The Process of Faculty-mentored Student Research in Family Medicine: Motives and Lessons

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Background and Objectives: *Research suggests that the strongest predictor of postgraduate research activity is medical student research involvement. Yet many medical students still regard family medicine as a "nonresearch" specialty. The purposes of this study were to discover what motivated a group of first-year medical students (and their faculty mentors) to participate in a summer research assistantship and how both groups evaluated the challenges and satisfactions of the experience.* Methods: *The study used a grounded theory qualitative methodology that emphasizes an in-depth, inductive approach to evaluation research. Over a 2-year period, 11 first-year medical students who participated in a summer research assistantship and their 10 faculty mentors completed written questionnaires and were interviewed by our research team. Various categories of analysis were constructed and refined over the course of the study to explain the raw data collected through interviews, written questionnaires, and field notes.* Results: *Findings included identification of a core theme or meaning that motivated participation in the project for students and faculty. This theme was expressed in terms of professional, personal, relational, and societal goals. The study also identified three interrelated mechanisms (socialization, relationship, and technical skill transmission) used in varying degrees by students and faculty to achieve these goals.* Conclusion: *In addition to technical mastery and knowledge, students were actively seeking professional relationships with faculty mentors, greater understanding of other peoples and cultures, and increased self-understanding and self-esteem. Junior and senior faculty reflected differing and multilevel motivations for participating in a research assistantship program.*

Family medicine has made great strides toward becoming a research-based specialty,[1] from generating a primary care research agenda[2] to incorporating research training into faculty development programs.[3] However, in most cases, new faculty joining family medicine departments remain insufficiently socialized to the research modality.[4] Often, this deficiency is the result of limited or nonexistent exposure to primary care research during medical school and residency training. Studies have shown that medical school research experience is predictive of postgraduate research involve-

ment.[5] Historically, however, it has been difficult to interest medical students in family medicine as a research discipline.[6]

Clearly, family medicine needs to identify students interested in research and provide role modeling and curricular opportunities to meet their needs.[7] One effort in this area[8] addressed content and structural issues involved in developing a summer research assistantship program. A more recent longitudinal survey of 60 students completing summer assistantships focused on student research productivity and involvement over time in research endeavors.[7]

As attempts to identify and train family medicine clinical researchers command greater attention in academic departments, it is apparent that we have little information about what initially attracts students to a family medicine research environment, nor do we

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know what problems and rewards they experience. Further, we know very little about the motivations of faculty to serve as research mentors, what their goals are in undertaking such a responsibility, what methods they use to fulfill their objectives, and their frustrations and satisfactions as a result of their efforts. This study provides a qualitative description and analysis of the experience of medical students and their faculty mentors conducting applied clinical research in a family medicine department.

Methods

Over a 2-year period, 11 first-year medical students participating in a research assistantship and 10 family medicine faculty preceptors were studied. In the application process for awarding assistantships, students were required to submit outlines of their proposed projects. Many students made initial inquiries about the assistantship program (year one, 11 students; year two, 14 students), but did not complete the application process. All 11 students who ultimately submitted a written application were accepted into the program.

The 11 students included four men and seven women. Four of the students were Caucasian, two were African-American, two were Hispanic, one was Filipino, one was Native American, and one was an Indian national. Students received a $1,200 stipend, paid in two installments halfway through and at the conclusion of the project, made possible by a grant from the US Public Health Service. Faculty supervisors included seven family physicians, one psychologist, one medical anthropologist, and a nurse practitioner; four faculty were male and six were female. Faculty were not compensated for their involvement, except through release time from other commitments.

The content of the student research topics is summarized in Table 1. In general, the studies were student initiated, with faculty input limited to shaping an answerable research question appropriate to the time and resource constraints of the program. The orientation of many student projects toward international health and cross-cultural studies was not a requirement for acceptance into the assistantship. Rather, this emphasis appeared to reflect the students' own ethnic backgrounds, or their perception of faculty expertise in cross-cultural research.

Procedures

This qualitative study used a grounded theory methodology. Grounded theory, originally developed by sociologists Glaser and Strauss,[10] adopts an inductive approach to investigation, in which generalized conclusions are derived from specific observations and data. We used a modified triangulation of methods to increase the trustworthiness of the findings; triangulation refers to a research methodology in which multiple observers, measures, and modalities are used to

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Table 1

Student Research Topics

1. The relationship of educational level to breast-feeding practices among Hispanic women
2. Factors associated with failure to immunize Hispanic children against measles
3. Knowledge and attitudes toward AIDS among Brazilian street children
4. Differential referral patterns among family physicians and internists
5. Relationship of uterine fibroids to TAB procedures in African-American women
6. Drug use among a sample of African-American pregnant women
7. Incidence of lead poisoning in Hispanic pediatric patients
8. Guatemalan surgical patients' folk beliefs and practices
9. Cambodian immigrants' health beliefs and practices
10. Knowledge and practices regarding diabetes among Native Americans
11. Treatment of diabetes in Spain and the United States

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address the same set of questions, thus enhancing the credibility of any particular conclusion. In this case, the methods used included initial written questionnaires completed by students and faculty, student interviews (conducted by a student investigator), faculty interviews (conducted by two nonmentor faculty), and follow-up interviews with both students and faculty (conducted by faculty investigators). This multiplicity of data collection procedures allowed us to check, clarify, and expand our original insights.

The written questionnaire was administered at the outset of the project and consisted of open-ended items soliciting information on previous research experience, motivation to engage in research, relation of project to future career goals, expectations for self and supervisor (or self and student), and anticipation of problems related to implementation of the project. Based on data gained from this survey, investigators formulated an open-ended interview schedule, including content-specific prompts. With modifications, this interview was subsequently administered to both students and faculty about a month after the start of the project and again 1 month after the conclusion of the project. Responses were either taped or annotated in field notes. Interview time for students ranged from 30 minutes to 1 hour; for faculty, interviews lasted approximately 30 minutes. Because the research was conducted at the investigators' home institutions, it was possible to return informally to both faculty and students to check evolving interpretations of the data.

Data Analysis

Data analysis was based on what Strauss[11] and Glaser and Strauss[10] call constant comparative methods. Once data collection had been undertaken according to the procedures described above, the investigators applied

Table 2

Number (in Parentheses) of Faculty and Students Endorsing Motivations to Engage in Clinical Research, as Identified Through Open-ended Coding

Faculty Motivations
Theme:

1. To become more involved with medical students (10)
2. To attract more students to family practice (9)
3. To be a role model of the family physician researcher (5)
4. To fulfill a particular aspect of the departmental mission statement (stimulating research) (5)
5. To improve their own skills (4)
6. To develop professional linkages (4)
7. To pursue their own research agenda (4)
8. To demonstrate to the home medical school family medicine's research potential (3)

Student Motivations
Theme:

1. Increasing knowledge about research (11)
2. To experience "people" as opposed to "animal" research (9)
3. To learn more about physicians and medicine, and about family medicine in particular (9)
4. Desire to make a contribution to society (8)
5. Financial concerns (8)
6. A productive way to spend the summer (7)
7. To have a corrective experience to negative experience with bench research (7)
8. Personal improvement ("to make me a better person") (6)
9. Interest in foreign travel (6)

various coding methods to the data, including open coding, axial coding, and selective coding. Open coding is based on a line-by-line analysis that identifies key words or phrases. Axial coding represents a higher level of generalization by considering discrete themes derived from the conditions, functions, and characteristics of the key words identified in open coding. Selective coding provides further refinement of initial groupings by attempting to collapse them into broad thematic categories. Investigators also used member checks (recontacting a respondent) on a regular basis to clarify coding concepts and elaborate on the original data obtained. The constant comparative method allows for hypotheses regarding the data set to evolve and be refined during the process of data collection and analysis. For example, after three or four initial faculty interviews, we discovered important differences in emphasis between the motivations and goals of junior and senior faculty. Subsequent modifications of the interview process as well as integration of this observation into the data coding resulted in our being able to address this issue in more detail.

Results
Initial Motivation

We first applied open coding to identify themes related to the initial motivation of both faculty and students for participating in the project. Coding yielded 17 distinct themes (Table 2). Axial analysis reduced these faculty and student themes to five major categories: 1) professional/individual, 2) personal, 3) relational, 4) professional/systemic, and 5) societal. To varying degrees, junior faculty, senior faculty, and stu-

Table 3

Motivational Categories Identified Through Axial Analysis

Motivational Category	Sr. Faculty	Jr. Faculty	Students
Professional/Individual		**	***
Personal			**
Relational	**	***	***
Professional/Systemic	***		
Societal	*	*	**

*Number of asterisks means more heavily emphasized

dent themes could be organized into one of these five categories (Table 3). Most commonly, participants noted goals in many of these thematic categories simultaneously.

The category "professional/individual" (Table 3) referred to motivations that were technical, knowledge focused, and career oriented and in which the primary emphasis was on benefits that could accrue to the individual student or faculty member. Both junior faculty and students had responses that were coded in this category. The "personal" category was relevant exclusively to student motivations. Students often sought in their research partial resolution of personal issues, such as ethnic prejudice, perceived lack of ethnic role models in medical research, or a commitment to furthering the health of people of a particular ethnic background. They also reported being motivated to pursue their research projects for personal growth reasons,

Table 4

Number of Faculty and Students Identifying Mechanisms to Achieve Research Goals (Open-ended Coding)

Faculty Mechanisms for Self
1. Listening, clarifying, encouraging behaviors (10)
2. Skill development for the student, including specific technical/ methodological expertise (10)
3. Helping students produce a final product (10)
4. Focusing, shaping, and limiting students' research-related ideas (10)
5. Being a role model (8)
6. Providing linkage assistance with other professionals (5)
7. Supporting student career aspirations (5)
8. Providing clarification for students about their level of emotional involvement with their project (3)

Faculty Mechanisms for Student
1. Teachability (10)
2. Capacity for independent work (10)
3. Content mastery (10)
4. Follow-through (9)
5. Evidence of future commitment to research (9)
6. Development of respect and understanding for the process of research (5)

Student Mechanisms for Self
1. Skill acquisition (11)
2. Technical mastery (11)

Student Mechanisms for Faculty
1. Availability (11)
2. Collaboration (9)
3. Leadership (6)

Table 5

Mechanisms for Achieving Research Goals Identified Through Axial Analysis

Mechanism	Sr Faculty	Jr Faculty	Students
Socialization	***	**	
Relationship	**	***	***
Technical Mastery/ Skill Acquisition			

* Number of asterisks means more heavily emphasized

such as "becoming a better person."

The next motivational category, "relational," was dyadic, stressing the importance of developing a personal as well as a professional relationship between student and faculty mentor. This category was important to all groups, but especially to faculty.

"Professional/systemic" had as its focus various aspects of professional impact, from the perspective of how assistantship activities would affect the department, the medical school, or the specialty, rather than the individual. This category was used exclusively by more senior faculty.

Finally, the "societal" category included statements about the importance of effecting significant social change as a result of the research. For example, students frequently reported a need to believe in the importance of their projects, in the possibility that their research could have major health care implications and/ or a significant impact on the health care system.

In general, students tended to be motivated most strongly by individually oriented motives (professional advancement, resolution of personal issues), interpersonal motives (developing a relationship with a faculty role model), and societal motives (hoping their research would make a significant social contribution). Junior faculty shared some of these motivations with students, notably a desire to advance their personal careers (professional/individual) and the aspiration to develop a successful mentor relationship with their student (relational/dyadic). Senior faculty rarely mentioned individual professional issues. While the mentorship role was important to them, the effect the assistantship program might have on the department or institution (professional/systemic) appeared to be of greater interest.

These five categories were subsequently reanalyzed through selective coding to ascertain what central, organizing core theme they represented. The core theme identified through this process was the perceived value or meaning attributed to the experience of participating in the summer student research program. In other words, the investigators concluded that every participant defined a kind of "meaning" or "value" that the project might hold for them.

Means and Mechanisms for Achieving Meaning

Open coding identified themes related to means of fulfilling both faculty and student expectations (Table 4). Additional coding identified three primary mechanisms through which student and faculty goals and expectations were pursued. These mechanisms were 1) socialization, 2) relationship, and 3) technical mastery/skill acquisition (Table 5).

Socialization

Socialization as a mechanism for achieving meaning emphasized initiating students into the world of research with the aim of having them adopt its values, methods, and priorities. Socialization mechanisms were favored by senior faculty who looked for meaning in the professional/systemic areas. Interestingly

Table 6

Number of Faculty/Students Reporting Problems/Satisfactions in the Research Process (Open-ended Coding)

Faculty Problems
1. Poor project parameters (10)
2. Lack of a research support network for students (5)
3. Lack of student initiative, enthusiasm, and preparation (5)
4. Insufficient time with students (5)

Satisfactions
1. Teaching insights (10)
2. Acquisition of new knowledge (10)
3. Student growth, evidenced by enthusiasm and increased knowledge (9)
4. Appreciation of student initiation in research (6)
5. Discovery of one's own competence as a supervisor (5)

Student Problems
1. Lack of sufficient structure and organization in the experience (8)
2. Persistent difficulty in conceptualizing their research question (8)
3. Availability, approachability of faculty (8)
4. Stresses associated with project execution (7)
5. Problematic interface with the community (6)
6. Concern about the nature of clinical research itself (5)
7. Winning the trust of patients (4)
8. Concern about the relative lack of experience among faculty (3)

Satisfactions
1. Increased confidence in their ability to conceptualize, execute clinical research (11)
2. Developing valued relationships with supervising faculty, research subjects (10)
3. Increased technical competence (9)
4. Personal growth (personal enrichment, better self-understanding, and heightened self-esteem) (9)
5. Service to the larger society (7)

enough, for younger faculty, supervising their student provided a vehicle for the faculty member's own socialization into research.

While senior faculty focused on socialization as a critical mechanism closely linked with their sense of felt meaning, no students mentioned this process. However, students definitely appeared to undergo a socialization process over the course of their training in terms of their concept of research. Students initially tended to differentiate between "hard" or "real" versus "soft" research and sometimes self-labeled their projects as "stupid" or "irrelevant." Later, they reported having a better understanding of the value of this type of research. Socialization also occurred in terms of students' future career goals. Some students focused on how this research experience might facilitate specific educational objectives, such as helping them get into a residency or positioning them for a career in academic medicine. Others mentioned their desire to incorporate clinical research as part of their future professional activities.

Relationship

Relationship mechanisms fulfilled a supportive, empathic function and were closely related to nurturing goals that fostered connection and mentoring between student and faculty. Relationship building (meetings that addressed student's and faculty member's larger goals and aspirations, occasional lunches, and time spent in clinic with the faculty member not di-

rectly related to the project) seemed to be a key mechanism in role modeling and in addressing issues of faculty-student personal growth and conflict. Relationship mechanisms were used less often and tended to be considered less important by junior faculty whose sense of meaning was derived primarily from achieving individual professional goals and by senior faculty whose primary interest was toward the effects of the program on either their department or their institution. On the other hand, junior and senior faculty who expressed largely nurturing goals did place a high degree of emphasis on relationship mechanisms. Relationship was important to students as well, and they also identified it as a mechanism through which the assistantship experience could provide meaning for them. Overall, students tended to report positive relationships with their supervisors. Interestingly, satisfaction with the supervisor did not appear to be a function of the level of the supervisor's research expertise. Rather, it was more closely related to availability, support, interest, enthusiasm, and the supervisor's willingness to allow the student to demonstrate initiative in the project.

Technical Mastery/Skill Acquisition

Technical mastery/skill acquisition was a more narrowly focused approach that emphasized specific knowledge, skill development, and research-related behaviors without necessarily spending much time developing a larger socialization or relationship con-

text. Reliance on this mechanism tended to be characteristic of faculty who were operating primarily in the professional/individual mode. It was also the most frequently cited student mechanism for achieving their project goals.

Outcome: Difficulties and Rewards

Open coding indicated that faculty and students encountered both problems and satisfactions during the course of the project (Table 6). Axial coding suggested that the various problems and satisfactions experienced by students and faculty could be understood as project outcomes of either success or failure.

In terms of outcome, the most problems seemed to arise when 1) the faculty-student relationship was impaired (primarily due to lack of contact) or 2) the socialization process was unsuccessful. In the latter case, there was often evidence of power struggles, lack of student enthusiasm and initiative, a perceived lack of research expertise among faculty, and lack of agreement between faculty and student as to whether the research assistantship should be primarily professional or relational in nature. The faculty who found least meaning and value in the experience were those whose initial motivations were more exclusively professional.

Projects appeared most successful when a concrete product resulted, such as a paper or a professional presentation and when a real relationship had emerged between mentor and student. In general, for both students and faculty, their sense of overall success or failure of the project was related to how well their particular expression of the core theme of meaning/value had been addressed by the project.

Discussion

Motivations for students and faculty to engage in our summer research assistantship were complex and included professional, personal, relational, and societal dimensions. Senior faculty tended to adopt a systems focus and stressed the effects of the program on the department and institution. Junior faculty appeared most satisfied when they felt they were improving their own research skills and when they developed personal relationships with their students. Students emphasized the importance of relationship with physicians, personal growth, and societal contribution. For all three groups, successful projects had personal meaning and significance.

Qualitative research, unlike quantitative studies, does not focus primarily on generalizability of results. In the case of the present study, the students who participated were not representative of the freshman class. Not only were they self-selected, but there was an overrepresentation of minority students in comparison to the medical student body as a whole. A qualitative approach cannot tell us that what we learned about these 11 students is necessarily applicable to the remaining 80 medical students in this class or to other medical students across the country. What we did learn is 1) that a primary care environment with opportunities for cross-cultural research appeared attractive to many minority students, and 2) that clinical research in the same setting was appealing to students who previously found bench research unsatisfying. These insights give us important clues in terms of who might be especially interested in the type of family medicine research described in this paper. It also suggested further investigation of other subgroups and categories of students who also might be targeted for recruitment. Of particular interest within this model were some of the differences in emphasis between faculty and students and between senior and junior faculty. Appropriately enough for student learners, "value" often assumed a highly personal orientation, with students focused on what skills they could acquire for themselves as individuals or how a particular research project might resolve some personal issue for them. Faculty as a whole were more oriented to the nurturing and socialization of a younger generation. They tended to stress the importance of relationship and role modeling vis-a-vis the student.

Junior faculty were more similar to students in their desire for skill acquisition and the development of a sense of personal competency. More senior faculty tended to regard the experience as meaningful if they saw evidence of satisfactory socialization into the world of family medicine for the student and if they felt that the experience had some broader effect, whether departmental or institutional. On the other hand, students tended to be most ambitious in terms of how their projects might make important contributions to society as a whole.

Conclusion

This research discovered that a research assistantship experience had both overt and covert objectives for faculty and students. The overt objectives tended to be empiric and rational, such as helping students develop and analyze a data base (faculty), or achieving competence in statistics and research design (students). However, covert objectives also existed, and these were more personal and subjective, such as the desire to develop a one-on-one relationship with mentor or mentee, to further departmental research goals, or to explore personal issues. In addition, many students were searching for a relationship with physicians, greater understanding of other people and cultures, greater self-understanding and self-esteem, and resolution of issues related to minority status in the dominant culture. For both faculty and students, rewards from the experience stemmed not only from the intellectual stimulation but from the discovery of personal competence, the relational bonds formed, and achieving a felt sense of meaning and purpose.

It is possible to conclude that increasing the likelihood of a successful research assistantship depends on many factors. Faculty can help ensure a positive experience for students by acknowledging the existence of complex and multifaceted expectations on their own part and on that of their student. Specifically, faculty need to be prepared to develop caring relationships with students, as well as emphasizing technical skill transmission and acquisition. They also need to recognize that projects chosen by students may have very personal meanings for both themselves and the student that should be explored and valued. Finally, faculty should encourage students to persevere in their projects until a concrete product such as a paper or a presentation has resulted.

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