35. (reversed) Relationship with mentor has not been very successful	Questions 1-20 (see Table 2 for text)

17 items for mentors and 11 items for protégés. These items were adapted from Turban et al¹⁶ and Ragins and Scandura.¹⁷ Examples of benefit/cost items for mentors included, "My interactions and relationship with my fellow have helped me increase my own productivity," and "My interactions and relationship with my

fellow have been more trouble than they were worth." The items were measured on a 7-point scale from "Not at all" to "To a very large extent."

The perceived success of the mentoring relationship was measured using four items (7-point scale) for both mentors and protégés, previously

used by Turban and colleagues.¹⁶ Example items were, "This relationship has been a positive experience for me," and "My relationship with my mentor/fellow has NOT been very successful." As to the nature and duration of the relationship, single items asked each respondent about the number of hours spent

Table 2: Comparison of Responses From Mentors and Protégés on Relationship Questions

Survey Questions	MENTOR Regarding your protégé, to what extent have you ...							PROTÉGÉ To what extent has your primary mentor ...							P Value*
	Not at all		To some extent		To a large extent		To a very large extent	Not at all		To some extent		To a large extent		To a very large extent	
	1	2	3	4	5	6	7	1	2	3	4	5	6	7	
	n (%)	n (%)	n (%)	n (%)	n (%)	n (%)	n (%)	n (%)	n (%)	n (%)	n (%)	n (%)	n (%)	n (%)	n (%)
1. Suggested fellow as a likely candidate when appropriate research/proposal opportunities came along	7 12.7	1 1.8	10 18.2	12 21.8	7 12.7	8 14.5	10 18.2	12 21.8	6 10.91	11 20.0	6 10.9	8 14.5	3 5.5	9 16.4	.0157
2. Gone out of the way to promote fellow's research interests	2 3.6	6 10.9	8 14.5	9 16.4	11 20.0	7 12.7	12 21.8	12 21.8	4 7.3	6 10.9	5 9.1	12 21.8	3 5.5	13 23.6	.0587
3. Introduced fellow to important people in the field	7 12.7	5 9.1	13 23.6	4 12.7	13 23.6	2 3.6	8 14.5	14 25.5	4 7.3	8 14.5	5 9.1	12 21.8	5 9.1	7 12.7	.3687
4. Created opportunities for fellow to impress important people	14 25.9	6 11.1	9 16.7	6 11.1	10 18.5	4 7.4	5 9.3	16 29.6	9 16.7	7 13.0	6 11.1	6 11.1	4 7.4	6 11.1	.7409
5. Brought fellow's accomplishments to the attention of important people	8 14.5	6 10.9	8 14.5	7 12.7	14 25.5	6 10.9	6 10.9	12 21.8	8 14.5	8 14.5	8 14.5	9 16.4	5 9.1	5 9.1	.0376
6. Given fellow suggestions on how to attain recognition for research ideas	3 5.5	3 5.5	10 18.2	12 21.8	13 23.6	4 7.3	10 18.2	10 18.2	7 12.7	10 18.2	6 10.9	12 21.8	5 9.1	5 9.1	.0022
7. Given feedback regarding fellow's proposal ideas and drafts	0 0.0	2 3.6	4 7.3	5 9.1	13 23.6	6 10.9	25 45.5	1 1.8	3 5.5	9 16.4	4 7.3	12 21.8	9 16.4	17 30.9	.0424
8. Helped fellow develop strategies to advance research productivity	0 0.0	4 7.27	8 14.5	9 16.4	16 29.1	5 9.1	13 23.6	10 18.2	5 9.1	5 9.1	10 18.2	11 20.0	6 10.9	8 14.5	.0013
9. Provided fellow with especially challenging assignments that have enhanced skills	15 27.3	9 16.4	5 9.1	8 14.5	12 21.8	2 3.6	4 7.3	16 29.6	2 3.7	13 24.1	9 16.7	5 9.3	2 3.7	7 13.0	.6725

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Table 2: (continued)

Survey Questions	n (%)	n (%)	n (%)	n (%)	n (%)	n (%)	n (%)	P Value							
10. Provided fellow with technical knowledge to develop new skills in grant writing	5 9.1	10 18.2	4 7.3	11 20.0	12 21.8	7 12.7	6 10.9	10 18.2	5 9.1	8 14.5	11 20.0	10 18.2	5 9.1	6 10.9	.3408
11. Assigned fellow tasks that pushed fellow to develop new research and grant writing skills	14 25.5	8 14.5	7 12.7	6 10.9	10 18.2	6 10.9	4 7.3	14 25.9	5 9.3	7 13.0	7 13.0	11 20.4	4 7.4	6 11.1	.5983
12. Conveyed feelings of respect for fellows as an individual	0 0.0	0 0.0	2 3.6	6 10.9	14 25.5	10 18.2	23 41.8	2 3.6	2 3.6	5 9.1	4 7.3	5 9.1	8 14.5	29 52.7	.6506
13. Encouraged fellow to try new ways of doing things	2 3.6	5 9.1	6 10.9	11 20.0	16 29.1	7 12.7	8 14.5	6 10.9	3 5.5	8 14.5	9 16.4	8 14.5	7 12.7	14 25.5	.9581
14. Encouraged fellow to talk openly about anxiety and fears that detracted from work	8 14.5	10 18.2	7 12.7	7 12.7	10 18.2	5 9.1	8 14.5	16 29.6	5 9.3	7 13.0	10 18.5	8 14.8	4 7.4	4 7.4	.0230
15. Shared personal experiences as an alternative perspective to fellow's problems	3 5.5	3 5.5	8 14.5	8 14.5	15 27.3	10 18.2	8 14.5	6 10.9	7 12.7	13 23.6	9 16.4	7 12.7	5 9.1	8 14.5	.0029
16. Served as a sounding board for fellow	5 9.1	7 12.7	7 12.7	4 7.3	9 16.4	11 20.0	12 21.8	11 20.4	5 9.3	10 18.5	6 11.1	9 16.7	3 5.6	10 18.5	.0129
17. Discussed fellow's concerns regarding feelings of competence, commitment to advancement, relationships with peers and superiors, or work/family conflicts	6 11.1	8 14.8	7 13.0	8 14.8	9 16.7	6 11.1	10 18.5	15 27.8	8 14.8	8 14.8	5 9.3	8 14.8	4 7.4	6 11.1	.0015
18. Interacted with fellow in a way that fostered mutual liking and understanding	0 0.0	5 9.3	10 18.5	6 11.1	12 22.2	4 7.4	17 31.5	3 5.5	2 3.6	7 12.7	3 5.5	12 21.8	9 16.4	19 34.5	.4077

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Table 2: (continued)

Survey Questions	n (%)	n (%)	n (%)	n (%)	n (%)	n (%)	n (%)	n (%)	n (%)	n (%)	n (%)	n (%)	n (%)	n (%)	P Value
19. Considered fellow to be a friend	6 11.1	6 11.1	7 13.0	4 7.4	12 22.2	7 13.0	12 22.2	6 11.3	6 11.3	7 13.2	8 15.1	8 15.1	6 11.3	12 22.6	.6610
20. Served as a role model for fellow	3 5.6	5 9.3	11 20.4	7 13.0	17 31.5	4 7.4	7 13.0	2 3.6	4 7.3	13 23.6	5 9.1	11 20.0	7 12.7	13 23.6	.1217

*Signed rank test

interacting with one's mentor/fellow, the average number of meetings and/or interactions (phone, e-mail, etc) per month, the length of the GGP relationship, and (from fellows only) how well the mentor and protégé knew each other before GGP and perception of the overall helpfulness of the GGP program as well as helpfulness of individual components of the program for generating grants.

Finally, demographic/identification information gathered from mentors and protégés included faculty rank, gender, age, year of terminal degree, and socioeconomic background, which used a 6-point scale (from underclass to upper class) previously used by Turban and Dougherty.¹⁸ Finally, protégés were asked about their year of participation in the GGP program and the number of GGP mentors they had.

Recruitment and Data Collection

Following approval of the survey instrument by the University of Missouri Health Sciences Institutional Review Board, an invitation e-mail was sent to all former GGP fellows and their mentors. The e-mail included a unique link to the online survey instrument for each potential participant; this allowed for confidential electronic collection of data and matching of mentor/protégé pairs, with data identified and matched by ID number only. Response rate was 88% for protégés and 85% for mentors.

Analysis

There was a set of questions associated with each of the four domains (Tables 1 and 2). To reduce

the number of variables in each of the four domains, a principal components analysis was done on the questions in each of the domains. Since the range of responses was similar, we calculated the mean score for the question that represented the domain. The resulting alphas for mentoring assistance, benefit, cost, and success of the mentoring relationship were respectively 0.98, 0.92, 0.86, and 0.93 using the protégé data. Similar results were obtained using the mentor data. Frequencies were calculated for categorical characteristics. Mean and standard deviation (SD) were calculated for quantitative characteristics.

We compared mentors' and protégés' responses to the first 20 survey questions, which were parallel for mentors and protégés. Frequencies were calculated, and then the Wilcoxon signed-rank test examined the difference between the mentor and the protégé response to each question. The Wilcoxon signed-rank test, which is similar to the paired *t* test, compares two related populations with matched data ordinal level data.

To assess the relationship between the four domains and quantitative variables from the mentor instrument, Spearman correlation coefficients were computed. The Spearman correlation coefficient shows the strength of the linear relationship based on ranks between the two variables. Spearman correlation coefficients were also computed to assess the relationship between the four domains and quantitative variables from the protégé instrument.

To compare the levels of the categorical demographic variables with respect to the four domains, the Kruskal-Wallis Test was used for demographic variables with three or more categories, and the Wilcoxon rank-sum test was used for dichotomous demographic variables. Those tests compare two or more independent groups relative to a quantitative variable based on ranks.

Results

Mentors were generally professors (78%), male (82%), with a mean age of 53 years, while protégés were assistant professors (53%) and almost evenly divided between male (51%) and female (49%) with mean age of 44 years. Responses to questions 1-20, which were asked of both mentors and protégés, are compared in Table 2. Statistically significant differences between mentors and protégés were found for nine of the 20 questions. Consistently, when there were differences, mentors tended to have higher values than protégés on their ratings of the specific relationship variables, indicating a perceived greater extent of the specific aspect of mentoring assistance, such as, "Suggested fellow as a likely candidate when appropriate research/proposal opportunities came along." These findings are consistent with Turban et al (2002) who examined the mentoring relationship between professors and doctoral students.¹⁵

Spearman correlation coefficients and corresponding *P* values for the four study domains (cost, benefit, successful mentoring relationship, and mentoring assistance) are shown in Table 3 for mentors and protégés,

Table 3: Results of Spearman Correlation Coefficients and Corresponding P Values for the Cost, Benefit, Success, and Mentoring Assistance in the Mentor-Protégé Relationship With Numerical Survey Variables

Variable	Measures of Mentor-Protégé Relationship—Mentor Perspective							
	Cost*		Benefit*		Success*		Mentoring Assistance*	
	Coefficient	P Value	Coefficient	P Value	Coefficient	P Value	Coefficient	P Value
Number of hours per month protégé and mentor interact (n=55)	0.01	.9449	0.59	<.0001†	0.53	.0001†	0.77	<.0001†
Number of meetings of protégé and mentor (n=54)	0.11	.4113	0.62	<.0001†	0.45	.0007‡	0.57	<.0001†
Number of months mentor worked with protégé (n=55)	-0.14	.3172	0.54	<.0001†	0.60	<.0001†	0.55	<.0001†
Variable	Measures of Mentor-Protégé Relationship—Protégé Perspective							
	Cost*		Benefit*		Success*		Mentoring Assistance*	
	Coefficient	P Value	Coefficient	P Value	Coefficient	P Value	Coefficient	P Value
Number of hours per month protégé and mentor interact (n=53)	-0.17	.2246	0.71	<.0001†	0.66	<.0001†	0.77	<.0001†
Number of meetings of protégé and mentor (n=54)	0.01	.9170	0.53	<.0001†	0.51	<.0001†	0.62	<.0001†
How well protégé knew mentor before GGP fellowship (n=54)	0.32	.0178‡	0.29	.0309‡	0.19	.1637	0.33	.0155‡

*See Tables 2 and 3 for variables comprising each domain.

† Correlation between numerical survey variables and subscales significant at $P<.001$.

‡ Correlation between numerical survey variables and subscales significant at $P<.05$.

respectively. Using the mentors' data in Table 3, significant positive correlations were found between three of the four domains—benefit, success of the mentoring relationship, and mentoring assistance—and the number of hours per month of mentor/protégé interaction, the number of mentor/protégé meetings per month, and the number of months the mentor worked with the protégé. That is, the more the mentor and protégé interacted, the higher (better) the mentor's score was for benefit, success of the mentoring relationship, and mentoring assistance.

Using the protégé data (in Table 3), significant positive correlations were found between the same three domains—benefit, success of the mentoring relationship, and mentoring assistance—and the number of hours per month of mentor/protégé interaction and the number of mentor/protégé meetings per month. That is, the more the mentor and protégé met or otherwise interacted per month, the higher the protégé's score was for benefit, success of the mentoring relationship, and mentoring assistance. How well the protégé knew the mentor before the GGP fellowship was significantly correlated

with cost, benefit, and mentoring assistance. That is, the better the protégé knew the mentor before GGP, the higher were the scores on cost, benefit, and mentoring assistance. However, the cost score was also higher, indicating that the better the protégé knew the mentor before GGP, the greater the cost of the relationship from the protégé's perspective.

Discussion

This study focused on specific ingredients that may herald success or failure of the mentoring process. In terms of relationship variables, there

were statistically significant differences on questions that seemed to highlight the mentors' inability to discuss protégé concerns, anxiety and fears, talk about more personal issues with a protégé, suggest a protégé for a particular opportunity, or give ongoing feedback. However, for other questions, there was agreement between mentor and protégé regarding the mentors' ability to promote the protégés' research interests, provide important technical skills, convey respect for the protégé, and serve as a friend and role model.

The mentoring assistance, benefit, and success of the mentoring relationship was positively associated with the amount of time spent together in terms of hours and meetings per month, as well as number of months involved in the relationship. However, this seemed to occur at a higher "cost" for protégés—possibly reflecting the greater burden of work activity. These data demonstrate that personal support of protégés by mentors is important and valued and that the closer the relationship in terms of time spent and support offered, the more the mentoring relationship is viewed as successful.

This analysis helps to define important characteristics of the mentor/protégé connection and has important implications for program development and specification of elements that may contribute to researcher productivity and career success. Our findings support evidence from other studies that have demonstrated the importance of "chemistry" or compatibility in the mentoring dyad and the positive influence of mentorship for personal career development and academic mastery.¹⁹

The study has several limitations. First there may be recall bias of both mentors and protégés in both directions. Further, this study was limited to a formal program, the GGP, and therefore may suffer from a

self-selection bias. The findings may apply only to academic family medicine rather than other medical specialties. There was no comparison group, which makes it difficult to generalize the findings. Since the emphasis of this study was on the nature of the mentoring relationship, we did not examine other outcomes such as grant productivity. Ingredients that will make the mentoring relationship viewed as successful by mentors include close career relationships, time spent together, and possibly closer matching of protégé with mentor on items such as degree achieved and socioeconomic background. For the future, a study comparing groups of mentors and protégés on specific outcomes will add important depth to the developing literature.

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