This is to certify that the

dissertation entitled

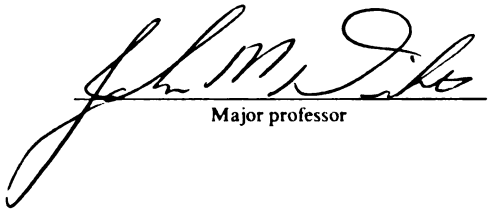
THE RESEARCH PRODUCTIVITY OF FAMILY MEDICINE DEPARTMENT FACULTY: A NATIONAL STUDY

presented by

JOSEPH J. BROCATO

has been accepted towards fulfillment
of the requirements for

Ph.D. degree in Dept. of Educational Administration



Major professor

Date 4/3/01

THE RESEARCH PRODUCTIVITY OF FAMILY MEDICINE DEPARTMENT FACULTY: A NATIONAL STUDY

By

Joseph J. Brocato

A DISSERTATION

Submitted to

Michigan State University

in partial fulfillment of the requirements

for the degree of

DOCTOR OF PHILOSOPHY

Department of Educational Administration

2001

ABSTRACT

THE RESEARCH PRODUCTIVITY OF FAMILY MEDICINE DEPARTMENT FACULTY: A NATIONAL STUDY

By

Joseph J. Brocato

The purpose of this study was to determine the research productivity of U.S. medical school family medicine department faculty and the individual faculty characteristics, prior socializing experiences, and research environment characteristics predictive of their research productivity. A national survey was sent to random sample of 796 faculty holding the M.D. or D.O. degree, or in combination with other advanced degrees. The adjusted response rate from valid returns was 63%.

The results showed that 79.3% of the faculty reported spending a half-day or less per week on research. Even though they seem to understand the expectations to produce research, few faculty identified a well-defined research agenda, nor currently have multiple research projects underway. Faculty reported significantly less than one scholarly work per year, with manuscripts for publication being the largest category of scholarship generated. During the last two academic years, 58.2% of faculty reported having no manuscripts accepted for publication, 67.3% no proposals/papers accepted for conference presentations, 75.8% no national government proposals funded, and 84.3% no national private grant proposals funded.

This study also tested a conceptual model of faculty research productivity through full model multiple regressions for several productivity measures. Each regression model included the following composite predictors: prior research training, psychological and cognitive characteristics of faculty concerning research, current research environments, resources for research, prior institutional prestige regarding research, and perceptions of family medicine as a discipline known for research. Models also included the demographic variables of age, years as a faculty member, hours per week spent on research, gender, ethnicity, advanced degree, academic rank, and tenure status. Across all forms of scholarship, the "psychological and cognitive characteristics of faculty" composite was highly predictive of research productivity. The elements of this composite emerge after the first faculty position and include having further developed research skills through formalized research training, a defined research agenda, motivation to do research, and multiple research project underway. The elements of this composite also include having an in-depth knowledge of a research area of specialty, well-developed professional networks, and clear expectations for promotion and tenure.

DEDICATION

To my grandparents, Raymond and Winfred Saum, who instilled in me their love for learning, and to my parents Gene and Susan Brocato, who taught me life's greatest lessons and remain my guiding lights.

ACKNOWLEDGEMENTS

I would like to thank my doctoral committee, Drs. John Dirkx, James Fairweather, Marilyn Amey, and Henry Barry for their ongoing support. Special thanks is also extended to Dr. Fairweather who spent many additional hours helping me hone this study and to Dr. Ann Austin who provided me with my own research socialization as her graduate assistant. I would also like to convey my sincere thanks to Drs. John Creswell from the University of Nebraska, Carole Bland from the University of Minnesota, and Francine Hekelman and Steven Zyzanski from Case Western Reserve University who provided invaluable mentorship toward conceptualizing this study. I would also like to thank the American Academy of Family Physicians Foundation for providing full funding for this research project. A big thanks also to Dr. Brian Mavis from the Office of Medical Education Research and Development at MSU for his statistical guidance (and friendship). Also, I greatly appreciated the help of Dr. John Dickinson and the Association of Departments of Family Medicine who endorsed this research study early on. I would also like to thank Mrs. Jan Szabo who helped me mail and collate the hundreds of surveys associated with this study. Finally, I would like to extend my heartfelt thanks to my graduate student colleagues from Michigan State University who are not only colleagues, but lifelong friends. They include Richard Albrecht, Kristin Anderson, Andrea Beach, Patricia Fraser, Linda Gross, Judith Kunkle, Margaret Lafleur, Lucy Maillette, Steve Poulios, Jonathan Rohrer, Lorinda Sheppard, and Aseem Srivastava.

TABLE OF CONTENTS

LIST OF TABLES

LIST OF TABLES (cont'd)

LIST OF FIGURES

CHAPTER I

INTRODUCTION

Family medicine department faculty in the U.S. share a diversity of clinical and academic professional roles including seeing patients as a family physician, teaching medical students, interns and residents as a clinical teacher, and conducting pure and applied research contributing to the specialty and to society at-large (Bland, Simpson, Hekelman, & Stritter, 1997). In short, family medicine department faculty are challenged to combine all of the academic roles normally held by college faculty in mainstream higher education while maintaining a significant patient caseload. Although much is known about family physicians' development as clinicians during medical school and residency (Burke, Baron, Lemon, Losh, & Novack, 1994; Campos Outcalt & Midtling, 1993; Hosokawa & Zweig, 1990; Merenstein & Schulte, 1990) as well as entry into new clinical positions after residency (Reynolds, Giardino, Onady, & Siegler, 1994; Thompson et al., 1998), little is known about those who have decided to pursue an academic research-oriented career track in departments of family medicine (Taylor et al., 1991).

Developing a better understanding of research activities by faculty in family medicine is vital for a number of reasons. From a macro societal view, clinical family medicine faculty researchers are uniquely positioned to conduct forms of research that cannot be filled by any other medical specialty's faculty (Culpepper & Becker, 1987a). Because of their positioning as the point-of first contact in patient care, as well as a focal point for continued longitudinal care, family medicine physician faculty have a unique opportunity

to conduct pure and applied research. From a micro perspective, building a core of research producing faculty is vital to enhance the clinical legitimacy of the relatively new field of family practice (Doherty, Christianson, & Sussman, 1987; Pellegrino, 1987; Stephens, 1987) as well as the academic legitimacy of family medicine (Colwill, 1987; Culpepper & Becker, 1987a; Doherty et al., 1987).

Geyman (1978b) distinguishes clinical and non-clinical (usually educational specialist) family medicine faculty who have traditionally carried the bulk of research production in departments of family medicine. According to Geyman, "the (clinical) family physician must play a central role in identifying and pursuing researchable questions, drawing on other disciplines for help as needed. Research in family practice cannot be delegated to non-clinical researchers, and cannot be meaningful without the combined efforts of the university and the 'real world' practice community (p.52)." Rodnick (1987) furthers this view by identifying M.D. faculty as the key cohort toward developing "a critical mass of (family) medicine faculty" (p.306). Rodnick states that these faculty "must overcome their innate inhibitions and force themselves to begin academic writing at the earliest possible moment following their decision to commit to academic careers. What they write about and where it is published is initially of secondary importance. (p.306)." Henry (1997) is even more specific in targeting fulltime tenure stream clinical "researcher/teachers" in family medicine as "the group of faculty who possess a great interest in the scholarship of discovery and are most likely to occupy tenured slots...", and accordingly , "have the greatest responsibility to pursue new knowledge (p.258)".

This study proposes to examine the research productivity of family medicine faculty in U.S. medical schools. The study considers the effects of prior research experiences, the diverse characteristics of these faculty, and the environmental conditions within medical schools and departments of family medicine on faculty research productivity. The data will assist family medicine leaders attempting to foster national research agendas, departments of family medicine examining promotion and tenure guidelines, faculty developers attempting to train family medicine faculty in research skills, and family medicine faculty attempting to gauge baseline research productivity for the discipline.

Research Activity among Family Medicine Faculty

In aggregate, family medicine faculty have generally not been well-trained to conduct research (Bland, Hitchcock, Anderson, & Stritter, 1987; Henry, 1997) or to teach medical students (Holloway et al., 1995). Additionally, they have not been socialized to accept the values and attitudes of the academic profession (Bland, Schmitz, Stritter, Henry, & Aluise, 1990; Rogers, Holloway, & Miller, 1990; Sheets & Schwenk, 1990). Instead, family medicine faculty have conceived of themselves as practitioners first and foremost. Gradually family medicine faculty are receiving limited academic training as more residency programs require research projects as part of their educational process (Alguire, Anderson, Albrecht, & Poland, 1996). Specialized faculty development fellowship programs to train these faculty in research and teaching skills also are more evident (Anderson, Stritter, Mygdal, Arndt, & Reid, 1997; Bland, Hitchcock, Anderson, & Sritter, 1986; Bland et al., 1987; Hitchcock, Anderson, Stritter, & Bland, 1988;

Hitchcock, Lamkin, Mygdal, Clarke, & Clarke, 1986; Hitchcock, Stritter, & Bland, 1993; Hueston, 1993b; McGaghie et al., 1990).

Yet this academic exposure is not the norm for family medicine faculty. Most of their academic training occurs "on-the job" (Baldwin, Levine, & McCormick, 1995; Bland et al., 1990; Friedman, Alpert, & Green, 1994) or through in-house faculty development programming, if at all. Although the evidence is quite limited, it appears that few family medicine faculty engage in research more than 10% of their time, particularly those with clinical responsibilities. Little of this is in the form of scholarly peer reviewed publications (Hitchcock & Buck, 1990). Among the most important reasons for this pattern is the historical development of primary care and of family practice as a specialty.

The Reemergence of Primary Care Medicine and the Generalist Physician

Generalist physicians are considered the line of first medical treatment in the United States. The majority of patient visits per year occur within their offices, often prior to and usually without subsequent referral to specialists (Geyman, 1978a). Between 90-95% of all doctor-patient contacts occur at the primary care level (Geyman, 1978a). Generalist physicians must possess a diverse set of skills and fundamental knowledge (Cassell, 1997) that will equip them to serve a range of patients: the old and young, white and nonwhite, those from suburban, as well as underserved and rural settings. Although some would argue that all physicians practice varying forms of primary care (Inui et al., 1998), others posit that "primary care medicine can be best provided by generalists who are

specifically trained to meet the broad, as well as the intellectually and technically exacting, demands implied in the definition." (Cassell, 1997, p.4).

The demand for expertise in a wide range of presenting medical conditions makes it vital that generalist physicians be properly trained within a well-defined specialty of medicine called primary care (Inui et al., 1998; Schatz, Realini, & Charney, 1996). Further, generalist physicians are increasingly being called to develop a core body of primary care research to provide a foundation of patient-centered clinical expertise.

The Context of the Family Practice Specialty within Primary Care Medicine

Within primary care is a large cohesive group of generalist physicians, the family physician practicing the newest of the 20 medical specialties called family practice. Family physicians account for 30% of all office visits per year (Culpepper, 1993). Additionally, each year they see more than one member of at least 90% of all families in the U.S. (Fry & Gambrill, 1978). Beyond mere patient numbers, family physicians traditionally have reached populations previously underserved, including inner city and urban poor (Freeman, Loewe, & Benson, 1998; Xu, Veloski, Hojat, Rabinowitz, & Rattner, 1997) as well as rural communities (Blondell, Norris, & Coombs, 1992; Kassebaum & Szenas, 1993). These family physicians serve as the initial point of contact for many families, as well as serve as the major source for continuing healthcare. Geyman (1978a) succinctly summarizes the central thrust of family practice as "the body of knowledge and skills applied by the family physician as he/she provides primary, continuing, and comprehensive heath care to patients and their families regardless of their

age, sex, or presenting complaint... (family practice) cuts across (the) territorial boundaries of all traditional specialties, and varies in its application by each family physician based upon his/her own training, interests and skills, as well as the community in which he/she practices and the proximity to other medical resources" (p.594).

The Development of Academic Family Medicine Departments

As with the other medical specialties, family practice has sought to develop a core body of teaching and research housed within academic departments in teaching hospitals and medical schools. As of 2000, 127 departments of family medicine in the U.S. provide the leadership for the clinical and academic directions of the family practice specialty. Historically, family medicine departments have augmented a small cadre of tenure stream fulltime faculty with non-tenure stream full-time faculty and part-time voluntary faculty (Bickel, 1991). However, the medical literature as well as leaders in family medicine increasingly have called for a nucleus of full-time tenure stream family medicine faculty as the academic foundation for the discipline (Henry, 1997). Yet several barriers confront the development of family medicine departments as major research producing units.

One of the largest challenges facing family medicine departments is their relative physical dispersion. Quite often family medicine faculty are scattered across several hospitals and clinics for at least a portion of their workdays, making academic meetings and research collaboration difficult. Centralized departmental space is becoming more commonplace, but individual faculty often have at least two if not three or four office sites at which they work. Coordinating faculty meetings, not to mention faculty

development programming, becomes extremely challenging for department chairs as well as for developers seeking to reach a majority of most family medicine department faculty.

In addition, the field of family medicine has few academic foundations upon which to build. Because of a lack of precedent for research and other forms of academic discourse, the mandate for conducting research and improving teaching within family departments is not universally shared by all individual faculty, including department chairs (Garr, 1986; Hueston, 1993b; Katerndahl, 1994). Nor is there universal understanding of the value of academic development as a tool for individual faculty advancement (Applegate & Williams, 1990; Zyzanski, Williams, Flocke, Acheson, & Kelly, 1996).

A third obstacle is that the faculty within family medicine departments differ in their academic interests. Some faculty may be engaged in teaching and research on childhood development while others may center their efforts on geriatric education (Culpepper & Becker, 1987a; Parkerson & et al., 1982). Finding ways to link faculty within and between departments into research networks (Nutting, 1996; Woods, Reid, Arndt, Curtis, & Stritter, 1997) and scholarly discourse networks for resource sharing remains problematic (Mavis & Brocato, 1998).

A final hurdle is a perception within some medical specialties and subspecialties that family medicine departments (and their faculty) possess less prestige and respect (Block, Clark-Chiarelli, Peters, & Singer, 1996; Friedman et al., 1994; Stephens, 1990). In comparison to non-primary care specialty academic units, family medicine departments

have a comparatively weaker financial base (Friedman et al., 1994). These departments are not well represented on institutional admissions and curriculum committees or in faculty governance in general (Friedman et al., 1994; Taylor et al., 1991). Further, family medicine faculty have a relatively poor track record in obtaining national research funding, particularly from the National Institutes of Health (Culpepper & Becker, 1987a; Sweeney & Jones, 1993). Small numbers of these faculty achieve tenure status (Gjerde, 1994; Jackson & MacInnes, 1984).

Challenges Toward Building Individual Faculty in Family Medicine Departments

In addition to challenges facing departments of family medicine, individual faculty within these departments also confront barriers to their academic development. Family medicine faculty on average are younger than their colleagues in other specialties of medicine (Friedman et al., 1994). Swee (1989) found that 75% of the family medicine faculty had been in academia for 8 years or less, while 40% had been appointed for less than four years. This relative inexperience has implications for research productivity.

Family medicine faculty also are less likely than other medical faculty to have received post-graduate teaching and research fellowships, although this gap has been narrowing over the last decade (Bland & Stritter, 1988). Family medicine faculty often enter new positions less well prepared for their new academic roles with the result being a reliance on informal, "on-the-job, trial-by-error" processes.

Family medicine faculty also perceive of themselves as clinicians first and academics second (Blackburn & Fox, 1976; Holloway, Wilkerson, & Hejduk, 1997). Medicine faculty in general train to be medical practitioners with little if any forethought given toward becoming future academics (Blackburn & Fox, 1976; Burke, 1992) much less to regularly engage in research as a major role (Burke, 1992; Hueston, 1993a). This prioritization has been reinforced by family medicine departments attempting to balance faculty's time to conduct scholarly activities with the need to generate patient dollars through clinical practice (The Association of Departments of Family Medicine Task Force on Clinical Practice in US family medicine departments in academic medical centers,1997). The primary role perception for family medicine faculty remains one rooted in medical practice.

Finally, few research producing academic role models exist within the field (Morzinski, Diehr, Bower, & Simpson, 1996; Stange & Hekelman, 1990). As Bland and Schmitz (1986) have shown, having a cohort from which to share ideas toward developing scholarly research networks both within and outside academic units is vital toward influencing research productivity. Because of a relative shortage of research intensive faculty at the department level, the advancement of a research agenda in family medicine has been painstakingly slow much to the chagrin of national family medicine leaders.

The Need for Full-Time Family Medicine Department Faculty

Family medicine departments need a cadre of full-time faculty pursuing both clinical and educational research because community-based part-time family medicine faculty are not

able to develop a culture of research and scholarship for the discipline (Hueston, 1993a). The nature of this research should be consistent with family medicine practice; therefore, the research has the potential to be longitudinal in nature, cutting across gender, ethnic, and familial lines toward larger populations. Thus, family medicine studies need faculty who are willing to spend several years, even generations, within a single research project or research focus. The continuity provided by fulltime tenure stream faculty cannot be discounted and must be encouraged toward engaging in lines of practical clinical research.

Forms of Research in Family Medicine Departments

Family medicine departments also must encourage research to attain credibility within colleges and universities, not only within the medical specialties. As alluded to above, the need for full-time tenure stream family medicine researchers is clear from the societal benefits accrued from the research they can produce. However, the need for research in family medicine departments also is desired because of a differing professional paradigm embraced by family medicine researchers. According to Colwill (1986), that which largely differentiates family medicine researchers has both conceptual and philosophical roots operationalized in the approach taken toward conducting research. More specifically to Colwill, family medicine researchers focus on the bond between patient and doctor, have generational attentions centered within the family unit, emphasize educational principles as guides, and are mindful of the patient as both an individual as well as part of families and communities.

Phillips (1978) posits further that family medicine research includes a unique melding of disciplines (such as biomedical sciences, epidemiology, behavioral science, philosophy, and ethics), research foci (such as pathogenesis and mechanisms, clinical strategies, health services, and public policy), and a diverse mix of research methods (such as multi-centered studies, collaborative models, as well as solo research) unfulfilled in other branches of medicine. Geyman (1978b) points out that family medicine research addresses topical, relevant, and applied issues for healthcare including a focus on managed care, preventive medicine, the effects of diagnostic and therapeutic methods, the long-term outcomes of healthcare, as well as educational issues.

In sum, Culpepper (1991) provides a snapshot of the unique niche filled by this research when he states that "family medicine research addresses the need for knowledge by family physicians so they may better manage their patients, their families, and their practices and fulfill their healthcare role at the community level. Further, family medicine research particularly seeks to answer the questions which require the family practice setting or the relationship among family physician, patient, family and community. It investigates issues from the family physician and patient perspectives." (p.10)

The Research Problem

As part of this study, five central questions emerged as guideposts. They include:

(1) What are the individual faculty characteristics (demographic, psychological & cognitive) of family medicine department faculty?

(2) What prior socializing experiences in terms of research have family medicine department faculty had before accepting their first faculty position?

(3) What are the characteristics of family medicine department faculty's research environments?

(4) What is the research productivity of family medicine department faculty in U.S. medical schools?

(5) What prior socializing experiences, individual faculty characteristics, and characteristics of research environments of family medicine faculty predict research productivity?

Study Limitations and Definitions

This study focused on U.S. medical school family medicine department full-time faculty who hold the M.D or D.O as the only advanced degree, or hold the M.D. or D.O. in combination with another advanced degree. As alluded to earlier, the reason for this limitation is because, as specified by both Rodnick (1987) and Henry (1997), these family medicine faculty provide the foundations of a clinical research core for the discipline. Although Ph.D.-degreed faculty produce meaningful educational research for departments of family medicine, they are the smallest group of faculty by academic degree comprising only 13% of all family medicine department faculty (The Association of American Medical Colleges, 1999). Additionally, Ph.D.-degreed family medicine

faculty possess an entirely different socialization than do clinical faculty, including more formal education in research skills as well as experience conducting research (Aren & Ben-David, 1968; Bland et al., 1990). Further, the resources and time available to conduct research for this group within departments of family medicine may be vastly different from clinical family medicine faculty.

This study also was limited to U.S. medical school's departments of family medicine faculty rather than including additional family medicine faculty at community-based hospitals or clinics. These community-based family medicine faculty normally carry significantly higher clinical and teaching loads and much smaller research responsibilities and expectations (Garr, 1986; Hitchcock & Buck, 1990), making it problematic to include them in this study.

For purposes of this study, I defined research productivity as the number of peer-reviewed journal articles, national conference presentations, and national grants (both private and public) over the most recent two-year period. The use of a two year period of self-reporting was selected as suggested by Creswell (1985a) as a suitable measure of faculty productivity studies. A "peer reviewed" focus was selected as a proxy for quality. Research productivity areas are limited to the three highly traditional forms of peer-reviewed scholarship because of the need for family medicine faculty to compile a core body of research comparable to other medical specialties. These traditional forms of research productivity are aligned to the three-step process proposed for developing a core body of research in family medicine by Dehaven, et.al. (1994) that includes "(grant)

funding, presenting, and publishing (p.307)". Additionally, according to Applegate (1990) these three forms of research productivity are vitally important for the career advancement of academic medicine faculty, particularly those seeking promotion and tenure.

Study Significance

This study is highly useful for multiple audiences in medical education through a aggregate measurement of the research productivity of family medicine faculty as well as the factors that may influence their research productivity. The study is also useful for national family medicine leaders seeking to encourage research within the specialty of family practice to move the field toward a more scholarly definition and standing, as well as to meet the needs nationally for community-based research with clear societal benefits.

Additionally, the information garnered in this study is informative for deans of medical schools seeking to review promotion and tenure guidelines for their schools and colleges. Deciding what role research can and should play in the process can be better informed by understanding how these faculty have been trained to do research before and after becoming faculty members as well as the resources they have at their disposal to conduct research.

Further, this study provides family medicine department chairs with a snapshot of the psychological and cognitive characteristics of family medicine faculty relating to research as well as a measurement of the research environments for these faculty. This information

is useful to department chairs toward analyzing the scholarly expectations for their departments as well as obtaining quantifiable data for promotion and tenure guidelines.

Finally, individual faculty within family medicine departments are provided with a composite of the conditions that may influence their own potential research success, and ultimately, promotion and tenure where applicable. By having a better understanding of both baseline levels of performance, as well as the "gold standard" for research productivity of faculty nationally, family medicine faculty are equipped with both a guidepost for their longitudinal academic development as well as a measuring stick for their academic careers.

CHAPTER II

REVIEW OF THE LITERATURE

Introduction

Although no studies have examined the research productivity of family medicine department faculty, the literature does enable developing elements useful toward conceptualizing a predictive framework of family medicine department faculty's research productivity. The review of the literature highlights these foundational studies and is presented in the following four sections: (1) past studies of family medicine faculty's research interests and activities, (2) the medical specialty of family practice and the academic discipline of family medicine's efforts toward developing faculty research, (3) faculty research productivity, and (4) the correlates of faculty research productivity. The review of the literature ends with a conceptual framework of family medicine department faculty's research productivity that serves as a guide for this study.

Family Medicine Research Interests and Activities

Although much has been written in the family medicine literature concerning the need for family medicine faculty to produce research, only a few empirical studies examine family medicine faculty's research interests and activities. One of the first major studies of family medicine faculty was conducted by Gjerde, Clements, and Clements (1982). They identified 74 family medicine department faculty (holding either clinical and/or academic degrees) in 104 departments nationally nominated for promotion during 1980-81 to determine their publication characteristics. The results of the departmental survey showed a relatively low level of research productivity for family medicine faculty seeking promotion. On average, promoted assistant professor candidates in the study reported 0.6 journal articles published prior to promotion, 7.4 journal articles published for associate professors, and 11.0 journal articles published for full professors—well less than one journal article per academic year. Additionally, 28% of nominees reported not being published in any journals at all. Despite relatively low levels of research productivity, 65% of the nominated faculty achieved promotion that academic year. Gjerde's (1994) follow-up during the 1988-89 academic year found similar results with one exception-- productivity at the promoted assistant professor level was higher (2.7 articles). Non-clinical faculty candidates reported significantly more publications than did clinical faculty. Successful candidates for promotion published more articles than did non-successful candidates.

Culpepper and Franks (1983) conducted the first national survey of family medicine research activities in departments of family medicine and family medicine residencies. Their survey of 353 family medicine departments and residencies found that 19% of departments and residencies had little or no emphasis on research, 44% reported an "emerging emphasis on research", while 37% had a "visible emphasis on research." The number of physician faculty involved in research also was quite low as reported by departments and residencies: 66% of faculty reported as having less then 10% of their time devoted to research, 26% spending between 10-50%, and 7.8% dedicating greater than 50% of their time on research. These findings were consistent with a similar 1982 study conducted by The Study Group on Family Medicine Research (Parkerson & et al., 1982).

The Culpepper and Franks study also described several impediments to research reported by departments or units. These included "lack of faculty time", "lack of funding for faculty time for research", "lack of funding for staff, equipment, and supplies, and "lack of faculty research skills".

In 1986, Garr (1986) surveyed 986 family physicians teaching fulltime in 214 family medicine residency programs to determine relationships between demographic characteristics and job satisfaction. Only 22% were satisfied with their opportunities to do research. Additionally, only 18% were satisfied with their own research skills. Also, only 18% of the faculty stated they were satisfied with the quality of their research efforts.

Nearly a decade after the Culpepper and Frank study, Hueston (1993b) surveyed 208 fulltime physician faculty in family practice residency programs focusing on their demographics, training and experiences, and factors that motivated them to select academic careers. Hueston found that over 80% of family medicine faculty spent less than 10% of their time on research. About one-third spend no time at all on scholarship. Additionally, those that did devote more than 10% of their time doing research were more likely to have been fellowship trained, employed in university training programs, have more academic experience, and identify opportunities to do research. Hueston found that having an interest in research when first seeking a faculty position was the greatest influence toward devoting more time to research for family medicine faculty.

The most recent published study of family medicine faculty research activity was by Zyzanski, et. al. (1996) who examined the publication patterns of successful candidates for promotion and tenure to associate professor in family medicine departments nationally. Zyzanski, et.al found that successful associate professor candidates averaged 7.6 peer-reviewed journal publications (or 1.3 per year), 44% had at least one funded research grant, and 54% had at least one funded training grant.

The results show that a large majority of family medicine faculty are producing little if any research despite increased emphasis on research by leaders in family medicine. The next section of this review synthesizes the literature from family medicine and family

practice concerning the need for family physicians to conduct scholarship, as well as the various research roles available for family physicians.

Developing Family Practice Research and Family Medicine Researchers

The literature on family practice focuses on kinds of research family physicians could produce. Additionally, it describes why these bodies of research are vital toward contributing to the development of the specialty of family practice and the legitimacy of the field of study. The sections that follow summarize the need for family physicians to engage in research and how academic family medicine departments and their faculty shoulder the burden for this scholarship.

Areas of Family Practice Scholarship

According to Geyman (1978a), family practice research covers three areas: clinical strategies, health care services, and educational methods. Specific examples include cost effectiveness of health maintenance and prevention procedures, functional outcomes of care, and effectiveness of educational approaches at various learning levels.

According to Stephens (1982), the value of family practice research is in bridging the gap between primary care and medical subspecialties. These subspecialties of shared research responsibility include child care and growth and development (shared with pediatrics), early diagnosis and treatment of cancer (shared with oncology), informed patient decision making regarding surgery (shared with general surgery), and diagnosis of mental illness (with psychiatry).

Hankey (1987) developed five general areas of family practice research and estimated the percentage of time the specialty devotes to these areas in the literature. These are "who are we and what do we do?" (20%), "how do we teach what we do?" (21%), "how can we survive as a specialty?" (11%), various psychosocial and biopsychosocial behaviors (19%), and biomedical diseases and their treatment (30%). Hankey distinguished the subspecialties from family practice by the subspecialties' ability to produce biomedical research well beyond the 30% produced by family practice researchers.

Building upon Stephen's conceptualization of family practice research as boundary-spanning, Culpepper and Becker (1987b) defined family practice research as either of practical applicability and/or biopsychosocial integration. Practical applicability studies often "involve illnesses commonly encountered by family physicians, and problems which reflect the unique features of primary care practice." These include "the presentation of illness at an earlier stage...the focus on prevention as well as diagnosis and treatment...the longitudinal care of patients...and the integration of care for a number of diverse problems." (p.142). According to Culpepper and Becker, the biopsychosocial integration theme of research moves beyond questions adhering to a "strict biomedical paradigm" to include an integration of "individual perceptions, feelings and values, and with interactions between the individual and his or her larger context." (p.142).

The choice of research topics is strongly influenced by the unique niche family physicians fill. This niche includes providing healthcare that is longitudinal rather episodic in nature, generation-spanning from infant care to geriatric care, and is also provided to under-served and rural populations. Family physicians "point of first (and usually last) contact" with patients, ability to provide long-term continuity of care, and emphasis on universal healthcare, opens up practical research possibilities available to no other non-primary care medical specialty's physician group (Culpepper, 1993; Geyman, 1978b).

The Need for Family Practice Research

Three primary research themes are readily identifiable from the family practice and family medicine literature. These include clarifying the identity of family practice among other medical specialties, providing a concrete core curricula rooted in primary care research to form the academic discipline of family medicine, and answering society's needs for primary care research. Leaders in family medicine view defining both the academic discipline of family medicine and the specialty of family practice through research as an interwoven process. As Geyman (1971) states "though much of family medicine is derived from other disciplines, all of family medicine is unique in terms of its multi-disciplined approach to the care of the individual patient and his family...we should be aware that the manner in which we define family medicine as an academic discipline relates directly to the nature of the future field of family practice." (p.820).

As evidence of this interwoven relationship between the specialty of family practice and the academic discipline of family medicine, Geyman (1977) notes two distinct phases of family practice development. The first occurred in the 1960's through the development of the specialty of family practice and the emergence of academic departments of family medicine primarily to teach in the new specialty at U.S. medical schools. Relevant influences include the 1967 Millis Commission identification of "primary physician" as a specialty-trained role, the 1969 approval of family practice as a board specialty, and the development of residency programs and departments of family medicine in the late 1960's and early 1970's (Holloway et al., 1997). Stephens (1979) further described the first phase as "countercultural" arising out society's need for broad access to healthcare centered in the humanistic qualities of the physician. According to Scherger (1997), during this time "newly formed department of family medicine derived their value and presence by having different priorities than other departments, including humanistic education, social research, and community-based clinics." (p.439).

The second phase of family practice development occurred at the end of the 1970's. According to Geyman (1977), this period "involv(ed) the better definition of the academic discipline (of family medicine) and the development of the research base in the field...therein lie(s) the life blood required to assure the continued development of family practice as a specialty". (p.15) In 1978, section 780 of Public Health Service Act provided much needed government funding to improve the research skills of family medicine faculty. These training programs allowed academic family medicine and the specialty of family practice to begin what Scherger (1997) called the "parity phase". In

addition, the Robert Wood Johnson fellowship program encouraged teaching research skills to family practice residents. This phase sought to place family medicine on equal footing with other academic departments in U.S. medical schools, and family practice to balance between its counter-cultural roots and its need for a traditional base of scholarship.

Scherger (1997) declared that academic family medicine is now entering the "integration phase". This phase involves the coordination of research and clinical practice between family medicine and the other medical specialties, especially the other primary care specialties of general internal medicine, general pediatrics, and general obstetrics and gynecology. The aim of such coordination is "primary care research networks" linking researchers between and among the medical specialties.

According to the Research Subcommittee of the Academic Family Medicine Organizations Steering Committee, (a major conglomeration of the major academic family medicine organizations), there are four core values for family medicine research including three involving a societal mandates (Rogers, 1995) (p.180). According to the Research Subcommittee, family medicine research should "advocate for an improvement in the health of individuals, families, and communities." Further, through family medicine research the "incorporation of new knowledge central to quality practice can improve decision making by patients, caregivers, learners, and policy makers". Lastly, family physicians conducting research allows for an "accepting (of) our leadership

responsibility in asking and answering important questions, because of our unique position as integrators of healthcare".

According to Sweeney and Jones (1993) the need for primary care research is vital to counterbalance the predominate focus of the National Institutes of Health (NIH) on biomedical research. Sweeney and Jones provide a compelling account of the historical imbalance between biomedical research, dominated by the non-primary care specialties, and mainstream family practice research (p.37):

> For the past 30 years, over 95% of all medical conditions have been evaluated and treated outside of hospitals. However, the traditional focus of medical education and research has been on medical problems in referred and hospitalized patients. Thus, the training of physicians and the research agenda have focused almost exclusively on inpatient rather than outpatient evaluation and treatment.
>
> The undifferentiated problems of patients seeing generalist physicians are met too often with a knowledge base derived from referred or hospitalized patients, which may not be relevant to the entry level of medical service and treatment. Office-based, community-oriented family practice and primary care research on the interaction between patients and physicians will enhance the ability of physicians to more effectively care for patients.

Finally, at the Keystone Family Medicine Conference, Stange, Miller and McWhinney (2000) listed five contributions of family medicine research:

1. To contribute to the growth and development of the academic discipline of family medicine
2. To teach new generations of family practitioners "tacit knowledge"
3. To improve patient care by embracing the life course of individuals, families and communities
4. To add to the knowledge base of the specialty of family practice
5. To address new challenges in the health care system, and in society at-large, through the use of a biopsychosocial model of research.

Why Family Medicine Clinical Faculty Bear the Burden of Scholarship

The literature in family medicine clearly isolates the need for both tenure-stream and non-tenure stream clinical faculty (i.e., those that hold the M.D. or D.O. degree rather than the Ph.D.) to take a leadership role in the generation of scholarship. According to Hitchcock and Buck (1990) tenure-stream family medicine faculty members are more likely to have protected time for research and may have greater access to grant funding opportunities. Further, tenure-track faculty should have at their disposal ancillary research support staff resources such as secretaries, librarians, research assistants, and statisticians to assist in research efforts. Finally, tenure-track faculty serve as mentors for medical students, interns, residents, and junior faculty. According to Henry (1997) this tenure-stream group can be labeled "researcher/teachers" and should "possess a great interest in the scholarship of discovery" (p.258). The numbers of tenure-system family

medicine department faculty identified by Henry, however, is exceedingly small. The aggregate volume of research they can produce is limited by a lack of "critical mass".

As one consequence, community-based faculty must produce scholarship about family medicine. Although this group has not historically been charged with these responsibilities, Hitchcock and Buck point out that they are increasingly being called to produce research because they comprise the majority of family medicine faculty and because of the addition of research requirements within community-based residency programs. Hitchcock and Buck still believe that the primary research roles for this group are to be informed consumers of research and to collaborate with medical school-based tenure system faculty in research projects.

In contrast, Geyman (1978b) argues that tenure status is not all-important when determining research responsibility. Instead, clinical family medicine faculty (i.e., those that hold the D.O. of M.D. degree) should take leadership for research because of their ability to conceptualize patient-centered, practice-based research questions. Further, Geyman views clinical family medicine faculty as bridging the gap between academic family medicine and the "real world practice community". In sum, both tenure and non-tenure system clinical faculty in family medicine departments shoulder the responsibility for research because of their unique positioning within academe and clinical practice because of their access to valuable resources for research.

Overview of Faculty Research Productivity

In her review of the literature on faculty research productivity Fox (1983) found one generalization across disciplines: the average rate of faculty publication tends to be low and the variation in performance levels remains very high. Historically, 10% of faculty have been thought to produce 90% of all publications (Finkelstein, 1984; Ladd, 1979). Stated further by Creswell (1985a), "why some faculty produce research year after year and others do not is a "puzzle" (p.iii)."

When considering publication productivity of faculty, Braxton and Bayer (1986) distinguish research and scholarship. Scholarship is both a process and a product, involving the application of professional knowledge and skill as its primary attribute. Although it can involve traditional research, scholarship includes broader forms of analysis and synthesis (Boyer, 1990), Braskamp (1994), and Glasick, Huber, and Maeroff (1997).

According to Braxton and Bayer, traditional research involves a more narrow, centralized focus than scholarship. Research includes the attributes of disciplined inquiry in terms of the process, and original discovery as an end product. Bowen and Schuster (1986) believe that this disciplined, scientific research can be in two forms: basic research that seeks to "discover the laws of nature regardless of practical applicability", and applied research that involves "way of putting (basic knowledge) to practical use (p.16)." Further, they point out that higher education institutions and college faculty, especially in "pure fields" such as the sciences, historically have emphasized basic over applied research.

Logan Wilson (1942) conducted the first substantial faculty work study in the early 1940's. In *The Academic Man,* Wilson examined various aspects of the work lives of academics, including their research and teaching loads. Concerning research performance, Wilson concluded that faculty devoting a larger percentage of time strictly to teaching were promoted more quickly than those devoted a larger concentration of time on research. In fact, those who devoted more time to teaching also became more valued institutionally, as evidenced by overall performance appraisals (Creswell, 1985a). Even decades ago, scholarly productivity could be considered a system of tradeoffs. Faculty work allocation was, and still is, influenced by the cultures of the discipline, institution, and department (Austin, 1990a).

According to Geiger, the development of the modern research university in the early 1900's in America served as focal point for the generation of knowledge and a cadre of research producing academics (Geiger, 1986). While attending to the education of undergraduates, these research universities differentiated themselves from mainstream higher education institutions by their additional emphasis on graduate education, ability to recruit, retain, and further develop research producing faculty, as well as proficiency at obtaining "extramural funding" for research activities through federal and foundation grants.

Much has happened in academe to shape faculty research productivity during and after World War II. Milestones include the scientific revolution precipitated by the launch of

Sputnik, the emergence and rapid growth of populace postsecondary education as mandated by the GI Bill, and attention to research focusing on social and global issues borne from the unrest of the 1960's (Geiger, 1993; Jencks, 1977). These forces among others have shifted how colleges and universities and their faculty conceptualize and engage in their research activities in terms of foci for research, how research is funded, as well as patterns of scholarly dissemination.

Merton (1968, 1973;1957) showed that the sciences led the move toward an emphasis on disciplinary research. Merton "studied the norms associated with scientific work in science, patterns of competition among scientists, the reward structure of science, scholarly refereeing, and inequality in scientific performance (In Creswell, 1985a) (p.3)". One of Merton's greatest contributions to the study of research productivity was his seminal work on the "Matthew Effect" in the sciences. According to Merton, the Matthew Effect (1973) "consists of the accruing of greater increments of recognition for particular scientific contributions to scientists of considerable repute, and the withholding of such recognition from scientists who have not made their mark." (p.446). What Merton describes is a classification of researchers into two groups, those that "have" and those that "have not". Those that "have" can be characterized as possessing an accumulation of prior research socialization that includes an understanding of the expectations for research of a particular discipline, as well as having well-developed research project experience. Further, the advantaged "haves" have had considerable reward and recognition for their research that is extrinsically motivating in nature. This prior research

socialization is what Creswell (1985b) and Fox (1983) described later as "cumulative advantage".

Measuring Faculty Research Productivity

Several uniform measures of faculty research productivity have been mentioned in the higher and medical education literature. In his synthesis of the faculty research productivity literature from nearly every discipline in higher education, Creswell (1985a) found that the three most frequent measures of faculty research performance were publication counts, citation counts, and peer and colleague ratings. According to Creswell, each of these performance measures addresses a different dimension of faculty research productivity. Counts of publications measure the quantity of an individual's research output, citations assess the quality of the publications, and peer or colleague ratings measure the value of the contributions of research to the discipline.

Faculty publication counts can either be "straight counts" or "weighted counts" (Collins, 1993). Perhaps the easiest way to gather counts is to ask respondents to self-report the number of publications produced for a particular period of time. Counting all publications equally may be simplistic because it ignores the quality of the publications. For example, a co-authored, non-peer reviewed essay could be counted as equivalent to a peer-reviewed, first-authored journal article. Further problems could arise when equal weight is given to many of the peer-reviewed publications in newer journals whose review standards may be less rigorous than more established journals. In sum, the main advantage to the researcher in employing self-reported straight counts of publications lies

in the ease of data collection. Further, publication counts are often useful for making comparisons across various disciplines. Finally, self reported publication count data are highly reliable when compared to verified publication counts (Creamer, 1998; Creswell, 1985b).

One method of adding quality into self-reported counts is to define eligible publications carefully. Faculty members can be asked to list non-refereed publications separately from referred journals. Single authored papers can be distinguished from multiple-authored ones. The types of publications—journal articles, books, monographs, book reviews—also can be distinguished. In this manner, quality can be taken into account by including only publications meeting higher prestige criteria.

Assigning weights to publications based upon predetermined criteria is another way to take quality into account. Weights can be based upon the reputation of a particular journal, by authorship position, type of publication, peer review status, or by combinations of these approaches (Hilton, Fisher, Lopez, & Sanders, 1997; Print & Hattie, 1997; Schneid, Hamm, & Crawford, 2000). Hypothetically, a weighted approach provides a more accurate measure of research productivity. In practice, it is cumbersome to apply. Weighting schemes also are seldom comparable across disciplines. Further, reaching a consensus on weight values remains highly contentious by all counts (Creswell, 1985a).

Citation counts also have been used to measure faculty research productivity, although collectively this data is cumbersome (Braskamp & Ory, 1994; Creamer, 1998; Creswell, 1985b). One way of gathering citation data is by obtaining curriculum vitae from faculty and verifying listed citations through citation abstracts and databases. More recently, streamlined discipline-specific indices have been developed to provide research summaries along with a cross reference of all authors cited in these works. According to Centra (1981), citation data better reflects the impact of faculty work. Unfortunately, citation counts tend to encourage the overuse of self-citations and citations of friend's works. Further, citation counts do not distinguish between positive and negative comments about the work being cited. Also, citation indices are subject to a long lag-time because of the long peer review and publication process.

In addition to publications, other measures of traditional forms of scholarship include grants, conference presentations, and professional reports (Centra, 1981; Creswell, 1985b). Boyer's (1990) seminal work called "Scholarship Reconsidered: Priorities of the Professoriate" has encouraged reconceptualizing faculty research into a broader vision of a four types of scholarship: the scholarships of discovery, integration, application, and teaching.

Boyer's broader conceptualization has not yet displaced the traditional peer-reviewed publication model of faculty productivity in promotion and tenure decisions within academe. Additionally, broader views of scholarship are not easily comparable within and across disciplinary boundaries toward defining a core body of knowledge. Thus,

faculty research productivity measured broadly may not be as useful as traditional scholarship measures--particularly with underdeveloped academic disciplines seeking to establish legitimacy.

Faculty research productivity studies in medicine and health also have used a variety of traditional research productivity measures with self-reported publication counts being the most commonplace (Collins, 1993). Hillman and Fajardo (1989) conducted a national survey of academic radiologists to examine research productivity by straight counts of peer reviewed publications. Vardan and Smulyan (1990) did the same with faculty in general internal medicine. In contrast, Ellwein and Khachab (1989) used weighted counts to assess research productivity for both clinical and basic science departments within one institution. Finally, Hekelman, Zyzanski, and Flocke (1995) used a straight count of peer reviewed publications and grants over a two year period to assess the research productivity of new faculty at Case Western Reserve University.

Correlates/Predictors of Faculty Research Productivity in Higher and Medical Education

One way of classifying the correlates of faculty research productivity is to divide them into separate groups based on the same theoretical constructs(Collins, 1993). In her study of science faculty, Fox (1983) includes three categories of correlates of research productivity: individual level characteristics (such as psychological characteristics, work

habits, and demographics), work environmental factors, and reinforcing feedback. Creswell (1985a, 1985b, 1990a, 1990b) expanded this list as follows (1985, p.15-24):

(1) **Psychological and individual factors**: productive researchers possess certain psychological and individual characteristics that exceed less productive researchers includes higher intellectual ability, more motivation to perform, a certain type of personality or cognitive structure, and particular background characteristics such as age and gender.

(2) **Cumulative advantage**: productive researchers have amassed resources and positioning in their preparatory training and early in their career which predisposes them to be more successful such as training in a research intensive department or institution which has major sources of resource funding.

(3) **Reinforcement**: productive researchers are provided with frequent and consistent praise for their research both from colleagues and from mentors throughout one's development as a researcher.

(4) Disciplinary norms: productive researchers are those who reflect the research priorities of their specialty areas through their production level, mix of research topics, as well as foci for research. Additional, they reflect the methodological norms that accepted with disciplines.

Faculty research productivity studies rarely use these categories of factors together in a predictive, conceptual manner due to the breadth and depth of the factors involved (Collins, 1993; Jungnickel & Creswell, 1994). However, notable exceptions include

Blackburn and Lawrence (1995) and Fairweather and Rhoads (1995) studies of higher education faculty research productivity. Without such a broad framework, determining the relative value of one category of factors over another is problematic. The following sections synthesize the faculty research productivity literature using Creswell's categories as a guide.

Psychological and individual factors

Psychological and individual factors used in studies of faculty research productivity include intelligence, motivation, personality characteristics, stress, age, gender, ethnicity, advanced degree, academic rank, and tenure status (Creswell, 1985b). Intrinsic motivation is highly correlated with faculty research productivity. Science faculty often are motivated to pursue their own lines of research (i.e., forming a research niche) in part by the satisfaction of producing new discoveries (Pelz & Andrews, 1966). This drive to conduct research, called the "sacred spark" (Merton, 1973), is seen as pushing high producing faculty toward further discovery. Behmeyer (1974), found that these intrinsic factors were the strongest predictors of faculty research productivity, a pattern also found by Harrington and Levine with dental school faculty (1986) and Rebne (1989) with faculty across multiple disciplines.

The role of stress in research productivity is more ambiguous (Behmeyer, 1974; Behmeyer & Blackburn, 1975; Blackburn & Bentley, 1993; Blau, 1973). Pelz and Andrews (1966) described stress as resulting from the difference between preferred time spent on research and actual time spent on research. Although faculty workload studies

show a significant difference between faculty's preferred effort for research and the actual time they spend on research (Blackburn & Lawrence, 1995; Finkelstein, 1984; Finkelstein, Seal, & Schuster, 1998), the relationship between this discrepancy and research productivity is minimal.

Most faculty productivity studies have shown that the relationship between career publications and age is not linear, although the overall rate of publication in general declines with age (Behmeyer, 1974; Behmeyer & Blackburn, 1975; Finkelstein, 1984; Finkelstein et al., 1998; Lawrence & Blackburn, 1988). However, an examination of national faculty research productivity by Fairweather (1996) did show such a linear relationship between career publications and age to be present. Yet, most studies isolate age as being a mediating influence on other predictors of research productivity, such as in time spent on research and motivation to conduct research, rather than being directly predictive (Collins, 1993; Creswell, 1985b).

As for gender, men historically have had higher levels of research productivity than women (Blackburn & Lawrence, 1995; Creamer, 1998; Finkelstein, 1984; Finkelstein et al., 1998). This gender gap has narrowed significantly in recent years (Blackburn & Lawrence, 1995). Similarly, non-minority faculty produce more research than minority faculty. The literature suggests that this gap is not narrowing over time (Creamer, 1998). Most studies of the relationship between gender and ethnicity with faculty research productivity focus on the career rather than on shorter time periods (Bentley &

Blackburn, 1990; Blackburn, Wenzel, & Bieber, 1994; Cole & Singer, 1991; Creamer, 1998; Long, 1990; Nettles & Perna, 1995).

Some authors believe that white males have better established research networks within and outside their departments than do women and minorities (Finkelstein, 1984; Hitchcock, Bland, Hekelman, & Blumenthal, 1995). Further, women and minority faculty are over-represented in the "soft science areas" with traditionally lower expectations for research (Finkelstein, 1984). Women and minority faculty are less likely to be employed at research-oriented universities and spend more of their time teaching--often at the expense of research activities (Bowen & Schuster, 1986). Finally, women faculty often have family demands that can detract from time available for research (Creamer, 1998). As with age, gender and ethnicity are considered mediating influences on productivity rather than direct causes (Blackburn et al., 1994; Cole & Singer, 1991; Creamer, 1998): "race and gender do not have a direct effect on publication productivity, but an indirect effect through factors such as rank and academic field; institutional factors, including work assignment; and environmental factors, such as access to funding and influential collegial networks (Creamer, 1998, p.3)."

Advanced degree, academic rank, and tenure status are moderately, positively related to publication output. In the health professions, such as nursing and dentistry, possessing a Ph.D. degree has been associated with higher levels of faculty research productivity in most studies (Collins, 1993; Flanigan et al., 1988; Harrington & Levine, 1986; Kraemer & Lyons, 1989; Megel, 1985). Acquiring the Ph.D. apparently teaches health professions

faculty the academic norms and values as well as research skills that graduate students acquire in other graduate programs.

In most studies of faculty research productivity, academic rank and tenure status are positively indicative of scholarly output (Blackburn & Lawrence, 1995). This pattern is less obvious in the health professions where faculty are less likely to hold tenure status. Finkelstein (1984) believes that academic rank is a significant predictor of the rate of publication because faculty in higher ranks have more control over their workload assignment. Additionally, Finkelstein as well as Fulton and Trow (1974) believe that senior ranks contain faculty who succeed at research; those who remain are more productive as a whole. Tenure status is not related to faculty research productivity (Blackburn, Behmeyer, & Hall, 1978; Megel, 1985; Neumann, 1979). Reskin (1977) says that "while there are powerful sanctions in the long run, promotion, tenure, and salary raises are probably not especially effective in maintaining day-to-day conformity to productivity norms (p.491)".

Of the various psychological and cognitive factors, including intelligence, motivation, personality characteristics, stress, age, gender, only intrinsic motivation has consistently been identified as a strong predictor of faculty research productivity. Most of the other psychological and cognitive factors have shown a modest correlation with faculty research productivity. They are better seen as mediating effects. The use of broad psychological/cognitive factors, other than intrinsic motivation, seems of limited value in developing a discipline-specific, predictive model of faculty research productivity.

Cumulative advantage (Research Socialization)

According to Merton (1973), faculty in most higher education disciplines acquire research recognition and resources through their prior academic and professional training. These experiences make it easier for them to acquire additional recognition and resources in the future. This cumulative advantage, called anticipatory socialization, provides the elements of the first stage of a faculty member's socialization to academe (Tierney & Rhoads, 1993; Van Maanen, 1976). The second phase, organizational socialization, occurs from faculty recruitment through accepting the first faculty position and beginning faculty employment.

During graduate school future faculty are socialized to a research culture. Anticipatory socialization is as an important concept in describing the development of graduate students as future academics. Gotlieb (1968) described how departmental climates and cultures, as well as interactions with faculty, influence future career choices of graduate students including their research foci. Bess (1978) described how certain graduate students may be predisposed toward faculty careers by developing a set of distinctive academic values, attitudes and beliefs. Weidman and Stein's (1990) conceptual model for graduate students' professional socialization included socializing agents and events including student's background characteristics, educational experiences, non-educational reference groups (family, employer, peer group), professional associations and professional practice. The outcomes of this graduate student socialization include developed and shared values and attitudes, academic aspirations, academic norms,

conceptualization of professional authority and status, development of knowledge and skills, individual identity, and professional commitment.

Blackburn and Fox (1976) conducted the only major study of how medical faculty are academically socialized through patterns of accumulative advantage. Blackburn and Fox found that very few clinical medical faculty (i.e. medical faculty with the M.D. degree) aspire to academic careers during their prior academic and professional training. Further, these clinical medical faculty made decisions about choosing an academic career relatively late in comparison to non-clinical medical faculty (i.e. medical faculty with the Ph.D. degree). Blackburn and Fox also showed that non-clinical medical faculty are more likely than clinical faculty to accept "university professorial norms". Clinical faculty are more accepting of new clinical recruits to the professorate. Regardless of terminal degree, however, Blackburn and Fox found that the medical faculty in their study exhibited similar academic goals, suggesting that their socialization to academic roles occurs on the job rather than during academic training.

Whatever the motivation, once faculty members publish the develop a cumulative advantage, highly predictive of future research productivity (Allison & Stewart, 1974; Blackburn et al., 1978; Clemente, 1973; Collins, 1993; Creswell, 1985b; Fox, 1983; Megel, 1985). This accumulative advantage includes early success in publishing, prior research project experience, research mentorship, development of research skills, collaboration on research projects, and research sponsorship (Collins, 1993; Creswell,

1985b; Fox, 1983, 1996). In sum, cumulative advantage is highly predictive of faculty research productivity.

Environmental Socialization and Reinforcement: The Influence of Disciplinary, Institutional and Departmental Cultural Norms for Research

Academic environments and their attendant cultures or climates (Peterson & Spencer, 1990), provide both socializing and reinforcing organizational messages about norms, values, and expectations concerning research (Kuh & Whitt, 1988). Based upon Clark's perception of faculty as embracing multiple organizational affiliations (Clark, 1987), Austin (1992) identified four faculty cultures: the discipline, the employing institution (i.e., the university or college), the national system of higher education, and the scholarly profession.

Disciplinary cultures have been isolated as the "primary units of membership and identification within the academic profession" (Clark, 1987) and have been categorized in many different ways such as pure or applied, abstract or practical, humanistic or scientific, among others (Becher, 1987; Biglan, 1973; Gaff & Wilson, 1971; Snow, 1959). According to Austin (1992), institutional cultures are formed by a colleges or university's "institutional mission and purpose, its size, complexity, age, and location, the way in which its authority is conceived and structured, the organization of work (especially teaching and inquiry), the curricular structure and academic standards, student and faculty characteristics, and the physical environment (p.1617)." Clark defined national systems of higher education to vary by the held values concerning issues of

accessibility (universality) of higher education, specialization of faculty work, the relationship between general and vocational education, and the balance of research and teaching activities (Clark, 1983). Finally, the culture of the academic profession includes a set of primary academic values such as intellectual inquiry and understanding, societal commitment, academic honesty and integrity, academic freedom, and faculty collaboration toward a community or scholars (Austin, 1992). Austin believes that these four cultures contain mixed and often conflicting messages concerning organizational values, beliefs and norms for faculty work (Austin, 1990a, 1990b, 1992, 1994; Austin & Gamson, 1983).

Although much has been written about the pervasiveness of faculty cultures in the shaping of faculty work environments in general, little attention has been given to medical faculty. The exception is Blackburn and Fox (1976). In their study of medical faculty socialization, medical faculty (especially clinical medical faculty) do not seem to identify well with the norms and values of the academic profession. Their follow-up study in 1983, Blackburn and Fox found that in all medical specialties the opportunity to engage in research was not valued equally across various physician career stages. Blackburn and Fox also found that the overall value physicians placed on academic matters was extremely low in comparison to other non-academic values. The limited evidence available from these two studies suggests that the culture of the academic profession may not be a useful construct when examining medical faculty culture--particularly when trying to isolate the influences exerted upon medical faculty's research productivity.

Across all of Austin's four faculty cultures, the disciplinary culture may be the most influential upon faculty research productivity. The literature in higher and medical education clearly shows that faculty research productivity varies between, and often times within, differing disciplines (Blackburn et al., 1978; Boyer, 1990; Braxton & Bayer, 1986; James Steven Fairweather, 1996; Finkelstein, 1984; Finkelstein et al., 1998; Fulton & Trow, 1974; McGee & Ford, 1987; Wanner, Lewis, & Gregorio, 1981). According to Finklestein (1984), the most research productive disciplines are the natural sciences with the "soft sciences" such as humanities, education, and art being the least research productive--a fact which has been substantiated in many other research studies (Biglan, 1973; James Steven Fairweather, 1996; Finkelstein et al., 1998).

As posited by Collins (1993), these differences reflect differing research philosophies and access to research opportunities. These philosophies and research opportunities develop into discipline-defining patterns of knowledge, ranging from "high internal consensus patterns" in the sciences, to "low internal consensus patterns" in the humanities. These consensus patterns are based upon the level of agreement about research foci and the important universality of "truths" within different disciplines (Biglan, 1973; Braxton & Bayer, 1986; Creamer, 1998). In addition, disciplines differ in both the number of publishing venues and peer-review rigor (Finkelstein, 1984).

Workload, Rewards, and Faculty Research Productivity

Traditionally, faculty have been thought to narrowly divide their work time among the three often conflicting roles of teaching, research, and service (Krahenbuhl, 1998). However, substantial differences in this balance between time spent teaching and on research are evident based upon a faculty member's employing institutional type, with research university faculty spending the greatest amount of time on research (1996). Prior to World War II, teaching comprised the largest faculty role, but after the war due to an explosion in federal research grant funding, teaching was soon replaced by research as most dominant in faculty reward structures as manifested through formalized promotion and tenure systems (Middaugh, 2001).

In terms of workload, studies in higher and medical education have shown that faculty that include significant time devoted to research activities are more research productive than those whose workloads include little or no time for research (Allison & Stewart, 1974; Bland & Schmitz, 1986; Calligaro & Others, 1991; Kraemer & Lyons, 1989; Liddle, Westergren, & Duke, 1997; S. Vardan, H. Smulyan, S. Mookherjee, & K. Mehrotra, 1990). Pelz and Andrews (1966) found that faculty workloads that are balanced between research and other faculty roles, such as teaching and administration, lead to greater productivity than exceedingly large or small workloads devoted to research. A later study in university and industrial settings by Knorr, Mittermeir, Aichholzer, and Waller (1979) showed that the most productive researchers are those whose workloads included no less than 20%, nor more than 80% of time devoted to

research. The same study showed the ideal percentage of faculty time on research to facilitate research productivity was an approximate 40% time commitment to research.

Academic institutions and academic departments greatly influence faculty research productivity through their norms regarding faculty work (i.e., distribution of faculty time), as well as reinforcement for conducting various faculty roles (i.e. intrinsic and extrinsic rewards). The cultures of these academic institutions and departments exerts influence on faculty through the establishment of research missions, various policies and practices regarding research, organizational structures, and management and allocation of research resources (Collins, 1993; Creswell, 1985a; Finkelstein, 1984; Kuh & Whitt, 1988). Further, faculty workload assignments, research budgets, salaries and wages, promotion and tenure policies, and level of research leadership/mentorship as determined by academic institutions and departments have also been shown to strongly affect faculty research productivity (Dill, 1986). Diamond (1993) believes that these institutional influences direct faculty's interests away from teaching, toward research as a primary activity.

Faculty rewards, such as compensation or promotion and tenure, also has also been shown to strongly influence faculty members interest in producing research, and in limited research, has been shown to positively influence faculty research productivity (Bland & Ruffin, 1992; Dill, 1986; Fairweather, 1996; Kasten, 1984; Oeffinger, Roaten, Ader, & Buchanan, 1997). Fairweather and Rhoads (1995) categorized faculty reward systems, in tandem with faculty workload allocation, as "administrative action."

According to Fairweather and Rhoads, administrative action is comprised of faculty workload allocation and faculty rewards, and when combined with current socialization and self-motivation, are keys to faculty behaviors, such as time allocated to both instructional and research activities.

Academic Prestige and Faculty Research Productivity

Finally, academic institutions and departments also affect faculty research through the level of prestige or reputation they possess for research. This prestige in turn provides a level of cumulative advantage not unlike that which highly experienced individual researchers develop through their prior research training (Fox, 1983; Merton, 1973). Blackburn, Behmeyer, and Hall (1978) found in their discipline-spanning productivity study that researchers affiliated with high prestige institutions had higher productivity than those affiliated with lower prestige institutions, a pattern found similar by other studies such as McGee and Ford (1987), Crane (1965), Long and McGinnis (1981). Additionally, having high research producing colleagues in academic departments positively influences faculty research productivity (Bean, 1982; Fox, 1983; Glueck & Jauch, 1975). Maintaining conversations about research within and outside departments and institutions has been shown to influence faculty research productivity by Blackburn, Behmeyer and Hall (1978), Braxton (1983), and Pelz and Andrews (1966), and Finklestein (1982).

Research Environments and Faculty Research Productivity

Finally, Bland and Ruffin (1992) provide a synthesis of the organizational literature describing the relationship between research environments and productive faculty researchers. Bland and Ruffin describe twelve important organizational variables (or cultural characteristics) that positively influence faculty research productivity. These cultural characteristics include organizations that have clear goals (including well-developed linkages to individual's goals), a research emphasis, a distinctive research culture, a climate balancing between respect and "intellectual jostling", assertive participative governance, and a flat (decentralized) organizational structure. Further, Bland and Ruffin include frequent communication, accessible resources (particularly human), diversity of research groups (group size, age, sex, ethnicity, etc.), reward structure for research, a focus on recruitment and selection, and leadership by those with research expertise, as being keys to successful research productivity.

Toward a predictive model of family medicine department faculty research productivity

Several literature-based and empirical models of faculty research productivity combine the aforementioned factors in one form or another. Three of these models are particularly useful because of the breadth of faculty productivity literature examined across multiple disciplines. The first model by Finkelstein (1984) is based upon seven "normative and behavioral variables" predictive of faculty publication productivity. These predictors include faculty researchers having a research orientation, the highest terminal degree within a field, early publication habits, previous publication activity, communication with

disciplinary colleagues, being subscribed to a large number of journals, and having sufficient time allocation to research among other academic role components.

The second model by Creswell (1985a) describes several correlates defining the productive faculty researcher. Creswell found psychological and individual correlates less explanatory than sociological (such as preference for research, time spent on research, and early productivity) and work-environment related correlates (such as prestige of employing institution).

According to Creswell, the profile of the productive faculty researcher includes being employed in a major university that rewards research and assigns ample time for faculty to conduct research. Additionally, successful researchers tend to hold a senior professorial rank, spend at least one-third of their time on research activities, publish early in a career and receive positive feedback from peers for research efforts. Finally, Creswell believes that successful faculty researchers maintain regular and close contact with colleagues on and off campus who conduct research on similar topics.

The third faculty research productivity model used here was developed by Bland and Schmitz (1986). Focusing on medical education, Bland describes successful faculty researchers as having a personal motivation to produce research, an in-depth knowledge of a research area, basic and applicable research skills, prior socialization to research, and research mentorship. Additionally, Bland states that having an early record of scholarship, well-developed professional networks, productive local peer support for

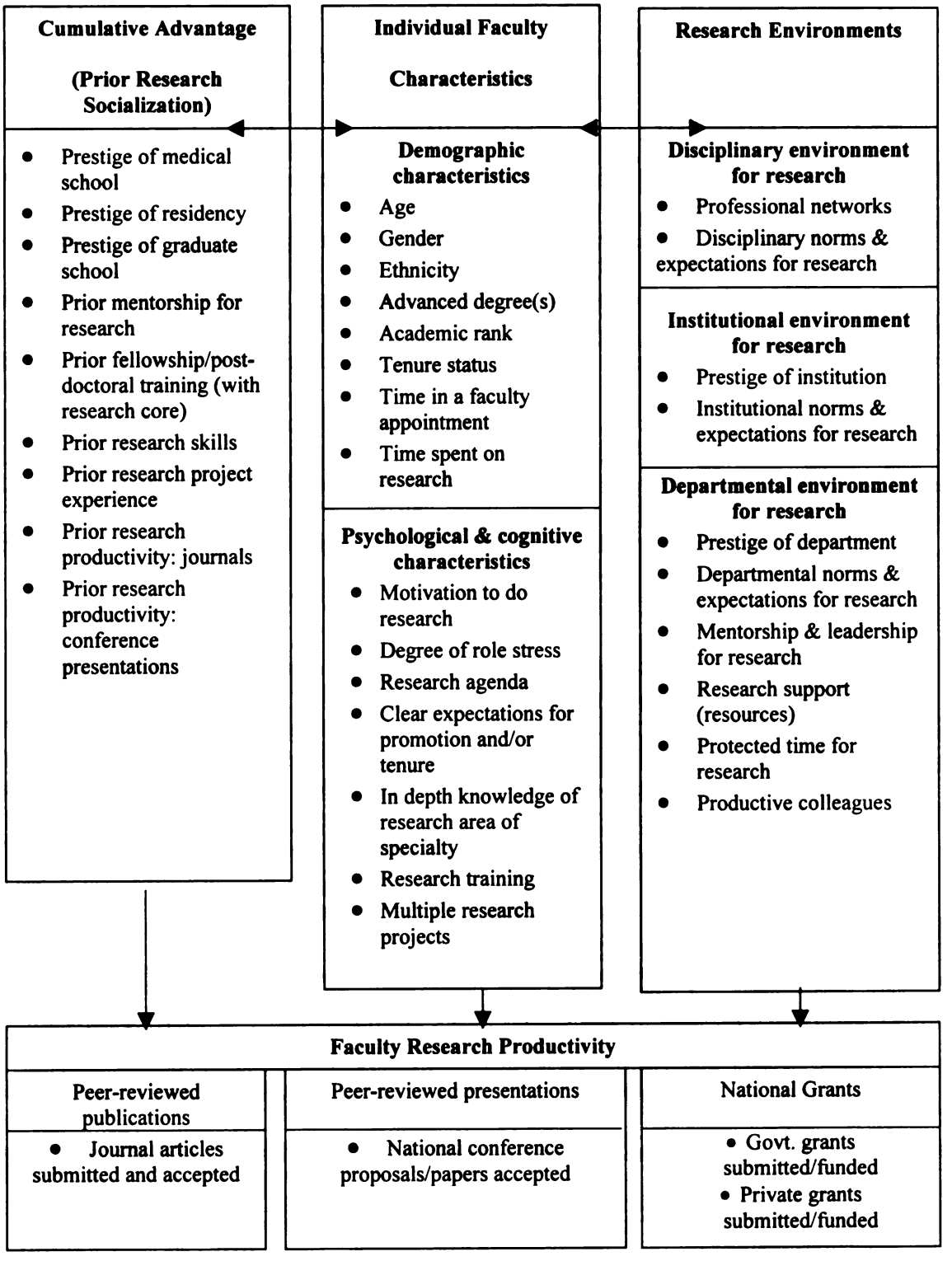
research, multiple research projects underway, and sufficient work time devoted to research are also defining characteristics of successful faculty researchers. Finally, Bland believes that successful faculty researchers have an external and internal orientation to colleagues producing research, a high degree of autonomy in faculty work and in work goals, and supportive environments for research that includes adequate physical and human resources with institutions and departments.

For this study, I developed a conceptual model of family medicine faculty research productivity based on the work by Finklestein, Creswell, and Bland (see Figure 2.1).

Figure 2.1

Conceptual Model:

Predictors of Family Medicine Department Faculty Research Productivity



This model also incorporates the faculty cultural elements suggested by Austin that shape and define faculty work, particularly research production.

The first section of the conceptual model includes the independent variables descriptive of cumulative advantage (or prior research socialization). These variables include the research socializing experiences as well as the research experiences future family medicine faculty have had prior to the first faculty appointment. These include critical research events undertaken during medical school, residency, graduate school, and fellowship training. The independent variables in this section include research prestige (reputation) of medical school, residency, and graduate schools (if applicable), mentorship for research, fellowship/post-doctoral training, as well as prior research skills, research project experience, research productivity, including journal articles written and conference presentations given.

The second section of the conceptual framework, individual faculty characteristics, contains two subsections of independent variables: demographic and psychological characteristics of faculty. Both subsections involve current (i.e., since becoming faculty members) rather than prior characteristics. The demographic subsection of independent variables provide a description of faculty's age, gender, ethnicity, advanced degrees earned, academic rank, tenure status, time in faculty appointment, and time spent on research activities. The psychological and cognitive subsection contains knowledge, skills, and attitudes (including motivation) concerning research that may influence

research productivity. The independent variables in this subsection include having motivation to do research, possessing an amount of role stress, having a defined research agenda, clear research expectations for promotion and tenure, an in-depth knowledge of a research area of specialty, additional research training, and multiple research project underway.

The third section of the conceptual framework includes those independent variables comprising family medicine department faculty's research environments, including subsections for faculty's disciplinary, institutional, and department environments for research. The independent variables in each of these three subsections include organizational cultural elements that may be influential upon the current research socialization of family medicine department faculty. The disciplinary environmental variables include maintaining professional networks and the perception of family medicine as a discipline rooted in research. The prestige of the institution and institutional norms and expectations for research make up the institutional environment for research. Finally, the departmental environment for research includes prestige for research, departmental norms and expectations for research, mentorship and leadership for research, research support (resources), protected time for research, and productive colleagues.

The fourth section of the conceptual framework comprises the dependent (outcome) variables for this study. These variables describes the research productivity of family medicine department faculty in terms of peer reviewed scholarship, including the

traditional research productivity categories of journal articles submitted and accepted, national conference presentations accepted, and national government and private grants submitted and funded.

In the next chapter, the methodology for this study is described that involves gathering descriptive data addressing each of the predictors from the conceptual model. Further, the methodology section includes a description of how the conceptual model will be further validated and tested empirically. Finally, the section will include a description of the data collection tool for this study--a national survey of family medicine department faculty's research activities and interests.

CHAPTER III

METHODOLOGY

This study's focus is to describe the overall research productivity of U.S. family medicine faculty and the various factors that may be associated with research productivity. Specifically, this study addresses the following questions:

(1) What are the individual faculty characteristics (demographic, psychological & cognitive) of family medicine department faculty?

(2) What prior socializing experiences in terms of research have family medicine department faculty had before accepting their first faculty position?

(3) What are the characteristics of family medicine department faculty's research environments?

(4) What is the research productivity of family medicine department faculty in U.S. medical schools?

(5) What prior socializing experiences, individual faculty characteristics, and characteristics of research environments of family medicine faculty are predictors of their research productivity?

Consistent with the goal of making national estimates of research productivity, this study gathers survey data from family medicine faculty nationwide. This research is the first survey study of family medicine department faculty ever conducted with faculty on a national basis to determine their self-reported research productivity, as well as some of the factors that may contribute to their productivity. Further, this study complements existing demographic descriptive data concerning family medicine department faculty gathered on an ongoing basis by the Association of American Medical College's (AAMC) Faculty Roster System (FRS).

The first section of this chapter describes the study's population within departments of family medicine nationally. The following section conveys an accounting of this study's sample and how it was determined. The third section involves a review of the data collection strategies employed in this study include instrumentation, description of study variables, validity measures, and data collection procedures. The final section includes a detailing of the data analysis plan including attention to returns and non-returns, the methods for handling response bias, the reporting and scaling of independent and dependent variables, and the statistics used to compare variables and answer the research questions.

Population

For more than 30 years, the AAMC's FRS, in cooperation with the National Institutes of Health, has collected census data on faculty in U.S medical schools across specialties and academic departments. As of December 31, 1999, Table 3.1 shows the population of family medicine faculty by advanced degree for the departments of family medicine located at the 125 U.S. medical schools and geographically separated campuses (i.e., including U.S. territories).

Table 3.1

Population of U.S. Medical School Departments of Family Medicine Faculty (by Advanced Academic Degree)

Advanced Degree	Number of Faculty	% of all Family Medicine Department Faculty
M.D. only	1,765	61%
M.D. plus other degrees	324	11%
D.O. only	88	3%
D.O. plus other degrees	8	<1%
All other degrees and combinations (not included in this study)	696	24%
Total Family Medicine Faculty in U.S. Medical Schools	2,881	100%

For this study, the population includes all family medicine department faculty in U.S. medical schools holding the M.D. (61% of all family medicine department faculty) or D.O. degree only (3% of all faculty), and holding either the M.D. or D.O. degree in combination with other advanced degrees (11% and <1% respectively). This population includes 76% of all family medicine department faculty nationally. The 24% not included in this study's population hold a wide range of advanced degrees, including the Ph.D. degree and various masters degrees such as the Masters of Public Health, Masters of Business Administration, and Masters of Education degrees.

Study Sample

A stratified random sample was selected for faculty holding the M.D. only and the M.D. plus other degrees. For the M.D. degree only and M.D. plus other degree groups, the Association of American Medical College's Faculty Roster System drew random samples. Both of these randomly sampled groups cut across all departments of family medicine faculty nationally. A certainty sample was used for two other groups--those holding the D.O. degree only and those holding the D.O. degree plus another advanced degree--because of their relatively small numbers.

A sample size of 314 for the M.D. degree only group was chosen based on the formula suggested by Aday (1989):

n (minimum sample size)= (Standard error associated with a confidence level^2)(Estimate of the standard deviation^2)/desired precision), or n=$(1.96^2)(2.0^2)/.05$=314.

Both the standard error associated with a confidence interval (1.96) and desired precision figures (.05) were arbitrarily set by the researcher using conventional figures used in a majority of studies in medical and higher education. The standard deviation (SD) for this study (2.0) was estimated by taking the average SD from a study conducted by Hekelman, Zyzanski, and Flocke (1995), which was similar in methodology, design, and focus. This study showed standard deviations of means ranging between 1.4 and 2.4; 2.0 was used as an arbitrary midpoint estimate of the standard deviation for this study.

Aday then suggests making several adjustments to the minimum sample size according to the nature of the study design, expected response rate, and expected proportion of eligible participants based upon the study's inclusion criterion. Because this study involved a random sample no adjustment in sample size is needed based upon the design of the study. However, an adjustment in the sample size must be made for the expected response rate for this study. Using as a range the Hekelman et. al study's (64% response rate) and an arbitrary 50% response rate on the low end, 57% was selected as an estimated midpoint target response rate. Using Aday's adjustment for the expected response rate (minimum sample size/expected response rate, or 314/.57), 551 was the adjusted minimal sample size. Finally, Aday recommends an additional sample size adjustment based upon the percentage of eligible responses. Since this study used FRS data reportedly 90% accurate (by AAMC estimates), I divided the minimum sample size by the percentage of eligibles (551/.90), resulting in a final adjusted sample size of 612. I rounded the M.D. only sample size to 600 for convenience.

Using the ratio of estimated sample size to the population estimate for the M.D. only group, I selected 100 from the M.D. degree plus other degree group. To this total I included the identified national population of D.O. only and D.O. plus other degrees (88 and 8, respectively).

Table 3.2

Family Medicine Department Faculty Study Sample Size (by Advanced Academic Degree)

Advanced Degree	This Study's Sample of Faculty (by Academic Degree)	% of Overall Study Sample	% of All Family Medicine Faculty Nationally
M.D. only	600	75%	34%
M.D. plus other degrees	100	13%	31%
D.O. only	88	11%	100%
D.O. plus other degrees	8	1%	100%
Total Sample Size	796	100%	36%

Data Collection Strategies

Instrumentation

I developed a survey instrument corresponding to the four parts of the conceptual framework (see Appendix B for the survey instrument). The survey instrument also included a variety of items derived from the higher and medical education literature on faculty research productivity. I pre-tested the instrument with two national experts on faculty research productivity, Dr. Carole Bland from the University of Minnesota and Dr. John Creswell from the University of Nebraska.

Part one of the survey contained one question for each of the prior research training variables, part two included one question for each of the current research interests and activities variables, and part three contained one question for each of the current research environment variables. In part four of the survey, one question was asked for each of the three outcome productivity measures for this study (self-reports of peer reviewed manuscripts for journal publication, peer reviewed proposals/papers for national conference presentations, and national government and private grants) over the most recent two-year period. Additional questions were asked to distinguish between submitted and accepted manuscripts, as well as national government and private grants submitted and actually partially or fully funded.

The prior research training, current research interests and activities, and current research environment sections of the survey instrument used five point Likert scales that included "strongly disagree", "disagree", "neither agree/disagree", "agree", "strongly agree" points

as suggested by Fink (1995) for scaled survey instruments. A sixth scaled option was added called "not applicable" based upon the results of the family medicine focus group feedback on the survey instrument (see validity measures section of this chapter). However, responses using this sixth point on the scaling were not included when tabulating the descriptive data for this study to allow for continuous measures to be realized for each question. The self-reported research productivity section include a five point scale ranging from zero to five or greater units of research productivity. This scale emphasized lower levels of research productivity based upon relatively low anecdotal estimates of family medicine department previously identified in the family medicine literature for each productivity measure. Finally, the demographic section was primarily composed of forced choice categorical measures, but also included continuous measures for year of birth and hours per week spent on research activities.

Description of Study Variables

The conceptual framework and instrumentation for this study included several categories of independent and dependent variables. The prior research socialization category of independent variables focused on research and research-related skills and experiences that family medicine faculty had prior to entering their first faculty position, primarily during medical school and residency. Individual faculty characteristics included independent variables that may be influential upon faculty research productivity, such as age, gender, ethnicity, and tenure status, among others. Additionally, individual faculty characteristics included a set of psychological and cognitive characteristics such as motivation to do research, degree of role stress, and having a formalized research agenda,

among others. Research environments contained independent variables at the disciplinary, institutional, and departmental level including professional networks, institutional and departmental prestige in terms of research as well as norms and expectations to conduct research, among others.

Validity Measures

In addition to checking the instrument with Drs. Bland and Creswell, the survey was piloted during January 2000 with four family medicine department faculty members at Michigan State University. The pilot respondents were asked to complete the survey, time themselves, and address the following reliability issues (Fink, 1995):

- Are the instructions for completing the survey clearly written?
- Are the questions easy to understand?
- Do respondents know how to indicate responses (e.g., circle or mark the response, etc.)?
- Are the response choices mutually exclusive?
- Are the response choices exhaustive?
- Do respondents understand what to do with completed questionnaires (i.e., how to return them and where to return them?
- Do respondents understand by when to return the completed survey?

Based upon the feedback from the pilot group, the survey's instructions were simplified, a "not applicable" category was added to the survey instrument's scaling, and the survey's cover letter was shortened.

Data Collection Procedures

The Association of American Medical College's Faculty Roster System compiled a mailing list and prepared sets of mailing labels for each of this study's four sampled groups. The surveys were mailed to respondent's academic departmental offices. Prior to the second mailing wave of surveys, non-respondents from the Faculty Roster System mailing list from wave one were cross-referenced with the American Academy of Family Physicians National Database to determine a new preferred mailing address (usually either a clinic address or a home address). The second and third waves of surveys mailed were to the preferred address to increase the likelihood of return response. Surveys for each mailing wave were printed on different colored paper and were coded with a number corresponding to each potential respondent in the study.

Using Dillman's (1978) total design method for survey research, the cover letter accompanying the survey was co-authored by the President of the Association of Departments of Family Medicine (ADFM) on ADFM stationary to lend name credibility (see Appendix A). Additionally, the American Academy of Family Physicians Foundation (AAFP/F) supported production and mailing costs for this study.

The instrument was formatted to fit on two pages (with print on both the front and back side), creating the impression that the survey was time-efficient. Further, respondents were provided with a postage-paid envelope in which to mail back completed surveys. All respondents were guaranteed confidentiality. Finally, the cover letter described

participation as being voluntary, with return of the survey signifying agreement to participate in the study.

The mailing and data collection methods employed for this study are those also suggested by Dillman for mail surveys:

1. At one week, a postcard reminder was sent to all faculty in the study to serve as a thank you for those who responded, as well as to serve as a reminder to those who had not responded.
2. At three weeks, a letter and replacement survey was sent to all non-respondents.
3. At seven weeks, a final mailing similar to the one in week three was sent with a final replacement survey.

Data Analysis

Data analysis included: (a) a focus on returns and non-returns, (b) methods for dealing with response bias, (c) reporting of a descriptive analysis of all independent and dependent variables, (d) scaling of independent and dependent variables and (e) the statistics used to compare groups or relate variables and answer the research questions (Creswell, 1994). The data analysis section of this chapter concludes with a summarization of the research questions, questionnaire items and associated analytic strategies listed in Table 3.3.

Returns, Non-Returns and Response Bias

Table 4.1 shows both the return and non-return rates in percentage for each of the study sample's groups. Table 4.2 tests for response bias, with a wave analysis for weeks two, four, and eight by analyzing responses to two questions from each of the five sections of survey instrument. I used these tests to determine whether or not differences between early, middle, and late responders existed.

Descriptive Analysis of Independent and Dependent Variables

The descriptive analysis of the first three research questions included a reporting of the mean, standard deviation, and range of scores for each variable, or in the case of dichotomous or categorical variables, frequency distributions. The results are presented separately by variable: (1) cumulative advantage, (2) demographic characteristics, (3) psychological and cognitive characteristics, (4) disciplinary environment for research, (5) institutional environment for research, and (6) departmental environment for research.

The fourth research question focused on the dependent measure, research productivity. Again, the analysis included the mean, standard deviation, and range of scores. The productivity data was presented in a cross-tabulated format by distinct productivity measure (journal articles, national conference presentations, national government grants, and private grants). These outcomes were also compared by age, advanced academic degree, academic rank, and years of faculty experience. Appendices D-G include these productivity tables listed by demographic variable.

Scaling of Independent and Dependent Variables

To reduce the independent measures to a manageable number, I carried out a factor analysis with orthogonal rotation to create composite predictor variables each with its own factor score (Babbie, 1990). A reliability analysis was conducted to determine the internal consistency of each new composite or factor score. Each of the individual variables was not grouped together prior to the factor analysis to allow each of the variables to form new categories based upon their relationships with each other. The four outcome measures were kept distinct to permit separate examination of the different types of scholarly productivity.

Statistics Used to Compare Groups, Relate Variables, and Answer Research Questions

The fifth research question required regressing each form of scholarly productivity on the factor scores and other demographics. A full model regression was used.

Table 3.3

Relationship Between Research Questions, Questionnaire Items, and Analytic Strategies

Research Question Number(s)	Questionnaire Number(s)	Analytic Strategies
1: Prior Socializing Research Experiences	1-9	Descriptive Analysis for each variable in this category of independent variables.
2: Individual Faculty Characteristics	10-16; 34-42	Same as above
3: Research Environments	17-26	Same as above
4: Faculty Research Productivity	27-33	Descriptive Analysis for each of four research productivity measures
5: Predictors of Research Productivity	N/A	Factor Analysis to combine independent variables within each major category of variables into six overall categories. Then, a multiple regression analysis to determine which of the six categories is predictive of each of the forms of research productivity.

CHAPTER IV

RESULTS

Introduction

This chapter contains the results of a national survey of family medicine department faculty's research productivity as well as the factors that may contribute toward their research productivity. The first section of the chapter contains a description of a survey response rate and survey question analysis both conducted as part of the validity and reliability measures for this study. The second section of this chapter provides the descriptive results garnered for the independent variables for this study, while the third section is comprised of the descriptive findings for the dependent variables (i.e., the research productivity data of family medicine department faculty). The fourth and final section of this chapter conveys the results of a factor analysis conducted to reduce the study's independent variables, as well as full model multiple regression tests of this study's conceptual model to determine the factors predictive of family medicine department faculty's research productivity.

Validity and Reliability Measures

In addition to the pre-tests described in Chapter 3, reliability tests were carried out using survey response rate analysis and survey question analysis.

Survey Response Rate Analysis

The first wave of 796 surveys was mailed during January 2000. Prior to a postcard reminder mailed in February 2000, 171 surveys were returned for the first wave for a response rate of 21.48%. After the postcard reminder, a second wave of surveys was mailed during March 2000. Prior to the third wave of surveys sent, 428 had been received for a response rate of 53.76%. The third and final wave of surveys was sent during April 2000. Data collection was concluded during May 2000 with 474 surveys having been received for a final response rate of 59.55%.

A review of the initial sample of 796 showed that 44 were ineligible for the study. Of the 44, 26 had left academic medicine, departments of family medicine, or retired, and 18 had moved without providing a forwarding address. The final adjusted response rate for this study, excluding these groups, was 63.03% (474/752).

Table 4.1 provides a survey response rate comparison between the study's sample and the survey respondents by advanced academic degrees held. There is little evidence of bias shown through the analysis.

Table 4.1

Survey Response (by Advanced Academic Degrees Held)

Advanced Academic Degree	**Percentage of Sample**	**Percentage of Survey Respondents**
M.D. only	75%	68%
M.D. plus other degrees	13%	18%
D.O. only	11%	12%
D.O. plus other degrees	1%	2%

Survey Question Analysis (by Survey Wave)

A survey question wave analysis compared responses from each of the first four sections of the survey for waves one and waves two and three (see Table 4.2). Waves two and three were combined to allow similar sized comparison groups.

Table 4.2

Survey Question Wave Analysis

Survey Question	Wave Number	Mean Score	t	df	Sig. (2-tailed)
Medical School Known for Research (Prestige of Medical School)	1 2 & 3	3.52 3.42	.84	468	.40
Residency Known for Research (Prestige of Residency)	1 2 & 3	2.79 2.74	.43	458	.66
Research Satisfying (Motivation to Do Research)	1 2 & 3	3.56 3.34	1.93	446	.06
Pressure to Engage in Research (Degree of Role Stress)	1 2 & 3	4.20 4.07	1.27	448	.21
Network Outside Department (Professional Networks)	1 2 & 3	2.30 2.43	-1.07	435	.29
Family Medicine Research as Discipline (Disc. Norms & Expect. For Research)	1 2 & 3	2.40 2.43	-.30	460	.76
Manuscripts Submitted for Publication	1 2 & 3	1.32 1.00	2.09	454	.04
Manuscripts Accepted for Publication	1 2 & 3	1.01 .83	1.32	453	.19

When comparing mean responses from wave one with mean responses from waves two and three, the only marginally significant difference noted was in the factor "manuscripts accepted for publication". Perhaps the respondents in wave one had a higher interest (and value) in research thus their earlier response. Similarly, respondents in wave one were more research productive than those in waves two and three. In sum the wave analysis demonstrates little bias in the survey responses.

Descriptive Findings: Independent Variables

Descriptive data for the independent variables comprise the next four subsections of this chapter. These subsections include a description of the demographic characteristics of family medicine faculty participating in the study, and their psychological and cognitive characteristics, cumulative advantage (prior research socialization), and research environments.

Demographic Characteristics

Table 4.3 contains a summarization of demographic data of family medicine faculty in terms of age, years of faculty experience, and hours per week spent on research activities. Faculty in the study are relatively middle aged and report a moderate amount of faculty experience. The faculty also spend little time on research activities, with a large majority spending little if any time on research. Although there were small pockets of faculty spending a significant amount of time on research, 37.6% reported no time spent on research each week, 79.3% spent a half-day or less per week on research, and 88.2% reported that they spent a day or less a week on research related activities.

Table 4.3

Demographic Characteristics: Age, Years of Faculty Experience, and Hours per Week Spent on Research Activities

	Mean	Median	Mode	Std. Deviation	Minimum	Maximum
Age	45.92	45.00	44.00	8.32	31.00	76.00
Years of Faculty Experience	10.88	9.00	7.00	7.18	1.00	40.00
Hours Per Week Spent on Research Activities	3.41	1.00	.00	6.30	.00	40.00

As shown in Table 4.4, the faculty were also predominately male and overwhelmingly from non-minority ethnic groups.

Table 4.4

Demographics Characteristics: Gender and Ethnic Origin

Gender

	Frequency	**Valid Percent**
Male	331	70.7
Female	137	29.3
Total	468	100.0

Ethnic Origin

	Frequency	**Valid Percent**
White, not of Hispanic Origin	404	89.4
Black, not of Hispanic Origin	15	3.3
Asian or Pacific Islander	14	3.1
Puerto Rican (Hispanic)	8	1.8
Mexican American of Chicano (Hispanic)	5	1.1
Other Hispanic	4	.9
American Indian or Alaska Native	2	.4
Total	452	100.0

Table 4.5 provides summary data in terms of academic rank. 74% of faculty categorized themselves as holding traditional academic ranks (i.e., instructor, assistant professor, associate professor, or professor) while 19% listed clinical ranks. The most prevalent level given was at the assistant or clinical assistant professor level (55% in total).

Table 4.5

Demographics Characteristics: Academic Rank

Academic Rank

	Frequency	**Valid Percent**
Instructor	10	2.2
Assistant Professor	167	35.9
Associate Professor	93	20.0
Professor	72	15.5
Clinical Instructor	7	1.5
Clinical Assistant Professor	68	14.6
Clinical Associate Professor	28	6.0
Clinical Professor	11	2.4
Other	9	1.9
Total	465	100.0

As shown in Table 4.6, in terms of academic status, faculty largely were in non-tenure track academic positions. Additionally, mirroring this study's sample, 87.7% held the M.D. degree, while 12.3% held the D.O. degree, with several faculty reporting non-clinical advanced degrees in addition to the M.D. or D.O. clinical degree.

Table 4.6

Demographics Characteristics: Academic Status and Non-Clinical Advanced Degrees

Academic Status

	Frequency	**Valid Percent**
Not in a Tenure Track Position	341	73.8
Tenured	75	16.2
On the Tenure Track	46	10.0
Total	462	100.0

Non-Clinical Advanced Degrees

	Frequency	**Valid Percent**
Masters Degree in Health Related Area	58	12.5
Other Masters Degree	24	5.2
Ph.D./Ed.D.	11	2.4
Masters Degree in Education Related Area	9	1.9
Other Health Doctorate	2	.4

Table 4.7 contains a breakdown of the academic ranks from respondents in the study. 73.6% of faculty reported themselves in the traditional academic ranks of instructor, assistant professor, or associate professor. Conversely, 25.5% were divided into clinical academic ranks, such as clinical instructor, clinical assistant professor, clinical associate professor, and clinical professor.

Table 4.7

Academic Rank

	Frequency	**Valid Percent**
Instructor	10	2.2
Assistant Professor	167	35.9
Associate Professor	93	20.0
Professor	72	15.5
Clinical Instructor	7	1.5
Clinical Assistant Professor	68	14.6
Clinical Associate Professor	28	6.0
Clinical Professor	11	2.4
Other	9	1.9
Total	465	100.0

Psychological and Cognitive Characteristics

Psychological and cognitive characteristics were measured by respondent's agreement/disagreement with statements concerning their motivation to do research, pressure to conduct research, ownership of a well-defined research agenda, understanding of expectations for promotion/tenure, in-depth knowledge of a research area of specialty, research training since becoming a faculty member, and having multiple research projects underway. For each scale, the higher the number the greater the agreement with 5 being the highest possible response. A score above 3 indicates an overall positive response, whereas less than 3 indicates a negative response. Not applicable scores were recoded and excluded from calculations.

As shown in Table 4.8, on the positive side, respondents found research to be personally satisfying, understood the promotion and/or tenure guidelines of their departments, stayed "up-to-date" on literature in their research areas, and further developed their research skills since becoming faculty members. On the negative side, a majority of faculty in the study described themselves as lacking a clear research agenda, having few research projects underway suitable for publication, and possessing a high degree of pressure to participate in research activities.

Table 4.8

Psychological and Cognitive Characteristics

	Mean	Std. Deviation
Find Research Satisfying	3.48	1.19
Feel Pressure to Engage in Research	4.15	1.09
Have a Well-Defined Research Agenda	2.52	1.23
Understand Research Guidelines for Promotion and Tenure	3.76	1.07
Stay up-to-date on Literature in Research Area(s)	3.71	.96
Further Developed Research Skills (since becoming a faculty member)	3.53	1.29
Have Multiple Projects Underway	2.57	1.40

Cumulative Advantage (Prior Research Socialization)

Respondents described experiencing little exposure to research during their academic and clinical training before becoming faculty members (Table 4.9). Few had substantive experiences engaging in research projects or in developing their own individual research skills. As a result, few had published original research and even fewer had opportunities to disseminate research at national conferences. Respondents also reported little mentorship in research prior to becoming faculty, including have opportunities to participate in research-based fellowships or post-doctoral programs. A few faculty in the study who had participated in graduate training prior to becoming faculty described their experiences positively.

Table 4.9

Cumulative Advantage (Prior Research Socialization)

	Mean	Std. Deviation
Medical School Known for Research	3.48	1.26
Residency Known for Research	2.77	1.32
Graduate School Known for Research	3.79	1.25
Mentoring in Research Prior to Faculty Position	2.35	1.34
Fellowship/Post-Doc Research Training	2.08	1.40
Research Skills Prior to Faculty Position	2.11	1.29
Meaningful Research Projects Prior to Faculty	2.49	1.41
Journal Articles Published Prior to Faculty	2.36	1.45
Conference Presentations Given Prior to Faculty	1.98	1.33

Research Environments

Family medicine faculty may be influenced by a variety of environmental factors including the prevalent disciplinary cultural norms and expectations concerning research, their academic institution's prioritization of research, and the extent that their own academic departments engage in research activities. As shown in Table 4.10, family medicine faculty describe the disciplinary culture in academic family medicine as not heavily vested in research. The majority of family medicine faculty do not have well-developed professional networks of colleagues outside their own academic departments with whom they can discuss research. In sum, characterization of family medicine as a discipline lacking research focus seems supported by the respondents in this study.

Respondents view their institutions as strongly influencing research norms and expectations. A large majority of the faculty viewed their academic institution as possessing a reputation for meaningful research and creating an expectation for faculty to generate scholarly work. For most family medicine faculty in the study, the institutional

expectation is realized-- that to be a successful faculty member means contributing a body of original research.

Study respondents were less clear about their department's cultural norms and expectations for research. Although departments emphasize research, respondents do not view their departments as possessing a reputation for research, nor are their colleagues research productive. Further, research support has been unevenly manifested in resources, including a consistent block of protected time for research.

Table 4.10

Research Environments: Disciplinary, Institutional, and Departmental

	Mean	**Std. Deviation**
Networks Outside Department	2.34	1.24
Family Medicine Research as Discipline	2.41	.96
Institution Known for Research	3.40	1.26
Institution Emphasizes Research	3.69	1.16
Department Known for Research	2.76	1.18
Department Emphasizes Research	3.11	1.11
Department Chairperson Supports Research	3.54	1.12
Adequate Department Resources	2.91	1.29
Department Provides Protected Time	2.20	1.17
Department Faculty are Productive Researchers	2.20	1.00

Descriptive Findings: Family Medicine Department Faculty Research Productivity

This section describes research productivity as measured by submitted and accepted peer reviewed manuscripts for publication, proposals/papers for conference presentation, and submitted and funded national government and private grants. These outcomes are examined separately by demographic variables.

Two Year Mean Productivity

Table 4.11 presents family medicine department faculty's research productivity for their last two academic years. For each type of productivity, faculty reported significantly less than one scholarly work per year. Manuscripts for publication were the largest category of scholarship generated.

Table 4.11

Family Medicine Department Faculty Research Productivity (Means for Last Two Academic Years)

	Mean	**Standard Deviation**
Manuscripts Submitted for Publication	1.20	1.61
Manuscripts Accepted for Publication	.95	1.43
Proposals/Papers Accepted for Conference Presentations	.71	1.30
National Government Grant Proposals Submitted	.61	1.08
National Government Grant Proposals Funded	.39	.82
National Private Grant Proposals Submitted	.37	.82
National Private Grant Proposals Funded	.22	.58

The majority of faculty produced nothing over the two academic year reporting period. A frequency distribution of research productivity for the two academic years showed that 58.2% reported no manuscripts accepted for publication, 67.3% no proposals/papers

accepted for conference presentations, 75.8% no national government proposals funded, and 84.3% no national private grant proposals funded (see Appendix D).

Productivity Differences by Demographic Variables

By age, the 40-45 year age group produced the most proposals/papers accepted for conference presentation (.970) and obtained more private grants (.303). The 46-50 year old group had the most manuscripts accepted for publication (1.20) and national government grants funded. Across all productivity measures, the 30-39 year age group was the least productive. An ANOVA conducted by age for each productivity measure shows that a statistically significant difference by age group in manuscripts accepted for publication ($F=9.80$, $df=3$,$p<.001$), proposals/papers accepted for conference presentation ($F=4.32$, $df=3$, $p<.001$), and national government grant proposals funded ($F=4.06$, $df=3$, $p<.001$). No significant differences were found for national private grants funded (see Appendix E for details).

Males produced more of the following research outputs than females: manuscripts accepted for publication (1.08/.629), proposals/papers accepted for conference presentations (.78/.53), national government grant proposals funded (.41/.34), and national private grant proposals funded (.25/.17). However, only the mean difference for manuscripts accepted ($t=3.08$, $df=451$, $p<.001$) was statistically significant.

Caucasians appeared to out produce non-Caucasians in two of the productivity means, manuscripts accepted (1.02/.31) ($t=3.18$,$df=437$, $p<.001$) and conference presentations

(.78/.26) (t=2.48, df438, p<.001). However, for government grants (.40/.39) and private grants (.23/.20), non-Caucasians out-produced Caucasians marginally.

Respondents with both clinical degrees (M.D. or D.O) and other advanced degrees produced more research than those with the M.D. or the D.O. degree. Additionally, across three of the productivity measures, MD's out-produced D.O.'s (see Appendix F). An ANOVA conducted by advanced degree for each productivity measure showed significant differences between those with M.D.'s only, those with D.O.'s only, and those with the M.D. or D.O. and other degrees, across all of the productivity measures: manuscripts (F=9.89, df=2, p<.001), conference presentations (F=12.74, df=2, p<.001), government grants (F=9.58, df=2, p<.001), and private grants funded (F=5.76, df=2, p<.001). However, a post-hoc, Tukey HSD comparison of means for each of these productivity measures did not show statistically significant differences at the alpha =.05 level between M.D.'s and D.O's. This test did show statistically significant differences for each of the productivity measures between those with M.D.'s degrees only or those with D.O. degrees only, and those that have the M.D. or D.O degree in tandem with other advanced degrees.

Full professors produced the most research, followed by associate professors, and assistant professors. Faculty with clinical appointments produced the least for each of the productivity measures (see Appendix G). An ANOVA showed a significant difference among the academic ranks across all productivity measures: manuscripts (F=31.40, df=3, p<.001), conference presentations (F=13.92, df=3, p<.001), government grants (F=16.29,

df=3, p<.001), and private grants funded (F=8.172, df=3, p<.001). A post hoc Tukey HSD test revealed for manuscripts, conference presentations, and government grants, there were significant mean differences between assistant and associate professors, assistant professors and professors, and associate professors and those with clinical ranks (∀=.05).

Tenured or tenure track faculty produced more research of all types than did those who were neither tenured nor on the tenure track: manuscripts (1.96/.59), conference presentations (1.50/.44), government grants (.81/.24), and private grants (.52/.11). Independent samples t-tests for equality of means showed significant academic status differences for each of the productivity measures: manuscripts (t=-9.82, df=446, p<.001), conference presentations (t=-8.12, df=447, p<.001), government grants, (t=-6.79, df=446, p<.001) and private grants funded (t=-6.74, df=442, p<.001).

Faculty with 16 or more years of experience had the highest mean number of manuscripts (1.40) and government grants (.67). Faculty with 11-15 years of experience had the highest number of mean conference presentations (1.16) and private grants (.38) (see Appendix H). For all productivity measures, those with five years or less of experience were the lowest producers. An ANOVA conducted by years as a faculty member for each productivity measure shows a significant difference between the experience groups across all productivity measures: manuscripts (F=14.91, df=3, p<.001), conference presentations (F=6.81, df=3, p<.001), government grants (F=10.43, df=3, p<.001), and private grants funded (F=5.284, df=3, p<.001). A Pearson Correlation shows a moderate

positive correlation between years as a faculty member and manuscripts (.293, p<.001), conference presentations (.171, p<.001), government grants (.256, p<.001), and private grants (.103, p<.05).

Finally, a Pearson Correlation shows a strong positive relationship between time spent on research and each of the productivity measures: manuscripts (r=.557, p<.001), conference presentations (r=.506, p<.001), government grants (r=.463, p<.001), and private grants (r=.412, p<.001).

Predictors of Family Medicine Department Faculty Research Productivity

This subsection describes the results of a factor analysis conducted to create composite predictors. Using these predictors, Research Question 5 is examined by testing the model in Figure 2.1.

Results of Factor Analysis of Independent Variables

To reduce the likelihood of multicollinearity in the regression analysis composite variables were created by carrying out a principal components analysis. Table 4.12 contains the results of principal components factor analysis using varimax with Kaiser normalization. Factor loadings of less than .30 are omitted from the table.

Table 4.12

Factor Analysis of Independent Variables

Rotated Component Matrix[a]

	Component					
	1	2	3	4	5	6
Prior Research Project Experience	.882					
Prior Research Skills	.855					
Prior Research Productivity: Conference Presentations	.851					
Prior Mentorship for Research	.819					
Prior Research Productivity: Journal Articles	.777					
Prior Fellowship/Post-Doctoral Research Training	.766					
Prestige of Graduate School	.459				.405	-.326
Research Training		.872				
Research Agenda		.823				
Motivation to Do Research		.774				
Multiple Research Projects		.769				
In-depth Knowledge of Research Area of Specialty		.660		-.300		
Professional Networks		.655				
Clear Expectations for Promotion & Tenure		.512				
Mentorship and Leadership for Research		.427	.374	.394		.374
Institutional Norms and Expectations for Research			.816			
Departmental Norms and Expectations for Research			.810			
Prestige of Institution			.799			
Prestige of Department			.779			
Productive Colleagues			.677			
Protected Time for Research		.419		.730		
Degree of Role Stress				-.716		
Research Support Resources			.345	.654		
Prestige of Medical School					.817	
Prestige of Residency					.377	
Disciplinary Norms & Expectations for Research						.849

Extraction Method: Principal Component Analysis. Rotation Method: Varimax with Kaiser Normalization.

[a] Rotation converged in 7 iterations.

Six components emerged from the analysis. The first composite describes prior research training before the first faculty position. The six measures in the composite include prior research project experience, prior research skills, prior conference presentations given, prior research mentorship, prior journal articles accepted for publication, and prior fellowship/post-doctoral research training. The Chronbach's alpha is .90, suggesting a high degree of internal consistency among the variables in the composite.

The second composite combines measures of psychological and cognitive predispositions toward research. This composite includes developing research skills through formalized research training, possessing a definable research agenda, having motivation to do research, having multiple research project underway, having an in-depth knowledge of a research area of specialty, having professional networks, and having clear expectations for promotion and tenure. The Chronbach's alpha of the composite is .88, also suggesting high internal consistency.

The third new composite defines the current research environment. It includes institutional norms and expectations for research, departmental norms and expectations for research, research prestige of the department, research prestige of the institution, and having research productive colleagues. The Chronbach's alpha is .85, demonstrating high internal consistency. The fourth composite defines resources available for faculty research. It includes having a department chairperson supportive of research, protected time for research, the degree of role stress, and research support resources. The Chronbach's alpha of this composite is .64. The fifth composite defines institutional

prestige. It includes the prestige of the medical school, residency, and graduate school. The Chronbach's alpha of this composite is .60. The sixth composite contains a single variable, perceptions of family medicine as a research discipline. Table 4.13 summarizes the composites and shows relevant descriptive statistics.

Table 4.13

Descriptive Statistics: Composite Variables

	N	Mean	Std. Deviation
Prior Research Training	314	2.27	1.16
Psychological and Cognitive Characteristics	363	3.27	.89
Current Research Environments	441	3.04	.91
Resources for Research	362	2.62	.80
Prior Institutional Prestige Regarding Research	459	3.34	.78
Perceptions of Family Medicine as a Research Discipline	462	2.41	.96

Results of Multiple Regression Analysis

After the factor analysis reduced this study's independent variable to six new composite predictors, a series of seven full model regressions were carried out to test the contribution of each composite predictor toward predicting each of the productivity outcome measures for this study. Along with the new composite predictors, demographic variables that were not subject to data reduction were also used in each of the productivity models.

Specifically, each model included the new composite variables prior research training, psychological/cognitive characteristics, current research environments, resources for research, prestige regarding research, and perceptions of family medicine as a research discipline. Additionally, the following demographic predictors were used in each of the models: age, years as a faculty member, hours per week on research, gender, ethnicity, advanced degree (M.D.), advanced degree (Ph.D./Ed.D), academic rank (assistant professor), academic rank (associate professor), academic rank (clinical ranks), and tenure stream status. The use of full model regression analysis required the exclusion of two demographic variables from each model, Academic Rank (Full Professor) and

Advanced Degree (D.O.), because of the statistical need to exclude at least part of dichotomous variables in each predictive model. The seven productivity models included manuscripts submitted and accepted, conference proposals/papers accepted, and national government and private grants submitted and funded.

For the outcome manuscripts accepted for publication, the full model regression accounted for 62.4% of the variance (R^2), suggesting a strong relationship between the independent variables used in the model and the outcome variable manuscripts submitted for publication. An ANOVA conducted as part of the multiple regression analysis showed that there is a highly significant relationship between the predictive models independent variables and manuscripts accepted for publication ($F=18.527$; $df=17,207$; $p<.001$). An examination of the coefficients for the predictive model shows that the composite predictor psychological and cognitive characteristics and the demographic variable hours per week on research activities provided the greatest contributions to the prediction, with betas of .405 and .281 prospectively. Additionally, being in a tenure stream appointment provided further, but less predictive contribution, as evidenced by a beta of .125. The psychological and cognitive ($t=6.383$; $p<.001$) and hours per week ($t=4.371$; $p<.001$) predictors were highly statistically significant, while being in a tenure system appointment was statistically significant, but less so ($t=2.234$; $p=.027$).

For the outcome conference papers/proposals accepted, the full model regression accounted for 50.4% of the variance (R^2), further suggesting a strong relationship for the predictive model. An ANOVA showed a highly significant relationship between the

predictive models independent variables and conference papers/proposals accepted (F=11.425; df=17,208; p<.001). As with the manuscripts accepted for publication predictive model, the coefficients for the conference presentations model also identified psychological and cognitive characteristics and hours per week on research activities as providing the greatest contributions to the prediction, with betas of .384 and .233 prospectively. However, the demographic variable of age provided further, but a less predictive negative contribution, as evidenced by a beta of -.138. The psychological and cognitive composite (t=5.285; p<.001) was highly statistically significant, while the hours per week (t=3.171; p=.002) and age (t=-2.065; p=.040) was less so.

The government grants funded model accounted for 43.7% of the variance (R^2), also suggesting a strong relationship. An ANOVA showed a highly significant relationship (F=8.708; df=17,208; p<.001). The model identified hours per week on research activities and years as a faculty member as providing the greatest contributions to the prediction, with betas of .586 and .196 prospectively. Hours per week was highly statistically significant (t=7.482; p<.001), while years as a faculty member (t=2.274; p=.024) was less so.

The private grants funded model accounted for 31.3% of the variance (R^2), also suggesting a strong relationship. An ANOVA showed a highly significant relationship (F=5.037; df=17,205; p<.001). The model identified the composites current research environment and psychological and cognitive factors, along with hours per week on research activities, as adding most to the predictive model, with betas of .222, .242, and

.202 prospectively. Additionally, each was statistically significant at the at the <.05 level, with t values of 3.098 (current research environment), 2.817 (psychological and cognitive factors), and 2.319 (hours per week on research activities).

Between each of the submitted and accepted models (i.e., manuscripts, government grants, and private grants) there was little difference in the variance explained (see Table 4.14 for a summary). Additionally, while the manuscripts submitted and manuscripts accepted models had the same predictors and beta significant levels, there were slight differences in the government and private grant models. For government submitted, current research environments and family medicine as a research discipline are additional statistically significant predictors along with years as a faculty member and hours per week spent on research activities. The private grants submitted model varied from the private grants funded model only in the exclusion in the private grants submitted model of the predictor hours per week on research activities. To facilitate comparison between each of the six predictive models, Table 4.14 provides a summarization of each of the full model regression statistics, while Table 4.15 provides a synthesis of the model's betas and levels of statistical significance.

Table 4.14

Summary of Full Model Multiple Regressions: Full Model Statistics

	Manuscripts Submitted	**Manuscripts Accepted**	**Conference Papers/Proposals Accepted**	**Government Grants Submitted**	**Government Grants Funded**	**Private Grants Submitted**	**Private Grants Funded**
Full Models Statistics:							
R^2	.655	.624	.504	.509	.437	.315	.313
F	21.338	18.527	11.425	11.636	8.708	5.137	5.037
df	17,208	17, 207	17,208	17,208	17,208	17,207	17,205
p	<.001	<.001	<.001	<.001	<.001	<.001	<.001

Table 4.15

Summary of Full Model Multiple Regressions: Standardized Coefficients (Beta)

	Manuscripts Submitted	Manuscripts Accepted	Conference Proposals Accepted	Govt. Grants Submitted	Govt. Grants Funded	Private Grants Submitted	Private Grants Funded
Full Models Standardized Coefficients (Beta):							
Prior Research Training	-.015	.013	.016	.065	-.064	.070	-.041
Psychological and Cognitive Factors	.466*	.405*	.384*	.095	-.058	.289*	.242**
Current Research Environments	.059	.057	.064	.123**	.057	.161**	.222**
Resources for Research	-.020	-.017	.027	.057	.038	.101	.025
Prestige Regarding Research	.056	.048	.083	.016	-.002	-.057	-.100
Family Medicine Research as a Discipline	-.019	-.002	-.037	-.163**	-.095	-.015	-.085
Age	-.066	-.046	-.138**	-.085	-.113	-.069	-.076
Years as Faculty Member	.082	.053	.109	.236**	.196**	.043	-.034
Hours Per Week on Research	.241*	.281*	.233**	.475*	.586*	.143	.202**
Gender	-.061	-.078	-.094	-.047	-.019	-.012	-.077
Ethnicity	.085	.053	.052	.046	-.012	.018	-.027
Advanced Degree: MD	.020	.039	.077	.071	.116	.090	.097
Advanced Degree: Ph.D/Ed.D	-.042	-.028	.017	-.058	-.029	-.038	.063
Rank: Asst. Professor	-.151	-.175	-.066	.005	-.130	-.075	-.109
Rank: Assoc. Professor	.002	.003	-.043	.040	-.063	-.046	.012
Rank: Clinical	-.077	-.084	-.121	-.036	-.155	-.097	-.062
Tenure Track	.120**	.125**	-.013	-.053	-.036	.028	.108

*Statistically significant, p<.001

**Statistically significant, p<.05

Summary

The results of a national survey of family medicine department faculty provide a demographic profile. The typical family medicine department faculty member is male, middle aged, Caucasian, not in the tenure stream, holding a traditional academic rank. In terms of time spent on research, 79.3% of faculty reported spending a half-day or less per week on research.

The results also provide a description of the psychological and cognitive characteristics of family medicine faculty concerning research. Positively, faculty described a high degree of internal satisfaction from research, have taken steps to improve their research skills, and stay up-to-date in potential areas of research. Negatively, a majority of faculty described a considerable amount of pressure to produce research, few had well-defined research agendas, nor multiple research projects underway.

The results also provide a description of the prior research socialization before the first faculty position. Before becoming faculty, few family physicians in training had opportunities to conduct and disseminate research through publications and presentations. Yet, the future family medicine faculty were largely aware of research activities having trained at medical schools where research was emphasized.

In terms of the disciplinary, institutional, and departmental environments for research, the influences of each are powerful, yet often times in conflict. The academic discipline of family medicine is not viewed as a discipline well known for its research, yet academic

institutions are both known for and emphasizing research. At the departmental level, chairpersons are supportive of research, but there is not a strongly perceived emphasis upon research. Further, departments are not perceived as being particularly well known for research activities. Large impediments toward producing research described by faculty include a lack of protected time and a dearth of departmental colleagues producing research.

The results also provide insight on the research productivity of family medicine faculty. In each of the faculty research productivity areas (manuscripts, conference presentations and government and private grants), faculty reported significantly less than one unit of productivity per year, with manuscripts being the largest category. An overwhelmingly large majority of the family medicine faculty reported producing no research over the last two academic years: 58.2% reported having no manuscripts accepted for publication, 67.3% no proposals/papers accepted for conference presentations, 75.8% no national government proposals funded, and 84.3% no national private grant proposals funded.

When examining productivity in light of demographic variables, a profile of the highly productive family medicine department faculty emerges. Those that are relatively higher producing tend to be Caucasian, male, between 40-50 years of age, and hold a D.O. or M.D. degree in tandem with other advanced degrees. Additionally, the higher producing are more likely to be in the tenure stream, have eleven or more years of experience as faculty members, and spend more than a half of a day per week devoted to research.

The results of this study also included the testing of a conceptual model of family medicine department faculty research productivity. Predictive factors include six composite variables (prior research training, psychological and cognitive characteristics concerning research, current research environments, resources for research, prestige regarding research, and family medicine as a discipline known for research). Additionally, the model also included the demographic variables of age, years as a faculty member, hours per week spent on research, gender, ethnicity, advanced degree (M.D.), advanced degree (Ph.D./Ed.D), academic rank (assistant professor), academic rank (associate professor), academic rank (clinical ranks), and tenure stream status.

For manuscripts submitted and accepted, the psychological and cognitive characteristics composite, along with the demographic variables of hours per week on research and tenure status, provided the largest contribution to the predictive regression model. The conference proposals accepted regression model also had psychological and cognitive characteristics, along with age, and hours per week on research activities as high contributors. The government grants submitted and funded models shared the highest elements of years as a faculty member and hours per week spent on research. However, the government grants submitted model had additional high contributions from current research environments and family medicine as a research discipline. The private grants submitted and funded models shared the psychological and cognitive and current research environments composites as most explanatory. Additionally, hours per week spent on research activities also was largely contributing for private grants funded.

CHAPTER V

DISCUSSION AND CONCLUSIONS

Introduction

This national study of family medicine department faculty attempted to determine their research productivity as well as the predictors of this research productivity. This chapter provides a discussion of the descriptive findings from this study, including family medicine faculty's individual characteristics, prior socializing experiences, current research environments, and research productivity. This chapter also contains discussion on the predictive factors and the conceptual model used as part of this study in light of positioning this study's results along side other faculty research productivity models, both literature-based and empirical. Finally, by way of conclusion, the chapter ends with specific recommendations for discipline of family medicine and the specialty of family practice in light of this study's findings toward fostering the growth advocated throughout the profession.

Review of Descriptive and Predictive Findings

Family Medicine Department Faculty Demographics

The first section of this study provided a description of family medicine department faculty's demographic characteristics. Comparisons can be made between this study's demographics and data compiled by the Association of American Medical College's Faculty Roster (1999). The demographic profile of faculty that emerged from this study is

consistent with demographic data found in the Faculty Roster for family medicine department faculty, in regard to gender, ethnicity, and tenure status.

However, the Faculty Roster data does not include separate breakdowns for clinical and non-clinical academic ranks, nor does it specifically categorize those holding clinical academic degrees in combination with other advanced degrees. This study found that 25% of family medicine faculty are located in clinical academic ranks and over 20% have additional advanced degrees beyond the M.D. or D.O. degree, data points that are missed through Faculty Roster reporting. Additionally, this study provides a unique contribution by providing data on both faculty's age as well as years in a faculty appointment, further demographics not addressed by Faculty Roster data.

Perhaps the most interesting demographic finding that emerged from this study was that 79% of faculty spent less than a half-day per week on research and 36% spent no time at all. These findings are consistent with earlier studies of family medicine faculty conducted by Culpepper and Franks (1983), as well as Hueston (1993). Unfortunately, the Faculty Roster does not measure faculty workload (including time spent on research), making comparisons to this study's workload data impossible.

However, a comparison can be made between this study's faculty and mainstream higher education faculty regarding time spent on research. The percentage of faculty in this study spending little or no time on research is dramatically larger than reported for higher education faculty by Fulton and Trow (1974) and Ladd (1979). Fulton and Trow reported

that, across all disciplines and institutional types, 7% of faculty spent no time on research and an additional 15% spent between 1-4 hours per week on research. Ladd found similar numbers in his study, 3% spending no time on research, and another 11% spending 1-4 hours per week.

The reasons for family medicine faculty spending less time on research than higher education faculty may be two-fold. As identified in the family medicine literature, family medicine faculty have been increasingly called to support academic activities through increasing clinical responsibilities. Because of heightened clinical demands, there is likely to be an erosion of the time available for research for faculty. Further, as shown in this study, the perceived expectation by the discipline of family medicine, medical schools, and departments of family medicine for faculty to conduct research has remained low in comparison to higher education faculty, much less other medical specialty's faculty.

Psychological and Cognitive Characteristics

In addition to the demographic characteristics of family medicine faculty, this study also provided some unique insights on the psychological and cognitive characteristics of family medicine department faculty, particularly the tension between clinical and academic responsibilities. Faculty in the study are aware of the need to produce research and to develop their research skills toward becoming research productive scholars. Yet, there is strong evidence from the results that faculty face a great deal of countervailing

pressure to be highly effective and profitable clinicians. Undoubtedly, this tension is manifested in the extremely high level of role stress reported by faculty in this study.

In short, the tension between academic and faculty roles is also exacerbated by the mixed messages being supplied by medical schools and departments of family medicine regarding the relative importance of both of these faculty role domains. As with higher education faculty possessing finite hours in which to complete multiple responsibilities, family medicine faculty are forced to make choices about faculty workload composition based upon their own strengths and preferences, but even more so, institutional and departmental expectations manifested through faculty promotion and reward structures. However, unlike higher education faculty, family medicine faculty must find ways to balance not only teaching, research and administrative responsibilities, but also clinical practice roles. This tension is supported by Blackburn's belief that medical faculty wrestle with two often conflicting professional identities, one as academics, and another as a clinicians (Blackburn, 1976). Normatively however, the clinical identity emerges as largely dominant in determining faculty's overall beliefs, values, and attitudes, and theoretically, prioritization of faculty work roles.

However, since family medicine faculty have chosen an academic career pathway, there must be at least a moderate interest and appreciation for research. Studies by Fulton and Trow (1974) and Ladd (1979) identified a large majority of faculty across disciplines and institutional types as having at least a moderate level of interest in research activities. The psychological and cognitive findings from this study in regard to interest and motivation

for research are also consistent with studies by Finkelstein, Seal and Schuster (1998) showing the greatest difference between faculty's preferred time and actual time spent in all roles is in research activities. This provides evidence that family medicine faculty are largely the same as higher education faculty in their intrinsic motivation for research, as well as perceived stress in struggling to balance conflicting faculty roles.

Prior Research Socialization (Cumulative Advantage)

This study's findings on prior research socialization shows little evidence of cumulative advantage occurring prior to the first faculty position as is often found in higher education, particularly in the sciences. Perhaps this is because of the extremely limited opportunities in medical school, internship, and residency that could be considered actual research socialization for future family medicine faculty, such as receiving research mentorship, participating in research projects, and having experiences producing and disseminating research. However, some future faculty were trained in medical schools and graduate schools where research was emphasized that may have been somewhat influential upon their overall development as researchers.

This lack of research socialization is largely different from what is experienced by graduate students anticipating future faculty careers, as well for other medical specialties students, interns, and residents developing their clinical practices rooted in a defined knowledge base centered in disciplinary scholarship. Particularly for graduate students during their academic training, there is significant exposure to high producing research mentors that train them how to identify researchable questions, how to develop a research

agenda, and how to obtain resources for research. Because family medicine faculty largely have missed this valuable anticipatory socialization, accelerated research socialization as new faculty becomes vital toward assuming faculty responsibilities, including producing research.

Environments for Research

Family medicine faculty members can be considered in some ways to be products of their disciplinary, institutional, and departmental environments for research. As discussed earlier, often conflicting and contradictory messages are sent to family medicine faculty in regard to the norms and expectations for research that may differ at the disciplinary, institutional, and departmental level.

From the results of this study, it is clear that family medicine faculty do not consider family medicine as a specialty, nor family practice as a discipline, to be strongly rooted in a research culture. Part of this perception may be because of the relative youthfulness of both the specialty and discipline. But a larger reason may be what others have identified as family practice's "counter-cultural roots", seeking to distance family practice from other medical specialties through the creation of a unique populist clinical identity, as well as non-conformist, "anti-intellectual" academic identity (Stephens, 1979; Rodnick, 1987; Doherty, 1987). It remains problematic for an emergent specialty and discipline to have faculty who largely do not share a consensus for or against these emergent professional identities.

The faculty in this study also describe little research networking occurring within departments, medical schools, and among faculty as scholarly colleagues. One cause for this lack of research networking may be because these networks are not developed much less modeled in medical schools and residency programs through primary care research activity and scholarly collaboration. Further, the lack of networking may occur because few family medicine faculty attend national research-based conferences where many linkages are forged both during their clinical development, as well as after being appointed faculty. Finally, since family medicine faculty identify themselves primarily as clinicians, their effort to maintain and develop networks may be focused more on clinical practice networks than research ones.

Medical schools that faculty are located in may also play a significant part in influencing research efforts because of these institution's available research resources. It is clear that most family medicine faculty are aware of the research norms and reputations of most of these medical schools for clinical research production. But, as is the case in mainstream higher education, it is doubtful that research expectations conveyed by academic institutions carry greater weight than greater weight than research expectations exuded from both disciplinary and departmental research environments.

The departmental environment for research for family medicine faculty seems to largely mirror the disciplinary mixed messages that are delivered concerning research. On the one hand, family medicine faculty describe their chairpersons as being supportive of research and that most essential resources are available for research. On the other hand,

this encouragement and facilitation does not translate into a critical mass of faculty conducting research, and as a result, few departments can be considered highly research productive, nor do they tend to convey high expectations for research. Perhaps the greatest department level impediment to research is that few departments offer protected time for research--a benefit consistently mentioned in the higher education literature as strongly influencing faculty research productivity.

Finally, there are several characteristics of family medicine department environments that may make them less than optimal for research efforts. For one, because of their clinical responsibilities, family medicine faculty may have a high degree of "academic rootlessness" in that they often move from one clinical practice site to another several times in one week, rarely setting foot in academic departments but for the occasional faculty meeting. As a result, unlike in most higher education departments, a core of family medicine faculty may have few opportunities to meet and collaborate on research projects, much less to formally and informally discuss research interests and activities. Finding ways to link faculty toward a common commitment to research (as well as other faculty roles) remains one of the greatest challenges facing family medicine departments nationally.

Family Medicine Department Faculty Research Productivity

Family medicine department faculty in this study reported very little evidence of scholarly productivity. The fact that in a two-year period, 58% of faculty did not produce any manuscripts, 67% any conference presentations, 75% any national government

grants, and 84% any private grants, clearly is troublesome to a specialty and discipline desiring growth and definition through a critical mass of faculty and research. As with time spent on research, the pattern of lack of research productivity is particularly more pervasive than is found in mainstream higher education and other medical specialty's faculty and supports earlier productivity studies conducted in family medicine two decades ago. Most troubling is the fact that this study offers no evidence that the level of family medicine department faculty research productivity is on the increase even given the consensus in the family medicine literature for the need for such scholarship to occur.

A Predictive Model of Family Medicine Department Faculty Research Productivity

The test of this study's conceptual model is compelling because of the theoretical and practical implications realized through this research. Perhaps most importantly, the results of this test are particular helpful for family medicine leaders to begin formulating discipline-wide research initiatives, and for medical schools and family medicine departments toward initiating faculty development programs addressing elements of this conceptual model.

The results of the test of the conceptual model for this study showed that a wide-range of prior research socialization, psychological and cognitive factors of faculty toward research, and research environmental variables are at the very least, moderately influential upon family medicine faculty research productivity. However, in terms of a predictive relationship, across most of the productivity measures, the psychological and cognitive characteristics of family medicine faculty concerning research was most highly

predictive of family medicine research productivity. These factors include having further developed research skills through formalized research training, having a defined research agenda, possessing a motivation to do research, and having multiple research project underway. Further, these factors also include having an in-depth knowledge of a research area of specialty, well-developed professional networks, and clear expectations for promotion and tenure.

It is important to note that unlike past higher education faculty research productivity studies, the influence of the disciplinary, institutional and departmental research environments is extremely small in comparison to the other factors examined in this study. This may support the earlier argument made that due to mixed positive and negative messages concerning research conveyed by family medicine as a discipline, as well as medical schools and departments of family medicine in general, the overall level of influence these environments have on productivity may be questionable.

Additionally, across all productivity measures, the impact of prior research training (research socialization), institutional prestige factors regarding research, and the availability of research resources appear to be largely negligible upon family medicine faculty's research productivity. This may be the case for research socialization because of the wide lack of research exposure future faculty receive during their clinical training, making research socialization for the most part non-existent. Because so few departments have a substantial critical mass of researchers, family medicine departments may be noted for other prestige factors, namely clinical ones, which provide more reputational

value to departments. Finally, in terms of research resources, because there is not much competition for the use of resources because so few faculty are conducting research within departments, its value as a predictor is not surprisingly questionable.

As is the case with most other disciplinary studies of faculty research productivity, there is little evidence from this study across all forms of research productivity, that the demographic variables of gender, ethnicity, and academic rank are particularly predictive. The lack of a demographic effect is not surprising given the relatively homogeneous faculty composition in family medicine, as well as the widespread lack of research activity cutting across all demographic groupings in family medicine. However, also consistent with other faculty research productivity studies, the demographic variable related to faculty workload--hours per week on research activities--holds particularly strong predictive strength across most of the productivity measures. Clearly having faculty roles where research is expected and is a larger portion of the overall workload allows faculty to devote concentrated time to research activities ostensibly less encumbered from competing faculty roles.

Across all productivity measures there were some key differences in contributions from various predictors. Research environments seemed to be more important for all forms of grants, psychological and cognitive factors for government grants, and tenure status for manuscripts. The influence of research environments for grants can perhaps be explained because of the emergent influence of institutional pressure to address healthcare financing, as well as the need to find alternative ways to support academic activities. The

tenure status relationship with manuscripts is not surprising given the current expectations for promotion and tenure in medical schools centering on manuscripts as predominant. However, the lack of a psychological and cognitive contribution to government grants (while not for other forms of productivity) remains enigmatic, as does the negative contribution of family medicine as a discipline for research toward predicting government grants submitted.

Because few faculty research productivity studies, both empirical and literature based, have comprehensively examined all of the elements of the conceptual used in this study, comparisons need to be made between this study's finding and these other studies by examining individual factors. Returning to the three models of faculty research productivity that serve as the foundations for the conceptual framework used in this study, a number of important similarities and differences are noted.

Finkelstein (1984) stated that there are seven important factors that predict research productivity across multiple disciplines. This study's composite psychological and cognitive factors is in agreement with two of Finkelstein's predictors: having communication with disciplinary colleagues, and having a research orientation (motivation). Clear differences also emerged in comparing this study's findings with Finkelstein's. Two factors from Finkelstein's study were largely predictive, but were not supported here, including having early career publication habits and previous publication activity. These differences may be accounted by the fact that as discussed earlier, the

research socialization of family medicine faculty may be largely different that what occurs for mainstream higher education faculty in terms of research exposure.

In addition to Finkelstein's model of predictive factors, Creswell's model of faculty research productivity described several correlates from the literature that are likely to influence research productivity. These correlates include intelligence test scores, motivation, personality characteristics, stress, age, gender, prestige of doctoral programs and mentoring, prestige of employing institutions, research resources and assignments, colleagues, rank and tenure status, early productivity, preferences for research, and disciplinary differences. Of these, Creswell identified psychological correlates (such as through intelligence tests) and demographic correlates (such as age, gender, and ethnicity), as being less explanatory than sociological correlates, such as preference for research, time spent on research, and early productivity--findings highly consistent with this study.

Finally, the clearest linkage can be made between the predictive results from this study and the comprehensive, literature-based model developed by Bland (1986). This is because Bland's model is comprehensive, cutting across many possible explanations for research productivity, and because it was written to be applicable across multiple disciplines. Of Bland's thirteen "Characteristics of Successful Researchers", eleven were included in this study's conceptual framework. Of these eleven, six characteristics were supported through a majority of this study's predictive outcomes. These six characteristics include having a personal motivation for research, an in-depth knowledge

of a research area, basic and applied research skills, well developed professional networks, multiple projects underway, and sufficient work time (protected time). However, four of Bland's characteristics were not supported as being predictive in this study conceptual model. They included having research mentorship, early work habits, productive local peer support, and a supportive research environment.

In sum, this study's model of family medicine department faculty research productivity is largely comparable to the few studies that examine research productivity from several different explanatory categories of predictors. While there are elements of overlap and agreement between this study's predictive findings and other studies findings, generalizations are problematic because disciplines often do not have similar socializing experiences, institutional culture dynamics, and expectations for faculty research. Ultimately however, the goodness of fit of this study's conceptual model will be determined by future researchers that attempt to use this framework in further faculty research productivity studies. Additionally, an perhaps more importantly, the power of this model will lie in the use that family medicine leaders and administrators have in further developing family medicine department faculty researchers based upon the results of this study. In the next section of this chapter, some recommendations are given for these same family medicine leaders and administrators toward developing family medicine researchers in light of the results of this study.

Recommendations for Family Practice and Family Medicine

The results of this study lend themselves to several recommendations for both the specialty of family practice and the academic discipline of family medicine. These recommendations have been suggested in the literature consistently by family physicians, family medicine faculty, and administrators as being essential toward the development of the specialty and academic discipline. However, before specific recommendations for family medicine can be considered further, a new research culture in family practice needs to be fostered by family physicians, both academically and clinically. This new research culture is centered in a core or critical mass of family physicians being broadly engaged in scholarly approaches to their clinical practice and in their faculty work.

Developing a research culture in family practice primarily involves convincing family physicians to engage in multiple research roles within their clinical practice environments. Leaders in family medicine are advocating that all family physicians need to contribute to this new conceptualization of family practice as being grounded in scholarly foundations. Stange et.al (2000) captured this most succinctly by stating that "every individual and organization involved in practicing, teaching, administrating or certifying general practice should participate in creating a culture that fosters the generation of new knowledge." Further, Stange and others in leadership positions in family practice have stated that each family physician should engage in a self-reflective practice that involves the patient voice in generating questions and interpreting clinical data. In sum, according to Geyman (1978), "the single most important factor influencing

the extent to which family physicians can be involved in investigative work is the 'mindset' held by the physician toward his/her own practice (p.74)."

Problematically, cultural research conducted in higher education strongly suggests that changing, or even influencing, the prevailing cultural norms and values in family practice, and ultimately family medicine faculty's research behavior patterns, will be exceedingly difficult (Austin, 1983; Alasuutari, 1995; Chaffee, 1988; Kuh, 1988; Schein, 1992; Wagner, 1981). Yet, Peterson et. al (1986) identified seven ways in which cultures in higher education may be influenced toward change. They include creating new organizational units, changing clientele or staff, using visionary leadership styles, redefining missions, reorganizing organizational units, using conflict creatively to examine differences between examined and espoused values, and using key events and conditions to refocus goals and priorities.

Once a change in the research culture has begun to take place, family medicine can begin to consider longitudinal approaches that shift the research culture even further toward family medicine department faculty producing original research. Using the research frame for this study as a guide, in the next three sections of this chapter several specific suggestions are offered for academic leaders in family medicine that may be useful for influencing family medicine faculty's research productivity.

Restructuring the Research Socialization of Future Family Physicians and Potential Family Medicine Faculty

As evidenced by this study, as well as the few research studies that have been conducted on family medicine faculty to-date, medical students, interns, and residents encounter few socializing events that may later influence their decision to becoming academics and to ultimately engage in research. However, several exposures to research activities could be developed throughout their academic and clinic training toward motivating them to embrace research early on.

During medical school, students interested in primary care (including family practice, general internal medicine, among others) should be identified and strongly encouraged to take a course on evidence-based clinical practices. This course should be developed and taught by research productive primary care physicians from all primary care disciplines who have successfully blended research into their own clinical practices. Ideally, this course should focus on developing primary care research skills, formulating research questions, as well as learning how to critically appraise the medical literature. Additionally, as part of this course or a separate course, a capstone primary care, discipline-specific research project should be undertaken. For example, with students interested in family medicine, the generation of a capstone project could involve a family physician being partnered with two or three medical students in a clinic setting to examine the root and mediating psychosocial causes of patient non-compliance with common drugs. At the end of this capstone course, family medicine students would present their research to their peers within medical schools. Additionally, they would also

be encouraged to produce subsequent journal articles and present at national conference toward disseminating their research.

Unfortunately, a majority of current didactics in medical schools focuses on systemic, disease state fundamentals with little attention given toward providing opportunities for faculty to engage in discussion of the results of their original research projects. This problem in medical schools is especially acute for primary care specialties more than for the subspecialties. To rectify this shortcoming, family physician researchers from both the community and from medical school faculties need to be paired to develop dialogue sessions with medical students on their own research projects and the implications of their research for family practice as a specialty, and for society at large.

Additionally, both during medical school and during the internship year, career development sessions should be developed that not only explore primary care specialty selection, but also encourage primary care academic careers as options. These sessions need to highlight equally the intellectual and other benefits of faculty careers, as well as the normative expectations for research such faculty careers would entail. Further, the career sessions should show that academic fellowships, with research as a core, have both short-term and long-term clinical and academic benefits, and are viable and dynamic alternatives from the traditional preparatory model moving from medical school, internship, and residency directly to clinical practice positions.

Finally, once future family physicians have selected family practice as a specialty, their residency programs need to encourage the continued development of research skills, critical appraisal of the literature, as well as engagement in family medicine research projects. While many family practice residencies currently offer these opportunities, they are not viewed as longitudinal research projects, but instead are narrowly defined, suitable for completion within a year or less. As a result, research projects lack the breadth and depth that family practice research affords as its strengths. Clearly, family practice residencies that span three or four years in length have the potential, if structured early, of allowing faculty practice residents opportunities to develop the early career research habits that have been proven to be predictive of higher education faculty's research productivity.

In sum, revising medical school and residency curricula is needed to allow family medicine trainees more opportunities to interact with family medicine faculty researchers as mentors, as well as to develop basic research skills, and engage in meaningful research projects. As these socializing experiences coalesce toward the formation of a culture of research, future family physicians will begin to be influenced by the norms and values for research needed to become successful family physicians, and potentially, future family medicine department faculty.

Drawing Strength from the Psychological and Cognitive Characteristics of Family Medicine: The Recruitment, Selection and Retention of Faculty

As evidenced from the results of this research project, the psychological and cognitive characteristics of family medicine department faculty are clearly the most important factor that predicts their research productivity. However, many of the individual faculty characteristics of faculty as well as their psychological and cognitive beliefs, values, and attitudes about research are innate, and as such, are not easily subject to influence. Yet, there are several practical, longitudinal steps that can be taken by administrators and leaders seeking to shape family medicine faculty research productivity in regard to these psychological and cognitive factors.

For one, the recruitment and selection process of new family medicine faculty by institutions and departments needs to enhanced in several ways. Family medicine faculty search committees need to be composed of research producing faculty and deans and department chairs active in scholarship. Additionally, family medicine faculty job descriptions need to more clearly define the research expectations required for promotion and/or tenure to occur. Consideration needs to be given by search committees to not only focus on clinical practice potential and teaching skills, but also interest and motivation to do research. Search committees need to not only address candidates past research productivity, but also pay more attention to their potential growth as researchers through their ability to articulate a clear research agenda and ability to identify a cohort of fellow primary care researchers with whom collaboration is possible.

Once new family medicine department faculty are hired into faculty positions, comprehensive, yet individualized institutional and department orientation programs should be offered to new hires. Meetings should be included in the orientation program that allows faculty time with medical school deans and department chairs to discuss establishing early (and ongoing) research expectations toward the development of individualized research agendas. Medical school deans and family medicine department chairs should actively engage in creating linkages for new faculty by formally scheduling appointments with new faculty and existing productive researchers to provide them with overviews of research activities currently undertaken both institutionally and nationally.

Finally, new family medicine department faculty should be required to develop an individualized academic career committee that includes the family medicine department chair, a senior family medicine faculty member, and another junior faculty member. This peer committee would help new faculty determine suitable topics for research, identify potential collaborative faculty researchers and research funding opportunities, and serve as a sounding board for research ideas. These career committees should meet quarterly, particularly early in a new faculty member's career and would be gradually replaced by informal meetings with departmental promotion and tenure committees if applicable.

A Reexamination of Family Medicine Faculty's Workload Policies (Roles and Rewards)

Based upon the results of this study, leaders of national family medicine organizations such as the Society of Teachers of Family Medicine, American Academy of Family Physicians, and North American Primary Care Research Group need to jointly initiate further dialogue about family medicine faculty's research roles and rewards. Critical workload issues need to be addressed through the establishment of faculty roles conferences similar to the Faculty Roles and Rewards Forums held annually in higher education by the American Association for Higher Education (AAHE). At these forums, family medicine faculty leaders, administrators, and faculty need to develop policy directives addressing some of the following questions:

- What are the various research roles family medicine faculty can play?
- Should all family medicine faculty be required to engage in some form of research?
- How should research be weighted, evaluated, and rewarded along with other faculty roles?
- How can research activities be encouraged as part of daily clinical and academic practices?
- What is the role of the tenure system for family medicine faculty in terms of research expectations?
- How can family medicine faculty be supported in terms of balancing clinical and academic roles?
- How can family medicine leaders and administrators encourage the development of faculty research skills locally, regionally, and nationally?

Each of these policy issues need to be discussed in collaborative forums with discussions then moving forward locally to medical schools and departments of family medicine to reexamine promotion and tenure guidelines, recruitment practices, as well as targeted, individualized faculty development. Through well thought out national and local research policies and practices, family medicine can take large steps as an academic discipline in encouraging faculty careers and achieving a critical mass of family medicine research and researchers.

Revisiting This Study's Limitations in Light of Opportunities for Future Research on Family Medicine Faculty

This study contributes toward reducing the dearth of research studies conducted over the last three decades on family medicine faculty. Considerable amounts of additional research needs to be conducted that further reduces these gaps, particularly by examining the research socialization, research environments, as well as work activities of family medicine faculty. Future researchers should be heartened to learn that the Society of Teachers of Family Medicine and the American Academy of Family Physicians are now jointly working on establishing a national family medicine faculty database and mailing list. This database should greatly reduce some of the barriers researchers face toward studying family medicine faculty. Additionally, this database may also offer a wealth of descriptive data that may be useful to compare with the descriptive data generated as part of this study.

In addition to general studies of family medicine faculty, researchers should further examine family medicine faculty research productivity to address some of the limitations of this study mentioned earlier in Chapter 1. For one, as this study excluded non-clinical family medicine department faculty, a study of this faculty group would be interesting, particular when using elements of this study's conceptual model. Researchers also might want to consider using this model with other specialty's departmental faculty to see if elements of the conceptual framework are generalizable to pursue across specialty boundaries. Additionally, with limited adaptations, this framework could also be used for departmental studies in higher education. It would be particularly interesting to compare the data gathered in higher education on the research socialization and research environments with that found in this study to better understand that which binds, as well as separates, medical faculty from mainstream higher education faculty.

As this study addressed research productivity in the short-term, it would also be useful for researchers to consider extending this study of family medicine faculty research productivity toward a longer period of time to examine faculty career research productivity. As family practice and family medicine now are entering their third decade of existence, examining career productivity may now be obtainable for researchers interested in such longitudinal studies.

Finally, as Creswell says, researching determinants of faculty research productivity remains "puzzling" because of the large number of independent variables that are both correlated with productivity as well as correlated with each other. This is supported by

the data in Appendix I of this study that shows the high degree of correlation between the predictors of family medicine research productivity. Since this study's research questions focused more narrowly on predicting the research productivity of family medicine faculty in aggregate as a discipline, without attempting to control or test for the mediating effects of both demographic and non-demographic independent variables, follow-up studies should be conducted using differing methodology. These studies should further refine the model developed in this study into both the direct and mediating effects upon productivity in light of these demographic and non-demographic interrelationships. One blueprint provided in the literature that may be useful for researchers toward examining direct and mediating effects was developed by Blackburn and Lawrence (1995) with higher education faculty.

Finally, researchers need to also consider deconstructing this family medicine faculty research productivity model by conducting more in-depth studies on individual elements of the model, particularly in the areas of research socialization, research environments, and psychological and cognitive characteristics of faculty. Every consideration should be given toward employing a range of differing methodologies, especially qualitative research methods that will provide a richer description of these areas. Only by fully understanding how family medicine faculty are socialized and acculturated toward research activities, can administrators and leaders in family practice and family medicine further foster the development of researchers and the production of research needed by the specialty, academic discipline, and society-at-large.

APPENDICES

APPENDIX A

SURVEY COVER LETTER

Dear Dr. <Insert Name>:

One of the many opportunities that come to the President of ADFM is the chance to work with others who have a genuine interest in advancing the academic side of our discipline. Several months ago, I have had the pleasure of working with Mr. Joseph Brocato, a doctoral candidate at Michigan State University, as he developed a national study of faculty in Departments of Family Medicine. His project has now received funding from the American Academy of Family Physicians Foundation (AAFP/F). The purpose of this letter is to ask for your participation.

This study will gather data on the research activities of individual family medicine faculty and the research environments within their respective departments/divisions of family medicine at each of the 125 medical schools and 11 geographically separated campuses in the United States. I have reviewed the research methodology with Mr. Brocato and believe this work will add important detail to ADFM's recently completed department survey. The study instrument will require only 10-15 minutes to complete. Data gathered as part of this study will be reported in aggregate only, with no individual respondent or department being connected to any particular responses.

The results of this research project will provide us all with a better understanding of our discipline as a national academic enterprise, as departments within our local medical school environments, and as individual faculty members and investigators.

Please take the few minutes required to complete the enclosed survey and return it to in the postage-paid envelope by <insert date>. If you would like to receive a copy of the study results, please also check the box on the back of the survey instrument.

Thank you for your time and effort.

Sincerely,

John Dickinson, M.D.
President, Association of Departments of Family Medicine

Joseph J. Brocato
Associate Director of Medical Education, Riverside Osteopathic Hospital
STFM Member and Doctoral Candidate, Michigan State University

APPENDIX B

SURVEY INSTRUMENT

Family Medicine Faculty Research Survey*

***Funded by the American Academy of Family Physicians Foundation and Endorsed by The Association of Departments of Family Medicine**

Part I: Prior Research Training.

Directions: Circle the **one** numbered response for each question that best describes your research training **prior to your first faculty appointment**.

	Strongly Disagree	Disagree	Neither Agree/ Disagree	Agree	Strongly Agree	Not Applicable
1. The medical school I attended was known for its research	(1)	(2)	(3)	(4)	(5)	(6)
2. The institution I attended during my residency was well known for its research	(1)	(2)	(3)	(4)	(5)	(6)
3. The graduate school I attended was well known for its research	(1)	(2)	(3)	(4)	(5)	(6)
4. I received valuable mentoring in research related activities prior to my first faculty position	(1)	(2)	(3)	(4)	(5)	(6)
5. I received focused research training as part of a national fellowship or post-doctoral program before my first faculty position	(1)	(2)	(3)	(4)	(5)	(6)
6. My research skills prior to my first faculty position included substantial training in basic statistics, research design, and data collection	(1)	(2)	(3)	(4)	(5)	(6)
7. I participated in meaningful research projects before my first faculty position	(1)	(2)	(3)	(4)	(5)	(6)
8. Journal article(s) that I authored (or co-authored) prior to my first faculty position were published in well-respected journals	(1)	(2)	(3)	(4)	(5)	(6)
9. I gave presentation(s) at national conferences highlighting results of meaningful research prior to my first faculty position	(1)	(2)	(3)	(4)	(5)	(6)

Part II: Current Research Interests & Activities.

Directions: Circle the **one** numbered response for each question that best describes your current research interests and activities.

	Strongly Disagree	Disagree	Neither Agree/ Disagree	Agree	Strongly Agree	Not Applicable
10. Conducting research is personally satisfying to me	(1)	(2)	(3)	(4)	(5)	(6)
11. Because of my multiple faculty roles (including clinical roles), I feel pressure to find time to engage in research	(1)	(2)	(3)	(4)	(5)	(6)
12. I would describe myself as having a well-defined research agenda/plan	(1)	(2)	(3)	(4)	(5)	(6)
13. I understand the research guidelines for promotion and/or tenure within my academic department	(1)	(2)	(3)	(4)	(5)	(6)
14. I stay "up-to-date" on the current literature in my research interest area(s)	(1)	(2)	(3)	(4)	(5)	(6)
15. Since accepting my first faculty position, I have further developed my research skills	(1)	(2)	(3)	(4)	(5)	(6)
16. I have multiple research projects under way that are suitable for publication	(1)	(2)	(3)	(4)	(5)	(6)

Part III: Current Research Environments

Directions: Circle the **one** numbered response for each question that best describes your current environments for research.

	Strongly Disagree	Disagree	Neither Agree/ Disagree	Agree	Strongly Agree	Not Applicable
17. I have a well developed network of faculty colleagues **outside** my academic department in family medicine with whom I frequently discuss research	(1)	(2)	(3)	(4)	(5)	(6)
18. I believe that family medicine as a discipline places a substantial emphasis upon research	(1)	(2)	(3)	(4)	(5)	(6)

	Strongly Disagree	Disagree	Neither Agree/ Disagree	Agree	Strongly Agree	Not Applicable
19. I believe that my academic institution is well known for its research	(1)	(2)	(3)	(4)	(5)	(6)
20. I believe that my academic institution places a substantial emphasis upon research	(1)	(2)	(3)	(4)	(5)	(6)
21. I believe that my academic department is well known for its research	(1)	(2)	(3)	(4)	(5)	(6)
22. I believe that my academic department places a substantial emphasis upon research	(1)	(2)	(3)	(4)	(5)	(6)
23. My academic department's chairperson is very supportive of my research efforts	(1)	(2)	(3)	(4)	(5)	(6)
24. I have adequate resources within my academic department (such as secretarial support, research assistants, computers, library materials, etc.) to conduct research	(1)	(2)	(3)	(4)	(5)	(6)
25. My academic department provides me with adequate protected time to conduct research	(1)	(2)	(3)	(4)	(5)	(6)
26. A large portion of my academic department's faculty can be considered "productive researchers"	(1)	(2)	(3)	(4)	(5)	(6)

Part IV: Research Productivity

Directions: For the following section, please answer each question by circling the one number that describes your research productivity within the following research areas.

27. Over the last two academic years, how many **peer-reviewed** manuscripts have you **submitted** for potential journal publication?	**0**	**1**	**2**	**3**	**4**	**≥5**
28. Over the last two academic years, how many **peer-reviewed** manuscripts have you had **accepted** for journal publication?	**0**	**1**	**2**	**3**	**4**	**≥5**
29. Over the last two academic years, how many **peer-reviewed** proposals/papers have you **submitted** that were **accepted** for national conference presentations that involve your research?	**0**	**1**	**2**	**3**	**4**	**≥5**
30. Over the last two academic years, how **many national government grant proposals** have you **submitted** in which you were an investigator?	**0**	**1**	**2**	**3**	**4**	**≥5**

31.	Over the last two academic years, how **many national government grant proposals** have you submitted in which you were an investigator that were **partially or fully funded**?	**0**	**1**	**2**	**3**	**4**	**≥5**
32.	Over the last two academic years, how many **national private grant proposals** (i.e., from private foundations, etc.) have you **submitted** in which you were an investigator?	**0**	**1**	**2**	**3**	**4**	**≥5**
33.	Over the last two academic years, how many **national private grant proposals** (i.e., from private foundations, etc.) have you submitted in which you were an investigator that were **partially or fully funded?**	**0**	**1**	**2**	**3**	**4**	**≥5**

Part V: Demographics

34. What advanced degrees do you hold? (Check all that apply): ▯ **M.D.** ▯ **D.O.** ▯**Other health doctorates** ▯**Ph.D./Ed.D** ▯**Masters degree in health-related areas** ▯**Masters degree in education-related areas** ▯**Other Masters degree**

35. What is your primary medical specialty as identified by the American Board of Medical Specialties (ABMS)?
▯ **Family Practice** ▯**Other:**_____ ▯**Not board certified in any medical specialty**

36. In what year were you born? _____

37. What is your gender? ❑1 **Male** ❑2 **Female**

38. What is your ethnic origin? (Check one)
❑1 **American Indian or Alaskan Native**
❑2 **Asian or Pacific Islander**
❑3 **Black, not of Hispanic Origin**
❑4 **Mexican American or Chicano (Hispanic)**
❑5 **Puerto Rican (Hispanic)**
❑6 **Other Hispanic**
❑7 **White, not of Hispanic Origin**

39. In what year were you first hired into a faculty position?_____

40. What is your current academic status? (Check one)

❑1 **Tenured**
❑2 **On the tenure track**
❑3 **Not in a tenure track position**
❑4 **Other**_____

41. What is your current academic rank? **(Check one)**
❑1 **Instructor**
❑2 **Assistant Professor**
❑3 **Associate Professor**
❑4 **Professor**
❑5 **Clinical Instructor**
❑6 **Clinical Assistant Professor**
❑7 **Clinical Associate Professor**
❑8 **Clinical Professor**
❑9 **Other (specify)**_____

42. How many hours per week on average do you **actually** spend on research activities (such as designing research projects, collecting research data, preparing for research conference presentations, writing journal articles, meeting with colleagues on research projects, etc.)? _____ Hours Per Week

43. I would like to receive the results of this study at its conclusion: Yes ☐ No ☐

APPENDIX C

INDEPENDENT VARIABLES: FREQUENCY DISTRIBUTIONS

Table 5.1

Independent Variables: Frequency Distributions

Psychological and Cognitive Characteristics

Psychological and Cognitive Characteristic	**Survey Question**	**Frequency of Response** Strongly Disagree	Disagree	Neither Agree/ Disagree	Agree	Strongly Agree
Motivation to do research	Conducting research is personally satisfying to me.	5.6% (25)	18.8% (84)	21.0% (94)	**31.7% (142)**	**23.0% (103)**
Degree of role stress	Because of my multiple faculty roles (including clinical roles), I feel pressure to find time to engage in research.	2.7% (12)	9.8% (44)	7.3% (33)	**30.2% (136)**	**50.0% (225)**
Research agenda	I would describe myself as having a well-defined research agenda/plan.	**21.7% (98)**	**37.4% (169)**	16.8% (76)	15.3% (69)	8.8% (40)
Clear expectations for promotion and/or tenure	I understand the research guidelines for promotion and/or tenure within my academic department.	3.1% (13)	12.1% (51)	16.8% (71)	**41.5% (175)**	**26.5% (112)**

Psychological and Cognitive Characteristic	**Survey Question**	**Frequency of Response**				
		Strongly Disagree	Disagree	Neither Agree/ Disagree	Agree	Strongly Agree
In-depth knowledge of research area of specialty	I stay "up-to-date" on the current literature in my research area(s).	1.7% (7)	11.0% (45)	21.3% (87)	**46.9% (192)**	**19.1% (78)**
Research training	Since accepting my first faculty position, I have further developed my research skills.	9.2% (42)	16.9% (77)	11.0% (50)	**37.5% (171)**	**25.4% (116)**
Multiple research projects	I have multiple research projects under way that are suitable for publication.	**29.6% (130)**	**27.3% (120)**	10.7% (47)	20.7% (91)	11.6% (51)

Cumulative Advantage (Prior Research Socialization)

Cumulative Advantage Factors	**Survey Question**	**Frequency of Response**				
		Strongly Disagree	Disagree	Neither Agree/ Disagree	Agree	Strongly Agree
Prestige of Medical School	The medical school I attended was known for its research.	6.4% (30)	20.0% (94)	20.4% (96)	**25.7% (121)**	**27.4% (129)**
Prestige of Residency Program	The institution I attended during my residency was well known for its research.	**18.9% (87)**	**30.0% (138)**	20.4% (94)	16.5% (76)	14.1% (65)
Prestige of Graduate School	The graduate school I attended was well known for its research.	5.4% (9)	13.1% (22)	19.0% (32)	**22.6% (38)**	**39.9% (67)**
Mentorship for Research	I received valuable mentoring in research related activities prior to my first faculty position.	**34.4% (157)**	**30.9% (141)**	9.2% (42)	16.4% (75)	9.0% (41)

Cumulative Advantage Factors	**Survey Question**	**Frequency of Response**				
		Strongly Disagree	Disagree	Neither Agree/ Disagree	Agree	Strongly Agree
Fellowship/Post -Doctoral Training (with Research Core)	I received focused research training as part of a national fellowship or post-doctoral program before my first faculty position.	**48.6%** **(191)**	**27.7%** **(109)**	2.8% (11)	8.7% (34)	12.2% (48)
Prior Research Skills	My research skills prior to my first faculty position included substantial training in basic statistics, research design, and data collection.	**42.1%** **(193)**	**31.9%** **(146)**	7.6% (35)	9.4% (43)	9.0% (41)
Prior Research Project Experience	I participated in meaningful research projects before my first faculty position	**33.2%** **(150)**	**26.3%** **(119)**	10.0% (45)	19.0% (86)	11.5% (52)

Cumulative Advantage Factors	**Survey Question**	**Frequency of Response**				
		Strongly Disagree	Disagree	Neither Agree/ Disagree	Agree	Strongly Agree
Prior Research Productivity	Journal article(s) that I authored (or co-authored) prior to my first faculty position were published in well-respected journals	**41.4%** **(146)**	**22.1%** **(78)**	6.5% (23)	19.0% (67)	11.0% (39)
Prior Research Productivity	I gave presentation(s) at national conferences highlighting results of meaningful research prior to my first faculty position	**53.1%** **(206)**	**23.7%** **(92)**	4.1% (16)	10.6% (41)	8.5% (33)

Research Environments: Disciplinary Environment for Research

Disciplinary Environment Factors	**Survey Question**	**Frequency of Response** Strongly Disagree	Disagree	Neither Agree/ Disagree	Agree	Strongly Agree
Professional Networks	I have a well developed network of faculty colleagues outside my academic department in family medicine with whom I frequently discuss research	**29.1%** **(127)**	**36.8%** **(161)**	12.1% (53)	14.6% (64)	7.3% (32)
Disciplinary Norms and Expectations for Research	I believe that family medicine as a discipline places a substantial emphasis upon research.	**14.1%** **(65)**	**49.1%** **(227)**	19.9% (92)	15.4% (71)	1.5% (7)

Research Environments: Institutional Environment for Research

Institutional Environment Factors	Survey Question	Frequency of Response				
		Strongly Disagree	Disagree	Neither Agree/ Disagree	Agree	Strongly Agree
Prestidge of Institution	I believe that my academic institution is well known for its research.	8.5% (39)	19.2% (88)	18.5% (85)	**31.6% (145)**	**22.2% (102)**
Institutional Norms and Expectations for Research	I believe that my academic institution places a substantial emphasis on research.	5.5% (25)	13.1% (60)	15.3% (70)	**39.3% (180)**	**26.9% (123)**

Research Environments: Departmental Environment for Research

Departmental Environment Factors	Survey Question	Frequency of Response				
		Strongly Disagree	Disagree	Neither Agree/ Disagree	Agree	Strongly Agree
Prestidge of Department	I believe that my academic department is well known for research.	**14.4%** **(66)**	**33.4%** **(153)**	22.7% (104)	21.2% (97)	8.3% (38)
Departmental Norms and Expectations for Research	I believe that my academic department places a substantial emphasis upon research.	8.2% (37)	22.7% (103)	27.8% (126)	**32.0%** (145)	**9.3%** (42)
Mentorship and Leadership for Research	My academic department's chairperson is very supportive of my research efforts.	4.2% (16)	15.1% (57)	25.7% (97)	**32.3%** **(122)**	**22.8%** **(86)**
Research Support (Resources)	I have adequate resources within my academic department (such as secretarial support, research assistants, computers, library materials, etc.) to conduct research.	**18.0%** **(78)**	**23.1%** **(100)**	18.9% (82)	29.6% (128)	10.4% (45)

Departmental Environment Factors	**Survey Question**	**Frequency of Response**				
		Strongly Disagree	Disagree	Neither Agree/ Disagree	Agree	Strongly Agree
Protected Time for Research	My academic department provides me with adequate protected time to conduct research.	**32.8%** **(138)**	**35.4%** **(149)**	16.2% (68)	10.2% (43)	5.5% (23)
Productive Colleagues	A large portion of my academic department's faculty can be considered "productive researchers."	**25.8%** **(115)**	**42.8%** **(191)**	18.8% (84)	10.8% (48)	1.8% (8)

APPENDIX D

DEPENDENT VARIABLES: FREQUENCY DISTRIBUTIONS

Table 5.2

Dependent Variables: Frequency Distributions

Manuscripts Submitted for Publication

Manuscripts Submitted	Frequency	Valid Percent	Cumulative Percent
0	238	52.2%	52.2%
1	72	15.8%	68.0%
2	58	12.7%	80.7%
3	27	5.9%	86.6%
4	26	5.7%	92.3%
5 or higher	35	7.7%	100.0%

Manuscripts Accepted for Publication

Manuscripts Submitted	Frequency	Valid Percent	Cumulative Percent
0	265	58.2%	58.2%
1	80	17.6%	75.8%
2	42	9.2%	85.1%
3	28	6.2%	91.2%
4	18	4.0%	95.2%
5 or higher	22	4.8%	100.0%

Proposals/Papers Accepted for Conference Presentations

Manuscripts Submitted	Frequency	Valid Percent	Cumulative Percent
0	307	67.3%	67.3%
1	69	15.1%	82.5%
2	32	7.0%	89.5%
3	20	4.4%	93.9%
4	9	2.0%	95.8%
5 or higher	19	4.2%	100.0%

National Government Grant Proposals Submitted

Manuscripts Submitted	Frequency	Valid Percent	Cumulative Percent
0	310	68.0%	68.0%
1	66	14.5%	82.5%
2	49	10.7%	93.2%
3	18	3.9%	97.1%
4	5	1.1%	98.2%
5 or higher	8	1.8%	100.0%

National Government Grant Proposals Funded

Manuscripts Submitted	Frequency	Valid Percent	Cumulative Percent
0	345	75.8%	75.8%
1	64	14.1%	89.9%
2	31	6.8%	96.7%
3	10	2.2%	98.9%
4	3	.7%	99.6%
5 or higher	2	.4%	100.0%

National Private Grant Proposals Submitted

Manuscripts Submitted	Frequency	Valid Percent	Cumulative Percent
0	356	78.2%	78.2%
1	52	11.4%	89.7%
2	33	7.3%	96.9%
3	9	2.0%	98.9%
4	3	.7%	99.6%
5 or higher	2	.4%	100.0%

National Private Grant Proposals Funded

Manuscripts Submitted	Frequency	Valid Percent	Cumulative Percent
0	380	84.3%	84.3%
1	45	10.0%	94.2%
2	24	5.3%	99.6%
3	0	0.0%	99.6%
4	2	.4%	100.0%
5 or higher	0	0.0%	100.0%

APPENDIX E

MEAN PRODUCTIVITY DIFFERENCES BY AGE

Table 5.3

Mean Productivity Differences by Age

Tukey HSD

	(I) AGEGRP	(J) AGEGRP	Mean Diff. (I-J)	Std. Error	Sig.
Manuscripts Accepted for Publication	30-39	40-45	-.85*	.18	.00
		46-50	-.90*	.20	.00
		51+	-.76*	.19	.00
	40-45	3-39	.85*	.18	.00
		46-50	.05	.19	.99
		51+	.09	.18	.96
	46-50	30-39	.90*	.20	.00
		40-45	.05	.19	.99
		51+	.14	.19	.88
	51+	30-39	.76*	.19	.00
		40-45	-.09	.18	.96
		46-50	-.14	.19	.88
Proposals/Papers Accepted for Conference Presentations	30-39	40-45	-.60*	.17	.00
		46-50	-.35	.18	.20
		51+	-.30	.17	.30
	40-45	30-39	.60*	.17	.00
		46-50	.24	.17	.47
		51+	.30	.16	.26
	46-50	30-39	.35	.18	.20
		40-45	-.25	.17	.47
		51+	. 05	.17	.99
	51+	30-39	.30	.17	.30
		40-45	-.30	.16	.26
		46-50	-.05	.17	.99
National Government Grant Proposals Funded	30-39	40-45	-.27	.11	.06
		46-50	-.35*	.11	.01
		51+	-.33*	.11	.01
	40-45	30-39	.27	.11	.06
		46-50	-.08	.11	.89
		51+	-.06	.11	.93
	46-50	30-39	.35*	.11	.01
		40-45	.08	.11	.89
		51+	.02	.11	.99

	(I) AGEGRP	(J) AGEGRP	Mean Diff. (I-J)	Std. Error	Sig.
	51+	30-39	.33*	.11	.02
		40-45	.06	.10	.93
		46-50	-.02	.11	.99
National Private Grant Proposals Funded	30-39	40-45	-.20*	.07	.04
		46-50	-.11	.08	.52
		51+	-.11	.08	.46
	40-45	30-39	.20*	.08	.04
		46-50	.09	.08	.67
		51+	.08	.08	.66
	46-50	30-39	.11	.08	.52
		40-45	-.09	.08	.67
		51+	-.01	.08	1.00
	51+	30-39	.11	.08	.46
		40-45	-.08	.08	.66
		46-50	.01	.08	1.00

*** The mean difference is significant at the .05 level.**

APPENDIX F

MEAN PRODUCTIVITY BY ADVANCED ACADEMIC DEGREE

Table 5.4

Mean Productivity by Advanced Academic Degree

		Manuscripts Accepted for Publication	Proposals/Papers Accepted for Conference Presentations	National Government Grant Proposals Funded	National Private Grant Proposals Funded
MD only	Mean	.85	.55	.354	.20
	N	309	309	308	307
	Std. Deviation	1.39	1.119	.759	.58
DO only	Mean	.51	.60	.10	.06
	N	47	47	47	47
	Std. Deviation	.88	1.21	.31	.25
MD or DO	Mean	1.48	1.29	.68	.38
Plus Other	N	96	97	97	94
Degrees	Std. Deviation	1.66	1.70	1.09	.67

APPENDIX G

MEAN PRODUCTIVITY BY ACADEMIC RANK

Table 5.5

Mean Productivity by Academic Rank

		Manuscripts Accepted for Publication	Proposals/Papers Accepted for Conference Presentations	National Government Grant Proposals Funded	National Private Grant Proposals Funded
Assistant Professor	Mean	.57	.61	.21	.15
	N	162	162	161	160
	Std. Deviation	1.05	1.22	.55	.44
Associate Professor	Mean	1.53	1.08	.62	.31
	N	89	90	90	90
	Std. Deviation	1.76	1.50	1.01	.61
Professor	Mean	2.04	1.34	.87	.47
	N	70	70	70	68
	Std. Deviation	1.74	1.69	1.19	.84
Clinical Academic Ranks	Mean	.48	.26	.21	.11
	N	120	120	120	119
	Std. Deviation	.91	.69	.54	.39

APPENDIX H

MEAN PRODUCTIVITY BY YEARS OF EXPERIENCE

Table 5.6

Mean Productivity by Years of Experience

Years as faculty member		Manuscripts Accepted for Publication	Proposals/Papers Accepted for Conference Presentations	National Government Grant Proposals Funded	National Private Grant Proposals Funded
1-5 Years	Mean	.35	.38	.15	.073
	N	124	124	124	123
	Std. Deviation	.77	.89	.44	.32
6-10 Years	Mean	.83	.64	.29	.28
	N	122	122	121	120
	Std. Deviation	1.35	1.25	.66	.65
11-15 Years	Mean	1.38	1.16	.57	.39
	N	80	81	81	81
	Std. Deviation	1.84	1.63	1.01	.75
16 or More Years	Mean	1.40	.88	.67	.22
	N	113	113	113	111
	Std. Deviation	1.48	1.40	1.05	.55

APPENDIX I

PEARSON CORRELATIONS FOR REGRESSION MODEL VARIABLES

Table 5.7
Pearson Correlations for Regression Model Variables

Correlations

		Prior Training	Psychological and Cognitive	Current Research Environment	Resources for Research	Manuscripts Accepted for Publication
Prior Training	Pearson Correlation	1.000	.399**	.180**	.133*	.337**
	Sig. (2-tailed)	.	.000	.002	.032	.000
	N	314	266	307	260	306
Psychological and Cognitive	Pearson Correlation	.399**	1.000	.123*	.281**	.625**
	Sig. (2-tailed)	.000	.	.020	.000	.000
	N	266	363	358	320	357
Current Research Environment	Pearson Correlation	.180**	.123*	1.000	.375**	.080
	Sig. (2-tailed)	.002	.020	.	.000	.097
	N	307	358	441	357	435
Resources for Research	Pearson Correlation	.133*	.281**	.375**	1.000	.216**
	Sig. (2-tailed)	.032	.000	.000	.	.000
	N	260	320	357	362	357
Manuscripts Accepted for Publication	Pearson Correlation	.337**	.625**	.080	.216**	1.000
	Sig. (2-tailed)	.000	.000	.097	.000	.
	N	306	357	435	357	455

**. Correlation is significant at the 0.01 level (2-tailed).

*. Correlation is significant at the 0.05 level (2-tailed).

Correlations

		Prior Training	Psychological and Cognitive	Current Research Environment	Resources for Research	Proposals/Papers Accepted for Conference Presentations
Prior Training	Pearson Correlation	1.000	.399**	.180**	.133*	.352**
	Sig. (2-tailed)	.	.000	.002	.032	.000
	N	314	266	307	260	307
Psychological and Cognitive	Pearson Correlation	.399**	1.000	.123*	.281**	.592**
	Sig. (2-tailed)	.000	.	.020	.000	.000
	N	266	363	358	320	358
Current Research Environment	Pearson Correlation	.180**	.123*	1.000	.375**	.077
	Sig. (2-tailed)	.002	.020	.	.000	.110
	N	307	358	441	357	436
Resources for Research	Pearson Correlation	.133*	.281**	.375**	1.000	.158**
	Sig. (2-tailed)	.032	.000	.000	.	.003
	N	260	320	357	362	358
Proposals/Papers Accepted for Conference Presentations	Pearson Correlation	.352**	.592**	.077	.158**	1.000
	Sig. (2-tailed)	.000	.000	.110	.003	.
	N	307	358	436	358	456

**. Correlation is significant at the 0.01 level (2-tailed).

*. Correlation is significant at the 0.05 level (2-tailed).

Correlations

		Prior Training	Psychological and Cognitive	Current Research Environment	Resources for Research	National Government Grant Proposals Funded
Prior Training	Pearson Correlation	1.000	.399**	.180**	.133*	.199**
	Sig. (2-tailed)	.	.000	.002	.032	.000
	N	314	266	307	260	306
Psychological and Cognitive	Pearson Correlation	.399**	1.000	.123*	.281**	.345**
	Sig. (2-tailed)	.000	.	.020	.000	.000
	N	266	363	358	320	358
Current Research Environment	Pearson Correlation	.180**	.123*	1.000	.375**	.044
	Sig. (2-tailed)	.002	.020	.	.000	.362
	N	307	358	441	357	435
Resources for Research	Pearson Correlation	.133*	.281**	.375**	1.000	.180**
	Sig. (2-tailed)	.032	.000	.000	.	.001
	N	260	320	357	362	358
National Government Grant Proposals Funded	Pearson Correlation	.199**	.345**	.044	.180**	1.000
	Sig. (2-tailed)	.000	.000	.362	.001	.
	N	306	358	435	358	455

**. Correlation is significant at the 0.01 level (2-tailed).

*. Correlation is significant at the 0.05 level (2-tailed).

Correlations

		Prior Training	Psychological and Cognitive	Current Research Environment	Resources for Research	National Private Grant Proposals Funded
Prior Training	Pearson Correlation	1.000	.399**	.180**	.133*	.199**
	Sig. (2-tailed)	.	.000	.002	.032	.000
	N	314	266	307	260	303
Psychological and Cognitive	Pearson Correlation	.399**	1.000	.123*	.281**	.436**
	Sig. (2-tailed)	.000	.	.020	.000	.000
	N	266	363	358	320	355
Current Research Environment	Pearson Correlation	.180**	.123*	1.000	.375**	.168**
	Sig. (2-tailed)	.002	.020	.	.000	.000
	N	307	358	441	357	432
Resources for Research	Pearson Correlation	.133*	.281**	.375**	1.000	.213**
	Sig. (2-tailed)	.032	.000	.000	.	.000
	N	260	320	357	362	353
National Private Grant Proposals Funded	Pearson Correlation	.199**	.436**	.168**	.213**	1.000
	Sig. (2-tailed)	.000	.000	.000	.000	.
	N	303	355	432	353	451

**. Correlation is significant at the 0.01 level (2-tailed).

*. Correlation is significant at the 0.05 level (2-tailed).

Correlations

		Prestige regarding Research	Family Med Research as Discpline (CRE18)	Manuscripts Accepted for Publication
Prestige regarding Research	Pearson Correlation	1.000	.102*	.154**
	Sig. (2-tailed)	.	.030	.001
	N	459	451	444
Family Med Research as Discpline (CRE18)	Pearson Correlation	.102*	1.000	-.091
	Sig. (2-tailed)	.030	.	.053
	N	451	462	452
Manuscripts Accepted for Publication	Pearson Correlation	.154**	-.091	1.000
	Sig. (2-tailed)	.001	.053	.
	N	444	452	455

*. Correlation is significant at the 0.05 level (2-tailed).

**. Correlation is significant at the 0.01 level (2-tailed).

Correlations

		Prestige regarding Research	Family Med Research as Discpline (CRE18)	Proposals/Papers Accepted for Conference Presentations	National Government Grant Proposals Funded	National Private Grant Proposals Funded
Prestige regarding Research	Pearson Correlation	1.000	.102*	.140**	.073	.064
	Sig. (2-tailed)	.	.030	.003	.124	.180
	N	459	451	445	444	440
Family Med Research as Discpline (CRE18)	Pearson Correlation	.102*	1.000	-.110*	-.138**	-.083
	Sig. (2-tailed)	.030	.	.019	.003	.078
	N	451	462	453	452	448
Proposals/Papers Accepted for Conference Presentations	Pearson Correlation	.140**	-.110*	1.000	.373**	.389**
	Sig. (2-tailed)	.003	.019	.	.000	.000
	N	445	453	456	455	451
National Government Grant Proposals Funded	Pearson Correlation	.073	-.138**	.373**	1.000	.360**
	Sig. (2-tailed)	.124	.003	.000	.	.000
	N	444	452	455	455	450
National Private Grant Proposals Funded	Pearson Correlation	.064	-.083	.389**	.360**	1.000
	Sig. (2-tailed)	.180	.078	.000	.000	.
	N	440	448	451	450	451

*. Correlation is significant at the 0.05 level (2-tailed).

**. Correlation is significant at the 0.01 level (2-tailed).

Correlations

		Prior Training	Psychological and Cognitive	Current Research Environment
Prior Training	Pearson Correlation	1.000	.399**	.180**
	Sig. (2-tailed)	.	.000	.002
	N	314	266	307
Psychological and Cognitive	Pearson Correlation	.399**	1.000	.123*
	Sig. (2-tailed)	.000	.	.020
	N	266	363	358
Current Research Environment	Pearson Correlation	.180**	.123*	1.000
	Sig. (2-tailed)	.002	.020	.
	N	307	358	441

**. Correlation is significant at the 0.01 level (2-tailed).

*. Correlation is significant at the 0.05 level (2-tailed).

Correlations

		Resources for Research	Prestige regarding Research	Family Med Research as Discpline (CRE18)
Resources for Research	Pearson Correlation	1.000	.061	.186**
	Sig. (2-tailed)	.	.254	.000
	N	362	356	361
Prestige regarding Research	Pearson Correlation	.061	1.000	.102*
	Sig. (2-tailed)	.254	.	.030
	N	356	459	451
Family Med Research as Discpline (CRE18)	Pearson Correlation	.186**	.102*	1.000
	Sig. (2-tailed)	.000	.030	.
	N	361	451	462

**. Correlation is significant at the 0.01 level (2-tailed).

*. Correlation is significant at the 0.05 level (2-tailed).

Correlations

		Manuscripts Accepted for Publication	Proposals/Papers Accepted for Conference Presentations	National Government Grant Proposals Funded	National Private Grant Proposals Funded
Manuscripts Accepted for Publication	Pearson Correlation	1.000	.654**	.383**	.389**
	Sig. (2-tailed)	.	.000	.000	.000
	N	455	455	454	450
Proposals/Papers Accepted for Conference Presentations	Pearson Correlation	.654**	1.000	.373**	.389**
	Sig. (2-tailed)	.000	.	.000	.000
	N	455	456	455	451
National Government Grant Proposals Funded	Pearson Correlation	.383**	.373**	1.000	.360**
	Sig. (2-tailed)	.000	.000	.	.000
	N	454	455	455	450
National Private Grant Proposals Funded	Pearson Correlation	.389**	.389**	.360**	1.000
	Sig. (2-tailed)	.000	.000	.000	.
	N	450	451	450	451

**. Correlation is significant at the 0.01 level (2-tailed).

Correlations

		Age	Years as Faculty Member	Hours Per Week on Research	Gender	Manuscripts Accepted for Publication
Age	Pearson Correlation	1.000	.675**	.014	-.242**	.113*
	Sig. (2-tailed)	.	.000	.774	.000	.017
	N	459	442	448	457	451
Years as Faculty Member	Pearson Correlation	.675**	1.000	.091	-.209**	.260**
	Sig. (2-tailed)	.000	.	.054	.000	.000
	N	442	452	445	452	439
Hours Per Week on Research	Pearson Correlation	.014	.091	1.000	.009	.557**
	Sig. (2-tailed)	.774	.054	.	.846	.000
	N	448	445	458	458	445
Gender	Pearson Correlation	-.242**	-.209**	.009	1.000	-.143**
	Sig. (2-tailed)	.000	.000	.846	.	.002
	N	457	452	458	468	453
Manuscripts Accepted for Publication	Pearson Correlation	.113*	.260**	.557**	-.143**	1.000
	Sig. (2-tailed)	.017	.000	.000	.002	.
	N	451	439	445	453	455

**. Correlation is significant at the 0.01 level (2-tailed).

*. Correlation is significant at the 0.05 level (2-tailed).

Correlations

		Age	Years as Faculty Member	Hours Per Week on Research	Gender	Proposals/Papers Accepted for Conference Presentations
Age	Pearson Correlation	1.000	.675**	.014	-.242**	.014
	Sig. (2-tailed)	.	.000	.774	.000	.773
	N	459	442	448	457	452
Years as Faculty Member	Pearson Correlation	.675**	1.000	.091	-.209**	.139**
	Sig. (2-tailed)	.000	.	.054	.000	.003
	N	442	452	445	452	440
Hours Per Week on Research	Pearson Correlation	.014	.091	1.000	.009	.506**
	Sig. (2-tailed)	.774	.054	.	.846	.000
	N	448	445	458	458	446
Gender	Pearson Correlation	-.242**	-.209**	.009	1.000	-.089
	Sig. (2-tailed)	.000	.000	.846	.	.058
	N	457	452	458	468	454
Proposals/Papers Accepted for Conference Presentations	Pearson Correlation	.014	.139**	.506**	-.089	1.000
	Sig. (2-tailed)	.773	.003	.000	.058	.
	N	452	440	446	454	456

**. Correlation is significant at the 0.01 level (2-tailed).

Correlations

		Age	Years as Faculty Member	Hours Per Week on Research	Gender	National Government Grant Proposals Funded
Age	Pearson Correlation	1.000	.675**	.014	-.242**	.093*
	Sig. (2-tailed)	.	.000	.774	.000	.048
	N	459	442	448	457	451
Years as Faculty Member	Pearson Correlation	.675**	1.000	.091	-.209**	.243**
	Sig. (2-tailed)	.000	.	.054	.000	.000
	N	442	452	445	452	439
Hours Per Week on Research	Pearson Correlation	.014	.091	1.000	.009	.463**
	Sig. (2-tailed)	.774	.054	.	.846	.000
	N	448	445	458	458	445
Gender	Pearson Correlation	-.242**	-.209**	.009	1.000	-.041
	Sig. (2-tailed)	.000	.000	.846	.	.389
	N	457	452	458	468	453
National Government Grant Proposals Funded	Pearson Correlation	.093*	.243**	.463**	-.041	1.000
	Sig. (2-tailed)	.048	.000	.000	.389	.
	N	451	439	445	453	455

**. Correlation is significant at the 0.01 level (2-tailed).

*. Correlation is significant at the 0.05 level (2-tailed).

Correlations

		Age	Years as Faculty Member	Hours Per Week on Research	Gender	National Private Grant Proposals Funded
Age	Pearson Correlation	1.000	.675**	.014	-.242**	.031
	Sig. (2-tailed)	.	.000	.774	.000	.514
	N	459	442	448	457	447
Years as Faculty Member	Pearson Correlation	.675**	1.000	.091	-.209**	.111*
	Sig. (2-tailed)	.000	.	.054	.000	.020
	N	442	452	445	452	435
Hours Per Week on Research	Pearson Correlation	.014	.091	1.000	.009	.412**
	Sig. (2-tailed)	.774	.054	.	.846	.000
	N	448	445	458	458	441
Gender	Pearson Correlation	-.242**	-.209**	.009	1.000	-.057
	Sig. (2-tailed)	.000	.000	.846	.	.232
	N	457	452	458	468	449
National Private Grant Proposals Funded	Pearson Correlation	.031	.111*	.412**	-.057	1.000
	Sig. (2-tailed)	.514	.020	.000	.232	.
	N	447	435	441	449	451

**. Correlation is significant at the 0.01 level (2-tailed).

*. Correlation is significant at the 0.05 level (2-tailed).

Correlations

		Advanced Degrees/MD	Advanced Degrees/Ph.D./Ed.D	tenure track (d40 recoded)	Manuscripts Accepted for Publication	Proposals/Papers Accepted for Conference Presentations
Advanced Degrees/MD	Pearson Correlation	1.000	-.071	.113*	.108*	.055
	Sig. (2-tailed)	.	.127	.016	.022	.238
	N	463	463	455	454	455
Advanced Degrees/Ph.D./Ed.D	Pearson Correlation	-.071	1.000	.102*	.096*	.112*
	Sig. (2-tailed)	.127	.	.030	.041	.016
	N	463	463	455	454	455
tenure track (d40 recoded)	Pearson Correlation	.113*	.102*	1.000	.422**	.359**
	Sig. (2-tailed)	.016	.030	.	.000	.000
	N	455	455	462	448	449
Manuscripts Accepted for Publication	Pearson Correlation	.108*	.096*	.422**	1.000	.654**
	Sig. (2-tailed)	.022	.041	.000	.	.000
	N	454	454	448	455	455
Proposals/Papers Accepted for Conference Presentations	Pearson Correlation	.055	.112*	.359**	.654**	1.000
	Sig. (2-tailed)	.238	.016	.000	.000	.
	N	455	455	449	455	456

*. Correlation is significant at the 0.05 level (2-tailed).

**. Correlation is significant at the 0.01 level (2-tailed).

Correlations

		Advanced Degrees/MD	Advanced Degrees/Ph.D./Ed.D	tenure track (d40 recoded)	National Government Grant Proposals Funded	National Private Grant Proposals Funded
Advanced Degrees/MD	Pearson Correlation	1.000	-.071	.113*	.122**	.097*
	Sig. (2-tailed)	.	.127	.016	.009	.040
	N	463	463	455	454	450
Advanced Degrees/Ph.D./Ed.D	Pearson Correlation	-.071	1.000	.102*	.082	.073
	Sig. (2-tailed)	.127	.	.030	.082	.124
	N	463	463	455	454	450
tenure track (d40 recoded)	Pearson Correlation	.113*	.102*	1.000	.306**	.305**
	Sig. (2-tailed)	.016	.030	.	.000	.000
	N	455	455	462	448	444
National Government Grant Proposals Funded	Pearson Correlation	.122**	.082	.306**	1.000	.360**
	Sig. (2-tailed)	.009	.082	.000	.	.000
	N	454	454	448	455	450
National Private Grant Proposals Funded	Pearson Correlation	.097*	.073	.305**	.360**	1.000
	Sig. (2-tailed)	.040	.124	.000	.000	.
	N	450	450	444	450	451

*. Correlation is significant at the 0.05 level (2-tailed).

**. Correlation is significant at the 0.01 level (2-tailed).

REFERENCES

REFERENCES

Aday, L. A. (1989). *Designing and conducting health surveys: a comprehensive guide* (1st ed.). San Francisco: Jossey-Bass Publishers.

Alasuutari, P. (1995). *Researching Culture: Qualitative methods and cultural studies.* Thousand Oaks, CA.: Sage Publications.

Alguire, P. C., Anderson, W. A., Albrecht, R. R., & Poland, G. A. (1996). Resident research in internal medicine training programs. *Annuals of Internal Medicine, 124*(3), 321-328.

Allison, P. D., & Stewart, J. A. (1974). Productivity differences among scientists: evidence for accumulative advantage. *American Sociological Review, 39*, 596-606.

Anderson, W. A., Stritter, F. T., Mygdal, W. K., Arndt, J. E., & Reid, A. (1997). Outcomes of three part-time faculty development fellowship programs. *Family Medicine, 29*(3), 204-208.

Applegate, W. B., & Williams, M. E. (1990). Career development in academic medicine. *American Journal of Medicine, 88*(3), 263-267.

Aren, L., & Ben-David, J. (1968). Socialization and career patterns as determinants of productivity of medical researchers. *Journal of Health Social Behavior, 9*(1), 3-15.

The Association of American Medical Colleges. (1999). Faculty Roster .Washington, D.C.

The Association of Departments of Family Medicine Task Force on Clinical Practice in US Family Medicine Departments in Academic Medical Centers. Clinical practice in academic medical center departments of family medicine. (1997). *Family Medicine, 29*(1), 15-20.

Austin, A. E. (1990a). Faculty cultures, faculty values. In W. G. Tierney (Ed.), *Assessing academic climates and cultures* (pp. 61-74). San Francisco, CA.: Jossey-Bass, Publishers.

Austin, A. E. (1990b). Tension, stress, and the tapestry of faculty lives. *Academe*(January-February 1990), 38-42.

Austin, A. E. (1992). Faculty cultures. In A. I. Morey (Ed.), *Encyclopedia of Higher Education* (pp. 1614-1622). Oxford, NY.: Pergamon Press.

Austin, A. E. (1994). *Understanding and Assessing Faculty Cultures and Climates.* Unpublished Manuscript.

Austin, A. E., & Gamson, Z. F. (1983). *Academic workplace: new demands, heightened tensions* (Vol. 10). Washington, D.C.: Association for the Study of Higher Education.

Babbie, E. (1990). *Survey research methods* (2nd ed.). Belmont, CA: Wadsworth Publishing Company.

Baldwin, C. D., Levine, H. G., & McCormick, D. P. (1995). Meeting the faculty development needs of generalist physicians in academia. *Academic Medicine, 70*(1 Supplement), S97-103.

Bean, J. (1982). *A causal model of faculty research productivity.* Paper presented at the annual meeting of the American Education Research Association, New York, NY.

Becher, T. (1987). The disciplinary shaping of the profession, *The Academic Profession* (pp. 271-303). Berkeley, CA.: University of California Press.

Behmeyer, C. E. (1974). Institutional and personal correlates of faculty productivity. Unpublished doctoral dissertation, The University of Michigan, Ann Arbor, MI.

Behmeyer, C. E., & Blackburn, R. T. (1975). *Environmental and personal attributes related to faculty productivity.* Ann Arbor, MI.: Center for the Study of Higher Education, The University of Michigan. (ERIC Document Reproduction Service No. ED 104317)

Bentley, R., & Blackburn, R. (1990). Changes in academic research performance over time: a study of institutional accumulative advantage. *Research in Higher Education, 31*(4), 327-353.

Bess, J. L. (1978). Anticipatory socialization of graduate students. *Research in Higher Education, 8*(4), 289-317.

Bickel, J. (1991). The changing faces of promotion and tenure at U.S. medical dchools. *Academic Medicine, 66*(5), 249-256.

Biglan, A. (1973). The characteristics of subject matter in different academic areas. *Journal of Applied Psychology, 57*(3), 195-203.

Blackburn, R. T., Behmeyer, C. E., & Hall, D. E. (1978). Research note: Correlates of faculty publications. *Sociology of Education, 51*(April), 132-141.

Blackburn, R. T., & Bentley, R. J. (1993). Faculty research productivity: Some moderators of associated stressors. *Research in Higher Education, 34*(6), 725-745.

Blackburn, R. T., & Fox, T. G. (1976). The socialization of medical school faculty. *Journal of Medical Education, 51*(10), 806-817.

Blackburn, R. T., & Fox, T. G. (1983). Physicians' values and their career stages. *Journal of Vocational Behavior, 22*, 159-173.

Blackburn, R. T., & Lawrence, J. H. (1995). *Faculty at Work: Motivation, Expectation, Satisfaction.* Baltimore, MD.: The Johns Hopkins University Press.

Blackburn, R. T., Wenzel, S., & Bieber, J. P. (1994). Minority vs. majority faculty publication performance: A research note. *The Review of Higher Education, 17*, 271-282.

Bland, C.J., & Ruffin, M. (1992). Characteristics of a productive research environment: Literature review. *Academic Medicine, 67*(June), 385-397.

Bland, C. J., Hitchcock, M. A., Anderson, W. A., & Stritter, F. T. (1986). A review of family medicine faculty development fellowship programs, their alumni and recommendations for future programs. *Proceedings of the Annual Conference on Research in Medical Education, 25*, 157-162.

Bland, C. J., Hitchcock, M. A., Anderson, W. A., & Stritter, F. T. (1987). Faculty development fellowship programs in family medicine. *Journal of Medical Education, 62*(8), 632-641.

Bland, C. J., & Schmitz, C. C. (1986). Characteristics of the successful researcher and implications for faculty development. *Journal of Medical Education, 61*(1), 22-31.

Bland, C. J., Schmitz, C. C., Stritter, F. T., Henry, R. C., & Aluise, J. J. (1990). *Successful faculty in academic medicine: Essential skills and how to acquire them.* New York: Springer Publishing Company.

Bland, C. J., Simpson, D. E., Hekelman, F. P., & Stritter, F. T. (1997). Introducing the dedicated issue on faculty development. *Family Medicine, 29*(4), 231-232.

Bland, C. J., & Stritter, F. T. (1988). Characteristics of effective family medicine faculty development programs. *Family Medicine, 20*(4), 282-288.

Blau, P. M. (1973). *The Organization of Academic Work.* New Brunswick, NJ.: Transaction Publishers.

Block, S. D., Clark-Chiarelli, N., Peters, A. S., & Singer, J. D. (1996). Academia's chilly climate for primary care. *JAMA, 276*(9), 677-682.

Blondell, R. D., Norris, T. E., & Coombs, J. B. (1992). Rural health and family medicine. *Family Medicine, 45*(6), 2507-2510.

Bowen, H. R., & Schuster, J. H. (1986). *American professors: A national resource imperiled.* New York: Oxford University Press.

Boyer, E. L. (1990). *Scholarship reconsidered: priorities of the professoriate.* Princeton, NJ: The Carneige Foundation for the Advancement of Teaching.

Braskamp, L. A., & Ory, J. C. (1994). *Assessing faculty work: Enhancing individual and institutional performance.* San Francisco: Jossey-Bass Publishers.

Braxton, J. M. (1983). Departmental colleagues and individual faculty publication activity. *The Review of Higher Education, 6*(2), 115-128.

Braxton, J. M., & Bayer, A. E. (1986). Assessing faculty scholarly performance. In J. W. Creswell (Ed.), *Measuring faculty research performance* (Vol. 50, pp. 25-42). San Francisco: Jossey-Bass Publishers.

Burke, D. L. (1992). *Physicians in the academic marketplace.* New York: Greenwood Press.

Burke, W., Baron, R. B., Lemon, M., Losh, D., & Novack, A. (1994). Training generalist physicians: structural elements of the curriculum. *Journal of General Internal Medicine, 9*(4 Supplement 1), S23-30.

Calligaro, I. L. S., & Others, A. (1991). Pharmacy research in academic institutions. *American Journal of Pharmaceutical Education, 55*(1), 40-44.

Campos Outcalt, D., & Midtling, J. E. (1993). Family medicine role models at US medical schools. Why their relative numbers are declining. *Archives of Family Medicine, 2*(8), 827-832.

Cassell, E. J. (1997). *Doctoring: The nature of primary care medicine.* New York: Oxford University Press.

Centra, J. A. (1981). Research productivity and teaching effectiveness. (ERIC Document Reproduction Service No. ED215637).

Chaffee, E. E., & Tierney, W. G. (1988). *Collegiate culture and leadership strategies.* New York: American Council on Education and Macmillian Publishing Company.

Clark, B. R. (1983). *The higher education system: academic organization in cCross-national perspective*. Berkeley, CA: University of California Press.

Clark, B. R. (1987). *The academic profession*. Berkeley, CA.: University of California Press.

Clemente, F. (1973). Early career determinants of research productivity. *American Journal of Sociology, 79*(2), 409-419.

Cole, J. R., & Singer, B. (1991). A theory of limited differences: Explaining the productivity puzzle in science. In H. Zuckerman & J. R. Cole & J. T. Bruer (Eds.), *The outer circle: Women in the scientific community* (pp. 277-310). New York: Norton.

Collins, B. (1993). A review and integration of knowledge about faculty research productivity. *Journal of Professional Nursing, 9*(May-Jun), 159-168.

Colwill, J. M. (1986). Academic departments of family medicine: A retrospective and a prospective view. *Family Medicine, 18*(6), 384-388.

Colwill, J. M. (1987). Family medicine in the medical school. In W. J. Doherty & C. E. Christianson & M. B. Sussman (Eds.), *Family medicine: The maturing of a discipline* (pp. 71-85). New York: Haworth Press.

Crane, D. (1965). Scientists at major and minor universities: A study of productivity and recognition. *American Sociological Review, 30*, 699-714.

Creamer, E. G. (1998). *Assessing faculty publication productivity: Issues of equity* (Vol. 26). Washington, D.C.: The George Washington University, Graduate School of Education and Human Development.

Creswell, J. W. (1985). *Faculty research performance: Lessons from the sciences and the social sciences. ASHE-ERIC Higher Education Report No. 4, 1985.*

Creswell, J. W. (1990a). Conceptual explanations of research performance. In M. J. Finklestein (Ed.), *The ASHE Reader on Faculty and Faculty Issues* (2nd ed., pp. 240-248). Needham Heights, MA.: Ginn Press.

Creswell, J. W. (1990b). Correlates of research performance. In M. J. Finklestein (Ed.), *The ASHE Reader on Faculty and Faculty Issues* (2nd ed., pp. 249-262). Needham Heights, MA.: Ginn Press.

Creswell, J. W. (1994). *Research design: Qualitative and quantitative approaches*. Thousand Oaks, CA: Sage Publications.

Culpepper, L. (1991). Family medicine research: major needs. *Family Medicine, 23*(1), 10-14.

Culpepper, L. (1993). Family medicine research: need for capacity-building. *Rhode Island Medicine, 76*(6), 303-308.

Culpepper, L., & Becker, L. A. (1987). Family medicine research: two decades of developing its base. In W. J. Doherty & C. E. Christianson & M. B. Sussman (Eds.), *Family Medicine: The maturing of a discipline* (pp. 129-157). New York: Haworth Press.

Culpepper, L., & Franks, P. (1983). Family medicine research. Status at the end of the first decade. *JAMA, 249*(1), 63-68.

DeHaven, M. J., Wilson, G. R., & Murphree, D. D. (1994). Developing a research program in a community-based department of family medicine: One department's experience. *Family Medicine, 26*(5), 303-308.

Diamond, R. M. (1993). Changing priorities and the faculty reward system. In R. M. Diamond & B. E. Adam (Eds.), *Recognizing faculty work: reward systems for the year 2000* (Vol. 81, pp. 5-12). San Francisco: Jossey Bass Publishers.

Dill, D. D. (1986). Research as a scholarly activity: context and culture. In J. W. Creswell (Ed.), *New Directions for Institutional Research* (Vol. 13, pp. 7-23). San Francisco: Jossey-Bass Publishers.

Dillman, D. A. (1978). *Mail and telephone surveys: The total design method.* New York: John Wiley & Sons.

Doherty, W. J., Christianson, C. E., & Sussman, M. B. (1987). Introduction. In W. J. Doherty & C. E. Christianson & M. B. Sussman (Eds.), *Family medicine: The maturing of a discipline* (pp. xi-xvi). New York: Haworth Press.

Ellwein, L., Khachab, M., & Waldman, R. (1989). Assessing research productivity: evaluating journal publication across academic departments. *Academic Medicine, 64*(Jun), 319-325.

Fairweather, J. S. (1996). Academic values and faculty rewards. In D. E. Finnegan & D. Webster & Z. F. Gamson (Eds.), *Faculty and faculty issues in colleges and universities* (2nd ed., pp. 361-378). Needham Heights, MA.: Simon and Schuster Custom Publishing.

Fairweather, J. S. (1996). *Faculty work and public trust: Restoring the value of teaching and public service in american academic life.* Boston: Allyn and Bacon.

Fairweather, J. S., & Rhoads, R. A. (1995). Teaching and the faculty role: enhancing the commitment to instruction in American colleges and Universities. *Educational Evaluation and Policy Analysis, 17*(2), 179-194.

Fink, A. (1995). *The survey kit*. Thousand Oaks, CA: Sage Publications.

Finkelstein, M. J. (1982). *Faculty colleagueship patterns and research productivity.* Paper presented at the annual meeting of the American Educational Research Association, New York, NY.

Finkelstein, M. J. (1984). *The american academic profession: A synthesis of social scientific inquiry since world war II.* Columbus, OH.: The Ohio State University Press.

Finkelstein, M. J., Seal, R. K., & Schuster, J. H. (1998). *The new academic generation: A profession in transformation.* Baltimore: Johns Hopkins University Press.

Flanigan, K., Ballinger, P., Grant, H., Bennett, D., Schiller, M., Waller, K., Jordan, L., Gierhart, J., Brodnik, M., Van, S. L., & et, al. (1988). Research productivity profile of allied health faculty. *Journal of Allied Health, 17*(May), 87-100.

Fox, M. F. (1983). Publication productivity among scientists. *Social Studies of Science, 13*(2), 285-305.

Fox, M. F. (1996). Publication, performance, and reward in science and scholarship. In D. E. Finnegan & D. Webster & Z. F. Gamson (Eds.), *Faculty and faculty issues in colleges and universities* (2nd ed., pp. 408-428). Needham Heights, MA.: Simon and Schuster Custom Publishing.

Freeman, J., Loewe, R., & Benson, J. (1998). Training family medicine faculty to teach in underserved settings. *Family Medicine, 30*(3), 168-172.

Friedman, R. H., Alpert, J. J., & Green, L. A. (1994). Strengthening academic generalist departments and divisions. *Journal of General Internal Medicine, 9*(4 Supplement 1), S90-98.

Fry, J., & Gambrill, E. (1978). Introduction. In J. Fry (Ed.), *Scientific foundations of family medicine*. Chicago: William Heinemann Medical Books.

Fulton, O., & Trow, M. (1974). Research activity in American higher education. *Sociology of Education, 47*(Winter), 29-73.

Gaff, J. G., & Wilson, R. C. (1971). Faculty cultures and interdisciplinary studies. *Journal of Higher Education, 42*(3), 186-201.

Garr, D. R. (1986). Characteristics and job satisfaction of family physicians in full-time teaching. *Family Medicine, 18*(5), 269-273.

Geiger, R. L. (1986). *To advance knowledge: the growth of American research universities*. New York: Oxford University Press.

Geiger, R. L. (1993). *Research and relevant knowledge: American research universities since World War II*. New York: Oxford University Press.

Geyman, J. P. (1971). Family medicine as an academic discipline. *Journal of Medical Education, 46*(10), 815-820.

Geyman, J. P. (1977). On entry into phase two in family practice development. *Journal of Family Practice, 4*(1), 15.

Geyman, J. P. (1978a). Climate for research in family practice. *Journal of Family Practice, 7*(1), 69-74.

Geyman, J. P. (1978b). Family practice in evolution: progress, problems and projections. *New England Journal of Medicine, 298*(11), 593-601.

Geyman, J. P. (1978c). On the developing research base in family practice. *Journal of Family Practice, 7*(1), 51-52.

Gjerde, C. (1994). Faculty promotion and publication rates in family medicine: 1981 versus 1989. *Family Medicine, 26*(6), 361-365.

Gjerde, C., Clements, W., & Clements, B. (1982). Publication characteristics of family practice faculty nominated for academic promotion. *Journal of Family Practice, 15*(4), 663-666.

Glassick, C. E., Huber, M. T., & Maeroff, G. I. (1997). *Scholarship assessed: Evaluation of the professoriate*. San Francisco: Jossey-Bass Publishers.

Glueck, W. F., & Jauch, L. (1975). Sources of research ideas among productive scholars. *Journal of Higher Education, 46*(January/February), 103-114.

Gottlieb, B. C. (1968). Processes of socialization in american graduate schools. In R. M. Pavalko (Ed.), *Sociology of Education: A book of readings* (pp. 258-270). Itasca, IL.: F.E. Peacock Publishers, Inc.

Hankey, T. L. (1987). The need for a paradigm to guide family practice research. *Family Practice Research Journal, 6*(4), 168-174.

Harrington, M., & Levine, D. (1986). Relationship between faculty characteristics and research productivity. *Journal of Dental Education, 50*(Sep), 518-525.

Hekelman, F. P., Zyzanski, S. J., & Flocke, S. A. (1995). Successful and less-successful research performance of junior faculty. *Research in Higher Education, 36*(2), 235-255.

Henry, R. (1997). Developing research skills for medical school faculty. *Family Medicine, 29*(4), 258-261.

Hillman, B. J., Fajardo, L. L., Witzke, D. B., Irion, M., Cardenas, D., & Fulginiti, J. V. (1989). Factors influencing the success of academic radiologists in publishing research. *Investigative Radiology, 24*(11), 849-854.

Hilton, C., Fisher, W., Lopez, A., & Sanders, C. (1997). A relative-value-based system for calculating faculty productivity in teaching, research, administration, and patient care. *Academic Medicine, 72*(9), 787-793.

Hitchcock, M. A., Anderson, W. A., Stritter, F. T., & Bland, C. J. (1988). Profiles of family practice faculty development fellowship graduates 1978-1985. *Family Medicine, 20*(1), 33-38.

Hitchcock, M. A., Bland, C. J., Hekelman, F. P., & Blumenthal, M. G. (1995). Professional networks: The influence of colleagues on the academic success of faculty. *Academic Medicine, 70*(12), 1108-1116.

Hitchcock, M. A., & Buck, E. L. (1990). Research roles for family physicians. *Family Medicine, 22*(3), 191-195.

Hitchcock, M. A., Lamkin, B. D., Mygdal, W. K., Clarke, C. M., & Clarke, S. O. (1986). Affective changes in faculty development fellows in family medicine. *Journal of Medical Education, 61*(5), 394-403.

Hitchcock, M. A., Stritter, F. T., & Bland, C. J. (1993). Faculty development in the health professions: conclusions and recommendations. *Medical Teacher, 14*(4), 295-309.

Holloway, R. L., Marbella, A. M., Townsend, J. M., Tudor, J. M., Tollison, J. W., Saultz, J. W., & Sherwood, R. A. (1995). Defining the need for faculty in family medicine: results of a national survey. *Family Medicine, 27*(2), 98-102.

Holloway, R. L., Wilkerson, L., & Hejduk, G. (1997). Our back pages: faculty development and the evolution of family medicine. *Family Medicine, 29*(4), 233-236.

Hosokawa, M., & Zweig, S. (1990). Future directions in family medicine: results of a Delphi study. *Family Medicine, 22*(6), 429-433.

Hueston, W. J. (1993a). A comparison of university and community-based family practice physician educators. *Family Medicine, 25*(9), 576-579.

Hueston, W. J. (1993b). Factors associated with research efforts of academic family physicians. *Journal of Family Practice, 37*(1), 44-48.

Inui, T. S., Williams, W. T., Jr., Goode, L., Anderson, R. J., Bhak, K. N., Forsyth, J. D., Hutton, J. J., Wallace, A. G., & Daugherty, R. M., Jr. (1998). Sustaining the development of primary care in academic medicine. Working group on sustaining the development of academic primary care. *Academic Medicine, 73*(3), 245-257.

Jackson, M., & MacInnes, I. (1984). Promotion and tenure in family practice in US medical schools. *Journal of Family Practice, 18*(3), 435-439.

Jencks, C. (1977). *The academic revolution.* Chicago: The University of Chicago Press.

Jungnickel, P. W., & Creswell, J. W. (1994). Workplace correlates and scholarly performance of clinical pharmacy faculty. *Research in Higher Education, 35*(2), 167-194.

Kassebaum, D. G., & Szenas, P. L. (1993). Rural sources of medical students, and graduates' choice of rural practice. *Academic Medicine, 68*(3), 232-236.

Kasten, K. L. (1984). Tenure and merit pay as rewards for research, teaching, and service at a research university. *Journal of Higher Education, 55*, 500-514.

Katerndahl, D. A. (1994). Factors chosen by department chairs as important to family medicine. *Family Practice Research Journal, 14*(2), 177-181.

Knorr, K., Mittermeir, R., Aicholzer, G., & Waller, G. (1979). Individual publication productivity as a social position effect in academic and industrial research units. In F. M. Edwards (Ed.), *Scientific Productivity: The Effectiveness of Research Groups in Six Countries* (pp. 55-94). Cambridge: Cambridge University Press.

Kraemer, L., & Lyons, K. (1989). Research productivity of allied health faculty in academic health centers. *Journal of Allied Health, 18*(Summer), 349-359.

Krahenbuhl, G. S. (1998). Integrating responsibilities and institutional needs. *Change*, 18-25.

Kuh, G. G., & Whitt, E. J. (1988). *The invisible tapestry: Culture in American colleges and universities. ASHE-ERIC Higher Education Reports.* (Vol. 1). Washington, D.C.: Association for the Study of Higher Education.

Ladd, E. C., Jr. (1979). The work experience of American college professors: Some data and an argument, *Faculty Career Development* (Vol. 2, pp. 1-4). Washington, D.C.: American Association for Higher Education.

Lawrence, J. H., & Blackburn, R. T. (1988). Age as a predictor of faculty productivity: Three conceptual approaches. *Journal of Higher Education, 59*(1), 22-38.

Liddle, B., Westergren, A., & Duke, D. (1997). Time allocation and research productivity among counseling faculty. *Psychological Reports, 80*(Feb), 339-344.

Long, J. S. (1990). The origins of sex differences in science. *Social Forces, 68*, 1297-1315.

Long, J. S., & McGinnis, R. (1981). Organizational context and scientific productivity. *American Sociological Review, 46*, 422-442.

Mavis, B. E., & Brocato, J. J. (1998). Virtual discourse: The emergence of DR-ED as a computer-mediated scholarly communications network for medical educators. *The Journal of Educational Computing Research, 19*(1), 53-65.

McGaghie, W. C., Bogdewic, S., Reid, A., Arndt, J. E., Stritter, F. T., & Frey, J. J. (1990). Outcomes of a faculty development fellowship in family medicine. *Family Medicine, 22*(3), 196-200.

McGee, G. W., & Ford, R. C. (1987). Faculty research productivity and intention to change positions. *Review of Higher Education, 11*(1), 1-16.

Megel, M. E. (1985). New faculty in nursing: Socialization and the role of the mentor. *Journal of Nursing Education, 24*(7), 303-306.

Merenstein, J. H., & Schulte, J. J. (1990). A residency curriculum for the future. The STFM Task Force on Residency Curriculum for the Future. *Family Medicine, 22*(6), 467-473.

Merton, R. (1968). *Social theory and social structure* (2nd ed.). Glencoe, IL.: The Free Press.

Merton, R. (1973). *The sociology of science*. Chicago: The University of Chicago Press.

Merton, R. K., Reader, G. G., Kendall, P. L., & (eds.). (1957). *The student-physician: Introductory studies in the sociology of medical education*. Cambridge, MA.: Harvard University Press.

Middaugh, M. F. (2001). *Understanding faculty productivity: standards and benchmarks for colleges and universities*. San Francisco: Jossey-Bass Publishers.

Morzinski, J. A., Diehr, S., Bower, D. J., & Simpson, D. E. (1996). A descriptive, cross-sectional study of formal mentoring for faculty. *Family Medicine, 28*(6), 434-438.

Nettles, M. T., & Perna, L. W. (1995). *Sex and race differences in faculty salaries, tenure, rank and productivity: Why, on average, do women, African Americans, and Hispanics have lower salaries, tenure, and rank?* Paper Presented at the annual meeting of the Association for the Study of Higher Education.

Neumann, Y. (1979). Research productivity of tenured and non-tenured faculty in U.S. Universities: A comparative study of four fields and policy implications. *Journal of Educational Administration.*

Nutting, P. A. (1996). Practice-based research networks: building the infrastructure of primary care research. *Journal of Family Practice, 42*(2), 199-203.

Oeffinger, K. C., Roaten, S. P., Jr., Ader, D. N., & Buchanan, R. J. (1997). Support and rewards for scholarly activity in family medicine: a national survey. *Family Medicine, 29*(7), 508-512.

Parkerson, G. R., & et al. (1982). Meeting the challenge of research in family medicine: report of the study group on family medicine research. *Journal of Family Practice, 14*(1), 105-113.

Pellegrino, E. D. (1987). Family practice facing the twenty-first century: Reflections of an outsider. In W. J. Doherty & C. E. Christianson & M. B. Sussman (Eds.), *Family medicine: The maturing of a discipline* (pp. 23-47). New York: Haworth Press.

Pelz, D. C., & Andrews, F. M. (1966). *Scientists in organizations: Productive climates for research and development.* Ann Arbor, MI: Institute for Social Research, The University of Michigan.

Peterson, M. W., Cameron, K. S., Mets, L. A., Jones, P. a., & Ettington, D. (1986). *The organizational context for teaching and learning: A review of the research literature.* Ann Arbor, MI: National Center for Research to Improve Postsecondary Teaching and Learning.

Peterson, M. W., & Spencer, M. G. (1990). Understanding academic culture and climate. In W. G. Tierney (Ed.), Assessing academic climates and cultures , 68 (Winter 1990), (pp. 3-18). San Francisco: Jossey-Bass, Publishers.

Phillips, T. (1978). Research considerations for the family physician. *Journal of Family Practice, 7*(Jul), 121-128.

Print, M., & Hattie, J. (1997). Measuring quality in universities: An approach to weighting research productivity. *Higher Education, 33*(4), 453-469.

Rebne, D. (1989). The social action perspective: attachments to workload and productivity in the research function. *Educational Administration Quarterly, 25*(1), 37-57.

Reskin, B. (1977). Scientific productivity and the reward structure of science. *American Sociological Review, 42*, 491-504.

Reynolds, P. P., Giardino, A., Onady, G. M., & Siegler, E. L. (1994). Collaboration in the preparation of the generalist physician. *Journal of General Internal Medicine, 9*(4 Supplement1), S55-63.

Rodnick, J. E. (1987). Research in family medicine: counterculture continued. *Family Medicine, 19*(4), 251-307.

Rogers, J. (1995). Family medicine research: a matter of values and vision. *Family Medicine, 26*(3), 180-181.

Rogers, J. C., Holloway, R. L., & Miller, S. M. (1990). Academic mentoring and family medicine's research productivity. *Family Medicine, 22*(3), 186-190.

Schatz, I. J., Realini, J. P., & Charney, E. (1996). Family practice, internal medicine, and pediatrics as partners in the education of generalists. *Academic Medicine, 71*(1), 35-39.

Schein, E. H. (1992). *Organizational culture and leadership* (Second ed.). San Francisco: Jossey-Bass, Publishers.

Scherger, J. E. (1997). Phase three of academic family medicine. *Family Medicine, 29*(6), 439-440.

Schneid, D. C., Hamm, R. M., & Crawford, S. A. (2000). Measuring academic production--Caveat inventor. *Academic Medicine, 75*(10), 993-995.

Sheets, K., & Schwenk, T. (1990). Faculty development for family medicine educators: An agenda for future activities. *Teaching and Learning in Medicine, 2*(3), 141-148.

Snow, C. P. (1959). *The two cultures and the scientific revolution.* Cambridge: Cambridge University Press.

Stange, K. C., & Hekelman, F. P. (1990). Mentoring needs and family medicine faculty. *Family Medicine, 22*(3), 183-185.

Stange, K. C., Miller, W. L., & McWhinney, I. (2000, July 27, 2000). *Developing the knowledge base of family practice.* Paper presented at the Keystone II Conference, Denver, Colorado.

Stephens, G. G. (1979). Family medicine as counterculture. *Family Medicine Teacher 1979, 16*(5), 14-18.

Stephens, G. G. (1982). *The intellectual basis of family practice.* Tucson, AZ.: Winter Publishing Company.

Stephens, G. G. (1987). Developmental assessment of family practice: An insider's view. In W. J. Doherty & C. E. Christianson & M. B. Sussman (Eds.), *Family Medicine: The maturing of a discipline* (pp. 1-15). New York: Haworth Press.

Stephens, G. G. (1990). *Family practice in the 1980's: A second decade of essays.* Kansas City, MO.: Society of Teachers of Family Medicine.

Swee, D. E., Winter, R. O., & Hammond, B. L. (1989). Testing a model of academic career development. *Family Medicine, 21*(5), 350-354.

Sweeney, R., & Jones, J. G. (1993). The case for family practice and primary care research at the NIH. *American Family Physician, 47*(1), 37-39.

Taylor, R. B., Colwill, J. M., Puffer, J. C., Heffron, W. A., Marsland, D. W., Rakel, R. E., & Geyman, J. P. (1991). Success strategies for departments of family medicine. *Journal of the American Board of Family Practice, 4*(6), 427-436.

Thompson, R., Haber, D., Chambers, C., Fanuiel, L., Krohn, K., & Smith, A. J. (1998). Orientation to community in a family practice residency program. *Family Medicine, 30*(1), 24-28.

Tierney, W. G., & Rhoads, R. A. (1993). *Enhancing promotion, tenure and beyond: Faculty socialization as a cultural process* (Vol. 6). Washington, D.C.: The George Washington University/School of Education and Human Development.

Van Maanen, J. (1976). Breaking in: Socialization to work. In R. Dubin (Ed.), *Handbook of Work, Organization, and Society.* Chicago: Rand McNally.

Vardan, S., Smulyan, H., Mookherjee, S., & Mehrotra, K. G. (1990). Factors encouraging research productivity in a division of general internal medicine. *Academic Medicine, 65*(12), 772-774.

Wagner, R. (1981). *The invention of culture.* Chicago: The University of Chicago Press.

Wanner, R. A., Lewis, L. S., & Gregorio, D. I. (1981). Research productivity in academia: a comparative study of the sciences, social sciences, and humanities. *Sociology of Education, 54*(238-53).

Weidman, J. C., & Stein, E. L. (1990). The professional socialization of graduate students in educational administration (ERIC Document Reproduction Service No.ED 326 945).

Wilson, L. (1942). *The academic man.* New York: Oxford University Press.

Woods, S. E., Reid, A., Arndt, J. E., Curtis, P., & Stritter, F. T. (1997). Collegial networking and faculty vitality. *Family Medicine, 29*(1), 45-49.

Xu, G., Veloski, J., Hojat, M., Rabinowitz, H. K., & Rattner, S. L. (1997). Factors influencing primary care physicians' choice to practice in medically underserved areas. *Academic Medicine, 72*(10 October Supplement 1), S109-111.

Zyzanski, S. J., Williams, R. L., Flocke, S. A., Acheson, L. S., & Kelly, R. B. (1996). Academic achievement of successful candidates for tenure and promotion to associate professor. *Family Medicine, 28*(5), 358-363.